Karm Diemert

this 45 the only copy

DRAFT 2 - APRIL 1998

AQUATIC RESOURCE BASELINE STUDIES TELKWA COAL PROJECT

1997

prepared by

DAVID BUSTARD AND ASSOCIATES LTD. LIMNOTEK RESEARCH AND DEVELOPMENT INC.

for

MANALTA COAL LTD.

April 1998

SUMMARY

Aquatic studies were conducted in the vicinity of the Telkwa Coal Project during 1997. These studies included updating baseline information describing the periphyton and benthic communities in Goathorn and Tenas creeks (Section 1), as well as studies of fish populations in the project area (Section 2). The studies improved the baseline data in specific areas so that it is relevant to the revised mine plans.

SECTION 1 - PERIPHYTON AND BENTHIC INVERTEBRATE STUDIES

Periphyton (mainly algae that grows on stream substrata) accumulation rates and community structure were examined at four locations including two control sites in upper Goathorn and Tenas creeks during the early fall of 1997. Benthic invertebrate monitoring was conducted at these same four sites. Monitoring was completed using the same methods that were used for earlier sample collections in 1983 and 1984 to allow time series comparisons. Water quality data from 1997 were provided by Agra Earth and Environmental Ltd.

Goathorn and Tenas creeks were found to be pristine headwater streams having low to moderate productivity. Stream periphyton were mainly diatoms characteristic of undisturbed mountain streams. Common species were Hannaea arcus, Achnanthes minutissima, Fragilaria sp., Gomphonema olivaceum, and Synedra ulna. Benthic invertebrates were larval stages of mainly three insect orders including mayflies, stoneflies and chironomids. All of the periphyton and invertebrate taxa are common in cool mountain streams that have high water quality.

Nitrogen and phosphorus concentrations were low at all stations, and they were in a range where a combination of both nutrients may limit production of periphyton which forms the basis of the stream food web. Alkalinity was almost twice as high in Tenas Creek compared to Goathorn Creek. As a result of this difference, Tenas Creek may be able to sustain more acid loading from any source than Goathorn Creek before changes to biological communities are apparent.

Periphyton biomass was higher at upstream stations compared to downstream stations at both creeks. This biomass can be influenced by nutrient concentration, temperature, substrata stability, scour from high water velocity and sediment transport, and grazing by invertebrates. Of these factors, the higher concentration of soluble N and P upstream compared to downstream may be most important in determining the observed biomass of periphyton in all years.

Mayflies and stonefly abundance and invertebrate taxon richness (number of taxa) were greater at upstream sites compared to downstream sites. Factors including temperature, water velocity, substratum variability, and food supply (mainly periphyton) would have

contributed to this difference. Periphyton biomass was considered most important. While invertebrate abundance and diversity usually increases over downstream gradients, the significantly greater periphyton biomass upstream compared to downstream was the single most important factor differentiating sites.

To assist future assessments, taxa that can indicate a structural and functional change in the streams were identified. Sustained high abundance of the diatoms Achnanthes minitussima, and Fragilaria sp. to the exclusion of other common diatoms can indicate a major change. The disappearance of heptagenid mayflies including Rhithrogena, Eporous, and Cinygmula at downstream sites but not at control stations in future monitoring would be another indication of structural and functional change in the biological communities in Goathorn and Tenas creeks.

The combination of water quality, periphyton and benthos data from 1983, 1984, and 1997 provide a baseline for comparison with data from future monitoring. There are options for analysis of data in the future, all of which will be capable of differentiating natural background variation from stressors that may change stream community structure and function.

Before further assessments of stream water quality and biological communities in Goathorn and Tenas creeks can be addressed, it is essential that accurate water chemistry data be collected. To date, the data are sparse and inadequate to make decisions on the potential ecological consequences of altered chemical characteristics. Laboratories that support a detection limit of ≤ 0.001 mg•L⁻¹ for SRP, 0.002 mg•L⁻¹ for TDP and TP, 0.005 mg•L⁻¹ for NH₄⁺-N, and 0.002 mg•L⁻¹ for NO₃⁻-N should be used for future water quality analyses.

SECTION 2 - FISHERIES STUDIES

Fish and habitat assessments were conducted throughout the Goathorn and Tenas creeks, lower Telkwa River and Hubert creek during 1997. Repeat sampling was conducted at 20 index locations for comparison to similar information collected between 1983 and 1985.

Fish sampling was also undertaken at an additional 20 sites to better distinguish between bull trout and Dolly Varden distribution and abundance in the project watersheds, and to provide better baseline information relative to crossing sites in Goathorn and Hubert creeks and the Telkwa River.

A 1:20000 scale aquatic map was prepared for the project area incorporating all past fisheries information together with 1997 data collected during this study and a concurrent Telkwa Watershed fish sampling program funded by Forest Renewal BC.

The results verified that lower Goathorn Creek, Tenas Creek and the lower Telkwa River are important steelhead trout systems. Steelhead fry and parr dominated the catches and densities are comparable to other important steelhead tributaries in the Skeena Watershed. Steelhead fry were distributed upstream as far as Cabinet Creek in the Goathorn system and had higher densities in the upper reaches of Tenas Creek than noted in past studies. Steelhead yearling numbers were low throughout the watersheds sampled in 1997, leading to an overall decline in steelhead parr estimates for the systems.

The studies suggest that Tenas and lower Goathorn creeks are the most productive steelhead tributaries in the Telkwa Watershed. Tenas Creek is an important spawning and rearing system, utilized by steelhead for at least 13 kms, with heavy use in the lower 9 kms. The data also suggest that the Telkwa River mainstem and sidechannels are very important steelhead rearing areas. Together these systems probably account for much of the steelhead production in the Telkwa Watershed.

Bull trout, a blue-listed species, are present in Goathorn and Tenas creeks. The highest abundance of juvenile bull trout occurred in the mid-reaches of Goathorn Creek and lower Cabinet Creek. Bull trout rearing densities were very low in Tenas Creek. A small number of bull trout spawners and redd sites were identified, mainly in the mid and upper reaches of Goathorn and Tenas creeks.

The low rearing densities and small numbers of adult spawners suggests that bull trout populations in these systems may be suffering from many years of heavy fishing pressure as well as liberal fishing regulations for this species. The overall life history of these fish in the Bulkley and Telkwa river systems is poorly understood.

Resident Dolly Varden dominated the catches in upper Goathorn and Tenas creeks, similar to past sampling results. However, overall abundance estimates were lower in 1997 than those measured in earlier years. Dolly Varden also dominated catches in smaller tributary streams in the Goathorn and Tenas watersheds. They were present at low densities for approximately 5 km of Four Creek, a small tributary in the middle of the project area.

Fish sampling in Hubert and Helps creeks indicated low abundances of juvenile coho in the lower creek compared to past sampling. Similarly, cutthroat juvenile numbers were down to 10% of levels recorded in the mid-1980's, probably a result of beaver dams preventing upstream migration from the mid-reaches of Helps and Hubert creeks. Fish distributions were better delineated in the upper sections of these creeks to assist with planning for fish passage at road crossing sites.

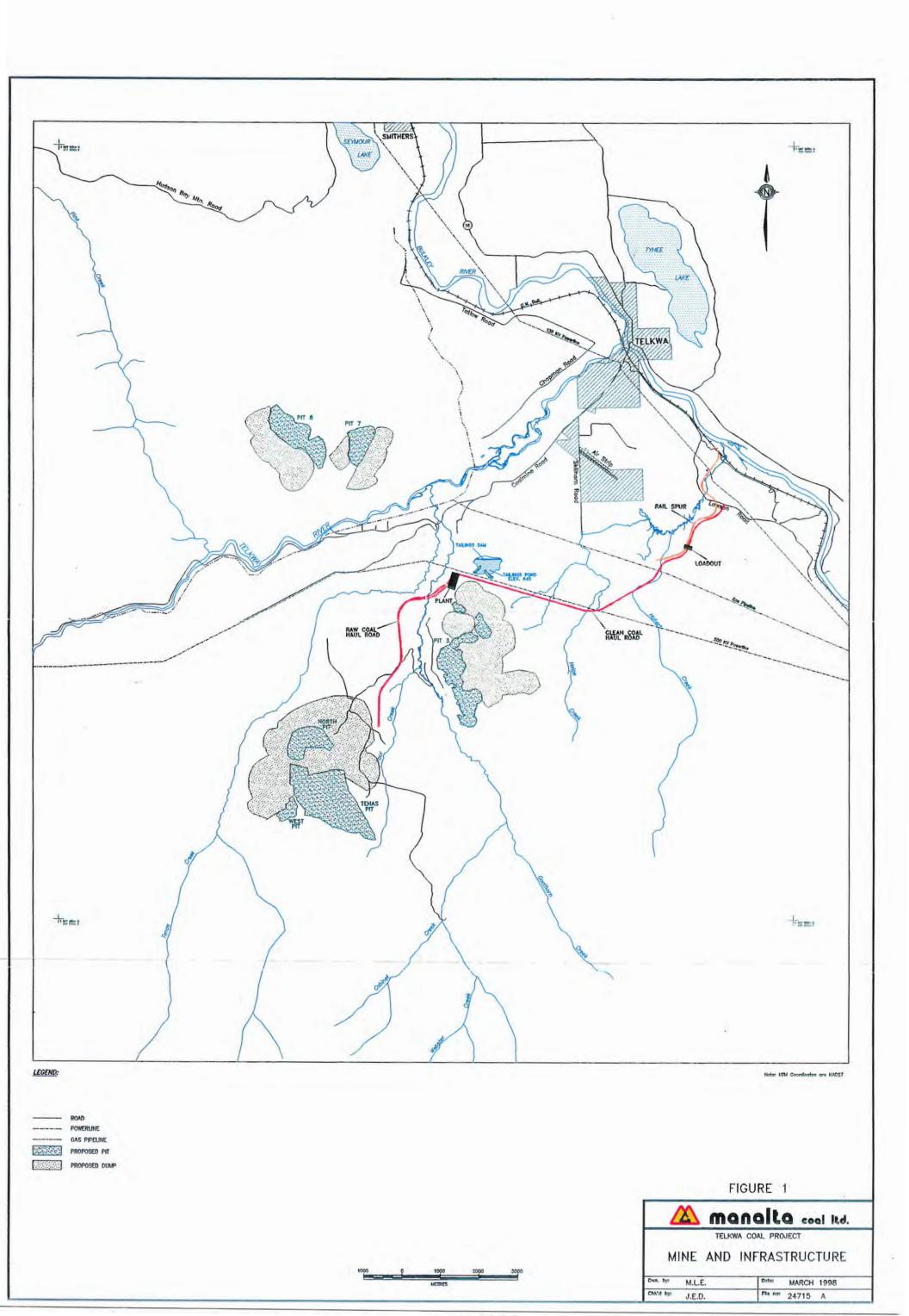


TABLE OF CONTENTS

	Page
SUMMARY	i
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	viii
INTRODUCTION	1
SECTION 1- PERIPHYTON AND BENTHIC INVERTEBRATE STUDIES	4
1.1 INTRODUCTION	4
1.2 METHODS	4
1.2.1 Sample Stations	4
1.2.2 Water Quality	5
1.2.3 Periphyton Accrual	
1.2.4 Benthic Invertebrates	8
1.2.5 Statistical Analysis	8
1.3 RESULTS	9
1.3.1 Water Quality	9
1.3.2 Periphyton Accrual and Algal Community Structure	11
1.3.3 Benthic Invertebrate Community Structure	13
.4 DISCUSSION	19
1.4.1 General Characteristics of Goathorn and Tenas Creeks	19
1.4.2 Temporal and Spatial Variation	21
1.4.3 Indicator Taxa	23
1.4.4 Application to Future Monitoring.	24
SECTION 2 - FISHERIES STUDIES	26
2.1 STUDY OBJECTIVES	26
2.2 METHODS	27
2.2.1 Fish Habitat Studies	27
2.2.2 Juvenile Fish Studies	28
2.2.3 Adult Surveys	31
2.2.3.1 Pink Salmon	31
2.2.3.2 Bull Trout and Dolly Varden.	32

TABLE OF CONTENTS (Cont'd)

	<u>Page</u>
2.3 RESULTS	33
2.3.1 Goathorn Creek	33
2.3.1.1 Habitat Description - Goathorn Creek	33
2.3.1.2 Juvenile Fish Sampling - Goathorn Creek	35
2.3.1.3 Adult Fish Observations - Goathorn Creek	43
2.3.2 Tenas Creek	48
2.3.2.1 Habitat Description - Tenas Creek	48
2.3.2.2 Juvenile Fish Sampling - Tenas Creek	
2.3.2.3 Adult Fish Observations - Tenas Creek	
2.3.3 Telkwa River	
2.3.3.1 Habitat Description - Telkwa River	
2.3.3.2 Juvenile Fish Sampling - Telkwa River	
2.3.4 Bulkley River.	
2.3.5 Hubert Creek.	70
2.3.5.1 Habitat Description - Hubert Creek	71
2.3.5.2 Juvenile Fish Sampling - Hubert Creek	72
2.3.5.3 Juvenile Fish Sampling - Helps Creek	75
2.5.5.5 saveime I ish bamping Theips Oreck	, 5
2.4 DISCUSSION	76
2.5 LITERATURE CITED.	84
APPENDICES 1-13	

LIST OF TABLES

	Page
Table 1.1. Water quality characteristics in upper and lower Goathorn and Tenas creeks in 1984 and 1997	10
Table 1.2. Regression equations for relationship between time and chlorophyll <u>a</u> concentration for sample stations at Goathorn and Tenas creeks	11
Table 1.3. Mean (±1SE) proportion by volume of most common algae species colonizing artificial substrata at sample stations on Goathorn Creek (G2 and G5) in September 1984 and 1997.	
Table 1.4. Mean (±1SE) abundance of common algae species colonizing artificial substrata at sample stations on Goathorn (G5 and G2) and Tenas creeks (T3 and T1) in September, 1997	14
Table 1.5. Mean (±1SE) biovolume (μ³ x 109/m²) of dominant algae species colonizing artificial substrates at sample stations on Goathorn (G5 and G2) and Tenas creeks (T3 and T1) in September, 1997	16
Table 1.6. P-values for F-tests from a two-way ANOVA testing the influence of date and station, and the interaction of date with station on indices of benthic invertebrate abundance in Goathorn and Tenas creeks	17
Table 2.1. Summary of fish species and age class composition at Goathorn Creek index sites (combined G1 to G5)	38
Table 2.2. Densities of steelhead fry and parr (fish/100m²) at the two main steelhead inde sites in lower Goathorn Creek from 1983-85 and in 1997	x 39
Table 2.3. Densities of char fry and parr (fish/100m2) at the three main char index sites in lower Goathorn Creek from 1983-85 and in 1997	41
Table 2.4. Summary of bull trout spawner and redd observations in Goathorn Creek during September 2-4 th , 1997	45
Table 2.5. Summary of densities of fish captured at sample sites in Four Creek during 1997	48
Table 2.6. Summary of fish species and age class composition at Tenas Creek index sites (combined T1 to T3)	53

LIST OF TABLES (Cont'd)

	Page
Table 2.7. Densities of steelhead fry and parr (fish/100m²) at three index sites in Tenas Creek from 1983-85 and in 1997	50
Table 2.8. Densities of char fry and parr (fish/100m²) at Site T3 in upper Tenas Creek from 1983-85 and in 1997	55
Table 2.9. Summary of bull trout spawner and redd observations in Tenas Creek during September 3-5 th , 1997	58
Table 2.10. Summary of total fish biomass at periphyton and benthic monitoring sites in Tenas and Goathorn creeks	59
Table 2.11. Summary of fish species and age class composition in the Telkwa River combined for main and sidechannels	61
Table 2.12. Summary of juvenile salmonid density estimates at sites in the mainstem and sidechannels of the Telkwa River, 1997	62
Table 2.13. Densities of steelhead fry and parr (fish/100m²) at side and main channel sample locations in the lower Telkwa River from 1983-85 and in 1997	63
Table 2.14. Densities of coho juveniles (fish/100m²) at sidechannel and mainstem locations in the lower Telkwa River from 1983-85 and in 1997	64
Table 2.15. Summary of fish catches at two wetland areas in the lower Telkwa River	65
Table 2.16. Summary of coho salmon spawner counts in the upper Telkwa River for selected years between 1982 and 1997.	69
Table 2.17. Densities of juvenile fish sampled along the mainstem Bulkley River in the vicinity of Hubert Creek and the proposed reload site	70
Table 2.18. Summary of the upstream distribution by species and age class of fish in lower Hubert Creek based on three years of sampling	73
Table 2.19. Summary of fish densities (fish/100m²) at electrofishing sites in the mid and upper reaches of Hubert Creek, 1997.	75
Table 2.20. Summary of fish densities (fish/100m²) at electrofishing sites in Helps Creek in 1986 and 1997	76

LIST OF FIGURES

	Page
Figure 1. Mine and infrastructure	3
Figure 1.1. Location of sample sites in lower Tenas and Goathorn creeks	6
Figure 1.2. Location of sample sites in upper Tenas and Goathorn creeks	7.
Figure 1.3. Mean concentration of chlorophyll <u>a</u> (μg/cm²) over time at sample stations on Goathorn and Tenas creeks in 1984 and 1997	
Figure 1.4. Mean absolute abundance of most common insect orders and total abundance in Goathorn and Tenas creeks 1983, 1984 and 1997	15
Figure 1.5. Mean ephemeropteran, plecopteran, trichopteran, EPT, and total taxon richness at Goathorn and Tenas creeks	18
Figure 2.1. Location of fish sample sites in the lower Telkwa River and Hubert Creek.	. 30
Figure 2.2. Estimated fish numbers and confidence intervals for steelhead and char at Goathorn Creek index sites	. 40
Figure 2.3. Density of steelhead and char in Goathorn Creek at different distances upstream from the Telkwa River, 1997	42
Figure 2.4. Estimated fish numbers and confidence intervals for steelhead and char at Tenas Creek index sites.	52
Figure 2.5. Densities of juvenile steelhead and char in Tenas Creek with distance upstream from Goathorn Creek, 1997	54
Figure 2.6. Summary of CPUE (fish/trap) at the three lower sample sections in Hubert Creek for three years	74
Figure 2.7. Summary of steelhead fry and parr densities at Goathorn and Tenas creeks and the lower Telkwa River sites from 1983 to 1997	. 78

INTRODUCTION

Aquatic studies were conducted from August through November 1997 for Manalta Coal Ltd. at their proposed Telkwa Coal Project located near Smithers B.C (Figure 1). These studies were conducted to address specific issues raised by the Telkwa Coal Project Committee outlined in a *Draft Project Report Specifications* document (July 1997). This document was prepared following a review of aquatic information submitted in Manalta Coal's *Application for a Project Approval Certificate* (February 1997).

BACKGROUND

Extensive studies describing fish species distribution, abundance and habitat utilization in the project area were undertaken during the period 1982-86 for Crows Nest Resources Ltd. As well studies describing the periphyton and benthic communities were undertaken at this time. The results of these studies are summarized in the *Application for a Project Approval Certificate* prepared by Manalta Coal Ltd. The full text of a key study entitled *Telkwa Coal Project Aquatic Resource Assessment 1984* (Bustard 1985a) was presented as Appendix 12 of that application.

Additional studies conducted in the project area but not included in the application include surveys outlining pink salmon spawning in lower Goathorn Creek and the lower Telkwa River (Bustard 1984b); more detailed fisheries and habitat studies in Hubert Creek (Bustard 1986a) and a third year of detailed fish assessments at index sites in the project area (Bustard 1985b).

The aquatic studies focused on developing a biological database with sufficient detail to serve as background for evaluating year-to-year variability within the system prior to mine development and to detect possible changes resulting from a mine operation. The studies had been designed so that sites above the proposed mine operation could serve as controls for monitoring potential impacts from the mine's operation over time.

Since these earlier studies, the mine project proposal has been modified, including changes to the loadout and access road location, and to the location, size, and sequencing of pits and the plant site. As well, considerable time has elapsed since the earlier aquatic studies, and some verification that the database reflected the existing situation was needed.

One important change that has been identified since the earlier studies was the presence of bull trout, a blue-listed species¹, in the Goathorn Creek drainage (Bustard 1996). During earlier studies, bull trout distribution and abundance information had been

¹ Blue-listed species are sensitive/vulnerable indigenous species that are not threatened but are considered at risk. This ranking is undertaken by the Conservation Data Center, Ministry of Environment, Lands and Parks. Bull trout were given this ranking due to their consideration for the Endangered Species List in the U.S. and their noted decline in Alberta and B.C.

combined with Dolly Varden, due to the inability to separate the two species. These two species have only recently been recognized as distinct (Cavender 1978). Both species are present in the Goathorn Creek system. Bull trout were identified at 6 of 26 sites examined during the Bulkley char study, including a single individual in Cumming Creek, also in the Telkwa drainage (Bustard 1996).

A second change since the earlier studies is that additional fish and habitat inventory work at a scale of 1:20000 has been undertaken in the project area. This inventory, funded by Forest Renewal B.C. (FRBC)², is near completion, and provides useful additional fish distribution information for the project area.

Given these changes, the development of an aquatic map for the project area that reflects changes in fish species now known to be present, and that incorporates more detailed and updated fish information, was an important objective of the 1997 baseline studies.

This baseline data provides the foundation for assessing potential impacts from the proposed mine and associated corridor and for developing a strategy to mitigate or compensate for potential impacts and to ensure no loss of fish habitat.

This report is presented in two sections. Section 1 outlines the results of the periphyton and benthic invertebrate monitoring studies prepared by Dr. P. Kiffney and Chris Perrin of Limnotek Research and Development. Section 2 presents updated fisheries and habitat information prepared by David Bustard.

An Impact Assessment of the proposed Telkwa Coal Project will be prepared under separate cover as more detailed information describing the mine proposal becomes available.

² This work is being undertaken by Triton Envionmental Consultants Ltd., Vancouver.



SECTION 1

PERIPHYTON AND BENTHIC INVERTEBRATE STUDIES

Prepared by P. Kiffney, PhD. and C.J. Perrin, MSc. RPBio.

1.1 INTRODUCTION

The biomass and community composition of algal periphyton and the abundance and composition of benthic invertebrates was assessed at stations on upper and lower Goathorn and Tenas creeks. Periphyton accrual (the time course accumulation of algal biomass on substrata) and benthic invertebrate abundance and composition that was found in 1997 was also compared to similar measurements collected in 1983 and 1984. By combining these data, the spatial and temporal variation of algal and invertebrate community structure in Goathorn and Tenas creeks could be described before mine development. This baseline information can be compared with similar data collected during and after mine development. The review of this ecological data has provided insight into the selection of ecological indicators that can be used during and after mine development to monitor ecological structure and function in Goathorn and Tenas creeks.

There were three specific objectives:

- To repeat sampling of periphyton biomass and composition in Tenas and Goathorn creeks using methods similar to those of previous years.
- To repeat monitoring of benthic invertebrate abundance and composition in Goathorn and Tenas creeks using methods similar to those of previous years.
- To identify ecological indicators that can be used to monitor ecological structure and function in Goathorn and Tenas creeks.

1.2 METHODS

1.2.1 Sample Stations

Sample stations were selected upstream and downstream of the proposed mine pits on Tenas Creek and Goathorn Creek (Figure 1.1 and 1.2). The upstream stations were labelled T3 and G5 respectively and the downstream stations were T1 and G2. The 1997 water quality data were provided by Agra Earth and Environmental Ltd. from sample collections at sites on upper and lower Goathorn and Tenas creeks that were the same as those reported by Bustard (1985a) for data collected in 1984. In both 1984 and 1997,

water samples were collected in September and October. Periphyton accrual was measured at G5 and G2 in 1984 and 1997 and from T3 and T1 in 1997. Benthic invertebrate samples were collected from G5, G2, T3 and T1 in 1983, 1984 and 1997.

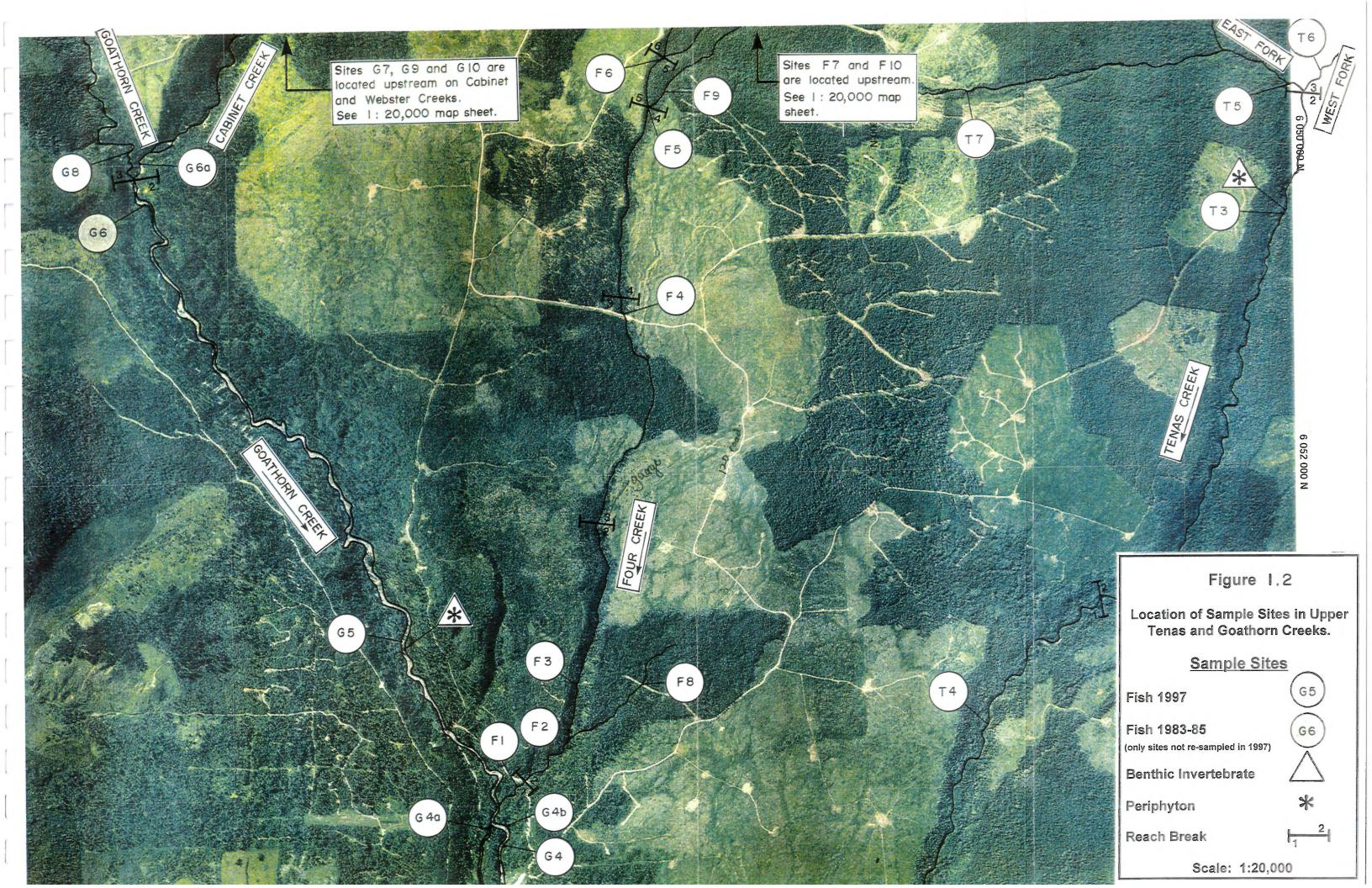
1.2.2 Water Quality

Water samples were analysed for pH, conductivity, alkalinity, and several forms of inorganic nitrogen and phosphorus. These data were selected from a suite of chemical analyses that were provided by Agra Earth and Environmental Ltd. from samples collected in 1997 and by Crows Nest Resources Ltd. from samples that were collected in 1984. In 1984, analytical methods followed those reported in MOE (1976) and APHA (1980).

1.2.3 Periphyton Accrual

Using artificial substrata, the periphyton community structure was described and the accrual of biomass (measured as chlorophyll <u>a</u>) was measured over five weeks between 5 September and 10 October, 1997. In 1984 a six-week period was used between 5 September and 17 October for the same measurements (Bustard 1985a). Four replicate artificial substrata were placed at each sample station in 1984 and three replicates were used in 1997. The substrata were composed of open-celled Styrofoam-DB (D.L. Jones Wholesale, Burnaby, BC) cut to dimensions of 0.6 cm x 30.5 cm x 5 cm and attached to a concrete block of similar size. The styrofoam provided a uniform surface that limited variation due to differences in texture and particle size that can occur on natural substrata between locations and points in time. Trends in chlorophyll <u>a</u> concentrations and algal species composition accruing on Styrofoam-DB are similar to that found on natural substrata (Perrin 1997). To minimize differences in environmental factors (i.e., current, water depth, and light) that may influence periphyton accrual among sample stations, the substrata were placed in riffle habitats where water depths were 20 to 30 cm and current velocities were 20 to 30 cm so 100 cm so 100

In 1984 and 1997, the styrofoam substrata on which the periphyton was growing was sampled weekly. Cores were extracted using the open end of a 12 dram plastic vial and frozen at -15°C. Stream temperature was measured using a pocket thermometer on each sampling date. The cores were packed on dry ice and shipped air freight to Vancouver for analysis. Chlorophyll <u>a</u> concentration was determined by fluorometry (APHA 1980) after homogenization of the cores in a high-speed tissue grinder. On the last sampling date of each accrual series, an additional core was collected and preserved in Lugol's solution for taxonomic analysis. In 1984, the relative abundance of each algal species was determined using an inverted, phase contrast microscope at 500x magnification. In 1997, absolute abundance and cell biovolume were also determined.



1.2.4 Benthic Invertebrates

Benthic invertebrates were sampled at four locations - two sites in Goathorn Creek and two site in Tenas Creek (Figures 1.1 and 1.2). Site G5 in Goathorn and T3 in Tenas Creek were upstream from the proposed mine operations and they served as controls. Sites G2 and T1 were in the stream sections that may be affected by mine operations.

Six replicate benthos samples were collected at each station within riffle habitats using a Waters-Knapp sampler (Waters and Knapp 1961) with a 250 µm mesh net and a 0.1 m² sample area. Substrata within the sampler cylinder was disturbed to a depth of approximately 10 cm. Large stones were brushed by hand to dislodge attached organisms. All samples were preserved in a 5% buffered formalin solution.

Samples were shipped to Dr. Charles Low (Victoria, B.C.) for identification and enumeration. Samples were washed through coarse (1 mm) and fine (180 μ m) screens and sorted from debris. Invertebrates were identified to genus or species and counted. No sample splitting was required. A reference collection was prepared and verified by an independent identifier. Sort checks were conducted on 10% of the samples as part of the QA/QC procedure.

1.2.5 Statistical Analysis

All statistical analyses were conducted using a PC-version of Statistical Analysis System (SAS 1990). The relationship between chlorophyll \underline{a} concentration and time was examined using regression techniques. Location and year effects were also tested on peak biomass (PB), which was defined as the maximum chlorophyll \underline{a} concentration accruing on the styrofoam substrata. T-tests were used to examine location effects within years and two and three-way analysis of variance (ANOVA) was used to examine station, day, and year effects. PB was the highest average concentration of chlorophyll \underline{a} attained during an accrual series. Because PB is directly related to growth (Bothwell 1989), PB was the metric used to examine the effect of year and location on periphyton accrual. A one-way ANOVA was used to determine if there were differences in absolute diatom abundance as well as cell biovolume between stations. If the ANOVA model was significant (indicating differences between stations), Tukey's multiple comparison procedure was used to determine which stations were different from one another.

A two-way ANOVA was also used to determine the influence of date and station and the interaction of date with station on benthic invertebrate community structure. Main and interactive effects were tested using the following response variables: abundance of Ephemeroptera (mayfly), Plecoptera (stonefly), Trichoptera (caddisfly), Chironomidae, and Diptera; total abundance; total taxon richness; mayfly, stonefly, and caddisfly richness; and EPT richness (number of ephemeropteran, plecopteran and trichopteran

taxa). The least-squared means procedure was used to determine differences between stations within a year and within a station between years.

All data except for measures of richness were log-transformed prior to analysis, as evaluation of residuals indicated non-homogeneity of variances. Statistical differences were determined to exist at p < 0.05. Values presented in figures and tables are of untransformed means (\pm 1 standard error).

1.3 RESULTS

1.3.1 Water Quality

Conductivity was highest in Tenas Creek and ranged between 131 and 145 µmhos/cm in September and early October 1997 (Table 1.1). In Goathorn Creek, conductivity was 115 - 124 µmhos/cm during the same time periods, indicating lower ionic content than in Tenas Creek. Conductivity also increased from upstream to downstream stations in both Tenas Creek and Goathorn Creek, indicating net contribution of dissolved solids in water transit downstream.

Conductivity values collected on October 16, 1997 were somewhat lower than those collected earlier in 1997 and in 1984. The October 16 data also showed that conductivity was similar for all stations (G5, G2, T3, and T1), whereas this similarity was not found previously.

Alkalinity is a measure of acid neutralizing capacity (ANC). It increased between upstream and downstream stations and it was almost twice as high in Tenas Creek compared to Goathorn Creek (Table 1.1). The pH of natural waters is determined mainly by the interaction of H⁺ ions arising from the dissociation of H₂CO₃ and from OH ions produced during the hydrolysis of bicarbonate. The pH of waters at Goathorn and Tenas creek stations was either at neutral (pH = 7) or slightly greater than neutral (pH > 7). In general, pH was lower in Goathorn Creek than in Tenas Creek. This finding is consistent with the higher ANC likely from bicarbonate in Tenas Creek. It may also be caused by photosynthetic activity, which if greater in Tenas Creek, would consume CO₂ and cause the carbonate equilibria to shift to the right and increase pH. Within each stream, pH was lower at upstream stations, potentially due to greater alkalinity downstream compared to upstream.

Nitrate is the form of inorganic nitrogen that usually occurs in highest concentrations in pristine mountain streams compared to other forms. Nitrate was below or at levels of analytical detection (0.01 mg•L⁻¹ in 1984 and 0.05 mg•L⁻¹ in 1997) at most sites during 1984 and 1997 (Table 1.1). The same was reported for ammonia which is the other common form of inorganic N (detection limit of 0.01 mg•L⁻¹ in 1984 and 0.1 mg•L⁻¹ in 1997). With most values below laboratory detection limits, particularly in 1997, the

inorganic N data were not suitable for interpretation of differences in concentrations between streams and dates. They were, however, in a range that is considered typical of pristine streams.

Total dissolved phosphorus (TDP) concentrations were higher at G5 than at G2 on both sampling occasions in 1984. In addition, TDP concentration was 6-10 times higher at both Goathorn stations in October 1984 than in September 1984. TDP concentrations in Goathorn Creek were also higher in September and October 1997 than in September 1984. Although TDP concentrations were greater at G5 than at G2 in 1984, this trend was reversed in 1997. In 1997, TDP was higher at T3 than at T1. Despite these differences, all TDP concentrations were in a range that indicates moderate productivity in a stream food web. In streams where the food web for fish is severely limited by phosphorus, the TDP concentrations are generally <0.010 mg•L-1. If this guideline and data in Table 1.1 are compared, Goathorn Creek may be considered more productive in 1997 than it was in 1984.

Table 1.1. Water quality characteristics in upper and lower Goathorn and Tenas creeks in 1984 and 1997.

Date	Sample	pН	Conductivity	Alkalinity	NO ₃ -N	NH ₃ -N	TDP
	site		(µmhos/cm)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Sept 1984	G5		105	45	< 0.01	<0.01	0.003
	G2		119	49	< 0.01	0.011	< 0.001
Oct 1984	G5		110	53	< 0.01	0.011	0.03
	G2		113	54	< 0.01	0.02	0.006
18 Sept 1997	G5	7.1	115	42			
	G2	7.5	124	52			
	T3	7.6	133	76			
•	T1	7.7	145	84			
1 Oct 1997	G5	7.2	117	36	0.06	<0.1	0.02
	G2	7.1	122	44	< 0.05	< 0.1	0.03
	T3	7.6	131	76	< 0.05	< 0.1	0.04
	T1	7.7	144	80	< 0.05	<0.1	0.02
16 Oct 1997	G5	7.3	95	38	0.08	<0.1	0.02
	G2	7.4	99	50	0.06	< 0.1	0.06
	T3	7.4	95	64	< 0.05	< 0.1	0.07
	T1	7.5	99	70	< 0.05	<0.1	0.05

1.3.2 Periphyton Accrual and Algal Community Structure

Periphyton biomass accruing on the styrofoam substrata reached 2.7 µg chl-a•cm⁻² in 1984 and 2.0 µg chl-a•cm⁻² in 1997 (Figure 1.3). This amount of biomass accruing in a 5 or 6 week period is considered low to moderate. In this accrual period, the periphyton community can reach a maximum biomass that is sustainable on the substrata for given nutrient, flow, and rate of grazing by aquatic invertebrates. An indication that maximum biomass is attained is by an initial decline in chlorophyll a concentration during the time series. This event occurred after day 30 in 1984 and after day 28 in 1997. The maximum biomass which is also called peak biomass (PB) in Goathorn and Tenas creeks was 3.7 times lower than the maximum amount of 10 µg chl-a•cm⁻² that is recognized in B.C water quality guidelines (Nordin 1985). This difference is typical for pristine and undisturbed streams of the central interior of British Columbia that have low concentrations of dissolved phosphorus.

For all stations and years, regression analysis showed a highly significant relationship between time and chlorophyll \underline{a} concentration (Table 1.2; Fig. 1.3a-d). The time series data in Figure 1.3 show that periphyton accrual was linear.

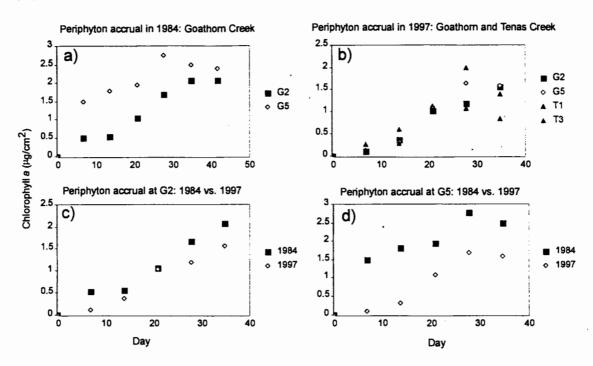
Table 1.2. Regression equations for relationship between time and chlorophyll \underline{a} concentration for sample stations at Goathorn and Tenas creeks.

	G5	G2	T3	T1
1984	$Y=0.052(x) + 0.764$ $R^2=0.72$	y=0.054(x) + 0.024 $R^2=0.96$	Not collected	Not collected
1997	y=0.055(x) + -0.154 $R^2=0.92$	y=0.048(x) + -0.12 $R^2=0.96$	y=0.055(x) + -0.13 $R^2=0.81$	y=0.0296(x) + 0.14 $R^2=0.76$

In 1984, initial colonization of artificial substrata by algae was higher at G5 than at G2 (Fig. 1.3a, p=0.0006).). This difference in chlorophyll \underline{a} concentration between sites can also be observed in the large difference in y-intercepts for the regression models for the two sites (Table 1.2). On day 35 when chlorophyll \underline{a} reached peak biomass (PB) at G2, concentrations were higher at G5 (2.5 \pm 0.4 μ g chl-a•cm⁻²) than at G2 (2.1 \pm 0.2 μ g chl-a•cm⁻²) but this difference was not statistically significant (p-value=0.17). G5 reached PB of 2.75 μ g chl-a•cm⁻² on day 28.

In 1997, accrual was similar among stations (Fig.1.3b). PB occurred between day 28 and 35 for all sites. PB at T3 ($2.03 \pm 0.2 \,\mu g \, chl-a \cdot cm^{-2}$), G5 ($1.66 \pm 0.4 \,\mu g / cm^2$) and T1 ($1.1 \pm 0.2 \,\mu g \, chl-a \cdot cm^{-2}$) occurred on day 28 followed by G2 ($1.57 \pm 0.4 \,\mu g \, chl-a \cdot cm^{-2}$) on day 35. Statistically significant differences in PB were observed on day 28 for the following comparisons: T3 > G2 (p=0.002); T3 > T1 (p=0.0006); G5 > T1 (p=0.03).

Figure 1.3 Mean concentration of chlorophyll \underline{a} ($\mu g/cm^2$) over time at sample stations on Goathorn and Tenas creeks in 1984 and 1997.



PB was higher at G2 and G5 in 1984 than at these sites in 1997 (Fig. 1.3c and d). These differences were only statistically significant for G5 (p-value=0.006).

Diatoms dominated algal community composition in 1984 and 1997 (Tables 1.3-1.5 and Appendix 1 (Tables 2 and 3)). There were only three taxa other than diatoms observed colonizing artificial substrates. These included the chlorophytes, *Closterium* sp. and *Ulothrix* sp. and the cyanophyte *Oscillatoria* sp. The most common taxa in 1984 and 1997 at G2 and G5 based on sample volumes were the diatoms *Hannaea arcus*, *Achnanthes minutissima*, *Diatoma tenne v. elongatum*, *Synedra ulna*, and *Fragilaria* sp. (Table 1.3).

In 1997, cell counts and biovolume were determined in samples from all sites (Table 1.4 and 1.5). The most abundant taxa were the diatoms Achnanthes minutissima, Gomphonema olivaceum, Synedra ulna, Fragilaria sp., and Hannaea arcus. In some cases, it was possible to conduct a means comparison procedure to determine which means were statistically different between stations. If small letters that are located below each mean value are the same (see Table 1.4 and 1.5), mean abundance was the same in the between station comparison. If letters are different, the means were different with one station having a statistically greater (or lesser) mean abundance than another station. For example, the diatom A. minutissima was present at all stations; therefore, allowing the determination of which mean abundance values were statistically greater between stations. Abundance of A. minutissima was highest at G5>G2>T3>T1 (Tukey's multiple

Table 1.3. Mean $(\pm 1SE)$ proportion by volume of most common algae species colonizing artificial substrata at sample stations on Goathorn Creek (G2 and G5) in September 1984 and 1997.

Species	· G5 (%)		G2 (%	
	1984	1997	1984	1997
Achnanthes minutissima	8 (2)	5(1)	10	3 (0.1)
A. sp.			8 (3)	
Cocconeis caesitosa		1 (0.4)		
C. ventricosa		2 (0.7)		
Diatoma hiemle		1(1)		
D. tenne v. elongatum	25 (0)	1 (0)	26 (1)	4(2)
Fragilaria sp.	20 (0)	13 (2)	20 (2)	1 (0.3)
Gomphonema sp.	7 (2)	5 (2)	17 (2)	•
G. olivaceum	,	27 (10)		6(1)
Hannaea arcus	20 (3)	19 (9)	18 (2)	1(0.7)
Nitzschia. palea	` ,	11 (1)	, ,	1 (0.3)
Synedra ulna	20 (3)	22 (6)	21 (2)	76 (6)

comparison procedure). Abundance of most diatom species and total diatom abundance was highest at the two upstream sites (G5 and T3). In contrast, there were no differences in species richness (number of taxa) among sites.

Diatoms also dominated the periphyton community in terms of cell biovolume (Table 1.5). The three most dominant taxa in terms of biovolume were *S. ulna*, *H. arcus*, and *G. olivaceum*. Similar to species counts, mean biovolume for most taxa was higher at upstream stations. Based on Tukey's multiple comparison procedure, mean cell biovolume of *H. arcus* from most to least was the following: G5=T3>G2=T1.

1.3.3 Benthic Invertebrate Community Structure

Most common benthic invertebrates at all stations were insects, primarily the orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Chironomidae (chironomids) (Fig. 1.4a-d). Common mayfly genera included *Baetis*, *Ameletus*, and *Rhithrogena*, while the most common stoneflies included the families nemouridae and chloroplerlidae. While chironomids were identified in some cases to the genus level in 1997, chironomids were simply separated according to adult, pupae and larvae in the 1983 and 1984 data. For the present analysis that involves inter-year comparisons, only numbers of chironomid larvae

Table 1.4. Mean (±1SE) abundance of common algae species colonizing artificial substrata at sample stations on Goathorn (G5 and G2) and Tenas creeks (T3 and T1) in September, 1997. Different small letters below mean values indicate significant differences (p<0.05) in abundance between stations within a taxa.

Species or metric	lean ± SE cell o	ll count (cells x $10^6/\text{m}^2$)		
	G5 .	G2	T3	T1
Achnanthes minutissima	1543 (385)	584 (187)	88 (20)	19 (6)
	a	a	c	Ъ
A. sp.		55 (11)	33	
Cocconeis placentula		22	12(1)	12 (5)
C. caesitosa	12 (2)		34 (15)	
C. ventricosa	55 (1)		70 (25)	
Diatoma hiemle	21 (7)	272 (106)	85 (28)	
D. tenne v. elongatum	123 (45)			
Fragilaria sp.	847 (181)	24 (14)	133 (28)	
	b	a	ab	
Gomphonema			39	12 (4)
herculeanum				
G. olivaceum	968 (152)	186 (25)	482 (62)	131 (5)
	b	a	c	a
Hannaea arcus	346 (227)	8 (3.2)	522 (69)	4 (2)
	a	b	a	b
Meridion circulare		7	12 (3)	
Nitzshia palea	349 (145)	22 (11)	70 (14)	138 (14)
-	b	a	abc	bc
Synedra ulna	174 (93)	420 (167)	220 (49)	277 (20)
•	a	à	a	a
Total abundance	4132 (1295)	1563 (415)	1754 (234)	605 (19)
	à	ab	ab	b
Number of species	10(1)	10 (0.3)	12 (0.3)	11 (1)

were used because the detailed taxonomic analysis was not available in the earlier data. Detailed results are listed in Appendix 2 (Tables 1 and 2).

There was significant (p<0.05) year to year variation in absolute abundance of the benthic invertebrates (Figure 1.4 and Table 1.6). Stonefly abundance was greater in 1997 than in 1983 and 1984. Chironomid abundance was greater in 1983 than in other years at G2 but it was greater in 1984 at T1. Total abundance, dominated by stoneflies and chironomids, was greater in 1983 and 1997 compared to 1984.

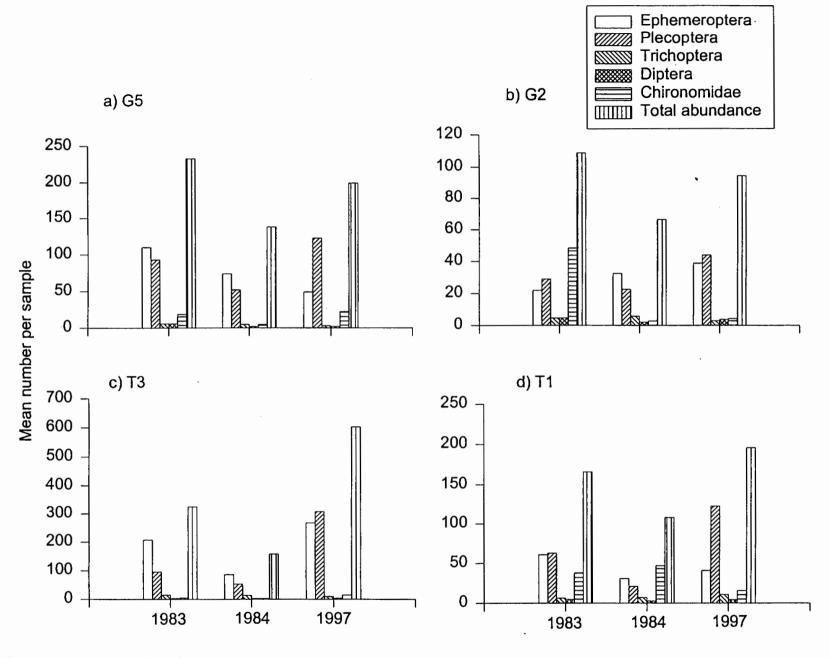


Figure 1.4 Mean absolute abundance of most common insect orders and total abundance in Goathorn and Tenas creeks in 1983, 1984 and 1997.

Table 1.5. Mean $(\pm 1SE)$ biovolume of common algae species colonizing artificial substrata at sample stations on Goathorn (G5 and G2) and Tenas creeks (T3 and T1) in September, 1997. Different small letters below mean values indicate significant differences (p<0.05) in biovolume between stations within a taxa.

Species	Mean \pm SE cell biovolume ($\mu^3 \times 10^9/\text{m}^2$)				
	G5	G2	Т3	T1	
Oscillatoria sp.	80	9 (2)			
Closterium sp.				11	
Ulothrix sp.		76	129		
Achnanthes minutissima	108 (27)	41 (13)	6(1)	1 (0)	
	a	a	c	b	
A. sp.					
Cocconeis placentula		20	10(1)	11 (5)	
C. caesitosa	14 (2)		41 (18)	2	
C. ventricosa	27 (1)		34 (12)		
Diatoma hiemle	13 (5)		54 (18)	1.8(0)	
	a		b	a	
D. tenne v. elongatum	22 (8)	49 (19)			
Fragilaria sp.	424 (90)	12 (7)	66 (14)	2 (0)	
	b	ad	d	ac	
Gomphonema herculeanum			152	50 (17)	
G. olivaceum	464 (73)	89 (12)	231 (29)	63 (3)	
	b	a	С	a	
Hannaea arcus	658 (431)	15 (6)	992 (131)	7 (4)	
	a	b	a	b	
Meridion circulare		3.6	5.7(1)		
Nitzshia. Palea	384 (160)	24 (12)	77 (15)	151 (15)	
	b	a	abc	bc	
Synedra ulna	521 (279)	1253 (499)	656 (147)	827 (61)	
	a	a	a	a	
Total diatom	2468	1546 (516)	2226	1124 (43)	
	(1083)	a	(314)	а	
	a		a	•	
Total other	80	46 (35)	129		

Table 1.6. P-values for F-tests from a two-way ANOVA testing the influence of date and station, and the interaction of date with station on indices of benthic invertebrate abundance in Goathorn and Tenas creeks. Analysis was conducted using log-transformed values, except for measures of richness which were not transformed.

Invertebrate Order	P-value from 2-way ANOVA				
	Date	Station	Date x Station interaction		
Ephemeroptera abundance	0.2	0.0001	0.005		
Plecoptera abundance	0.0001	0.0001	0.1		
Trichoptera abundance	0.4	0.01	0.9		
Chironomidae abundance	.0005	0.001	0.002		
Diptera abundance	0.9	0.3	0.6		
Total abundance	0.002	0.0001	0.2		
Ephemeroptera taxa richness	0.0001	0.1	0.05		
Plecoptera taxa richness	0.0001	0.0001	0.09		
Trichoptera taxa richness	0.6	0.01	0.8		
EPT richness	0.0001	0.0017	0.1		
Total Taxon richness	0.0001	0.03	0.8		

In addition to temporal variation in abundance, there was considerable variation in abundance among stations. A station effect was found for all orders except the dipterans. The station effect on mayflies and chironomids varied significantly with year ($p \le 0.005$). There were more mayflies and stoneflies upstream than downsteam in both streams. Furthermore, total invertebrate abundance was higher at T3 (range 200-600 individuals/sample) than at all other stations.

The greater invertebrate abundance at T3 in 1997 than at other stations corresponded to relatively high periphyton PB at this station (Figure 1.3c), which suggests that overall productivity at T3 may have been greater than at the other sites in 1997.

Total invertebrate abundance was similar at G5 (range 125-225 individuals/sample) and T1 (range100-175 individuals/sample), while station G2 (range 60-110 individuals per sample) had the lowest total abundance. Mayfly and chironomid abundance did not vary consistently among stations and years (interaction term was statistically significant: Table 1.6). Mayfly abundance progressively increased at station G2 during the years 1983-1997, whereas mayfly abundance decreased at G5 from 1983 to 1997.

There were both year and station effects on total taxon, stonefly and EPT (number of ephemeropteran, plecopteran, and trichopteran taxa) richness while mayfly richness differed among dates and caddisfly richness differed among stations (Table 1.6; Fig. 1.5a-d). There were more taxa identified in 1997 compared to 1983 and 1984. Given the

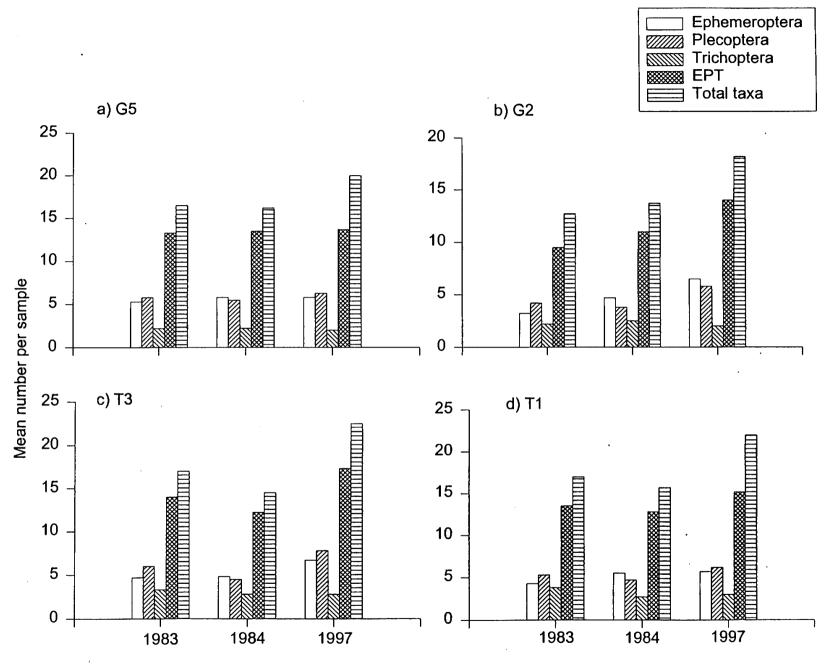


Figure 1.5. Mean ephemeropteran, plecopteran, trichopteran, EPT, and total taxon richness at Goathorn and Tenas creeks.

differences in effort of taxonomic analysis between years (chironomids identified to genus in 1997 but no identification of chironomids in 1983 and 1984), this result may be an effect of lab procedures rather than due to actual changes in richness between years. By combining location data from all years, total taxon richness and EPT richness from most to least were T3=T1 > G5 > G2. Mayfly and stonefly taxa richness was greater at upstream stations (G5 and T3) compared with downstream stations. When averaged across years, mayfly taxa richness was significantly higher at G5 vs. G2 (p=0.02). G5 and T3 had significantly more stonefly taxa than G2 and T1, respectively.

1.4 DISCUSSION

1.4.1 General Characteristics of Goathorn and Tenas Creeks

Goathorn and Tenas creeks are pristine, low to moderately productive stream ecosystems. The inorganic nitrogen and total dissolved phosphorus concentrations in water were in a range that is typically found in nutrient deficient streams in B.C. (Perrin et al. 1987, Johnston et al. 1990, Mundie et al. 1991, Stockner and Shortreed 1978, Bothwell 1989, Perrin and Richardson 1997). The nitrate concentrations were all ≤0.08 mg•L⁻¹, ammonia concentrations were ≤0.011 mg•L⁻¹ and TDP concentrations were between 0.001 mg•L⁻¹ and 0.07 mg•L⁻¹. Only a small fraction of the TDP is actually available for biological uptake. This fraction is analytically called soluble reactive phosphorus (SRP) but it was not available in data supplied for this study. The concentration of SRP would be expected to be substantially lower than TDP concentration which potentially puts it in a range typical of streams having low to moderate productivity.

Due to high detection limits for nutrient analyses and lack of replication in data supplied for this report, it is difficult to comment on differences in nutrient concentrations between the two streams across years. Lower detection limits, however, were used in 1984 and these data are useful for a preliminary interpretation of whether nitrogen or phosphorus primarily limits algal growth and thereby production of the stream food webs.

The nitrogen:phosphorus (N:P) ratio can provide an index of which of these nutrients potentially limits the growth of algae in streams. This algae is, at least in part, the basic biomass that supports the food web upon which fish depend. Rhee (1978) has shown that for a given species of algae there is a sharp transition between phosphorus (P)-limited and nitrogen (N)-limited growth. Assuming all other nutrients are in excess of algal requirements, N-limitation will occur at low N:P ratios, while at high ratios P-limitation will prevail. The particular ratio at which the transition from N-limitation to P-limitation will occur is species dependent, varying from as low as 7:1 for some diatoms (Rhee and Gotham 1980) to as high as 50:1 for some blue-greens (Healey 1985).

In the 1984 data, the sum of nitrate (NO_3^--N) and ammonia (NH_4^+-N) concentrations yielded values generally $\leq 20 \, \mu \text{g} \cdot \text{L}^{-1}$, while soluble reactive phosphorus (SRP)

concentrations were 3-8 µg•L¹. If we assume a median SRP concentration of 5 µg•L¹ and an inorganic N concentration of 20 µg•L¹, the molar N:P approximates 9. This value is at the low end of the range of ratios that indicates P limitation in algae (Rhee and Gotham 1980), suggesting that growth of many algal species in Goathorn Creek (Tenas Creek chemistry was not examined in 1984) was potentially limited by N and some others were limited by P in 1984. While limitation of algal growth by N is not common in oligotrophic streams of British Columbia (e.g., Stockner and Shortreed 1978, Bothwell 1989, Perrin et al. 1987), it does occur where there is localized P enrichment, producing what appears as co-limitation by N and P (Perrin and Richardson 1997). Goathorn Creek may be another example where this co-limitation by N and P occurs.

The implication of potential N-limitation of algal growth is that any introduction of inorganic N to Goathorn or Tenas creeks has the potential to increase algal growth rates and biomass, but only to a point where it is limited by P concentration. If both N and P are added to N and P deficient streams, there is potential for an increase in algal biomass by up to several orders of magnitude (Perrin et al. 1987).

While very high N and P loading can produce water quality problems, moderate enrichment can increase stream food web productivity (e.g., fish biomass). This concept is the basis behind case studies of intentional river fertilization projects on Vancouver Island (Perrin et al. 1987) and in Alaska (Deegan et al. 1997). In these projects, N and P addition resulted in substantial increases in fish growth (Johnston et al. 1990, Deegan and Peterson 1992). This effect is thought to occur by nutrient addition causing an increase in algal biomass, which supports increased survival of fish food organisms (Mundie et al. 1991; Perrin and Richardson 1997). Results from this work are now being used to support fertilization as a restoration measure in British Columbia streams (Ashley and Slaney 1997).

In the Vancouver Island project, algal biomass reached 15 µg chl-a•cm⁻² and in the Alaskan work, biomass up to 20 µg chl-a•cm⁻² was measured where inorganic N concentrations were in excess of algal requirements (near 0.1 mg•L⁻¹) and SRP concentrations were near 0.005 mg•L⁻¹. There was no evidence from this work that periphyton biomass up to these concentrations caused a deterioration of fish habitat. Based on these findings, a several fold increase in algal biomass from current concentrations <3 µg chl-a•cm⁻² in Goathorn and Tenas creeks would not be expected to be detrimental to water quality and may improve food supply to fish populations.

The amount of periphyton biomass in Goathorn and Tenas creeks is consistent with the nutrient concentrations that were found. The peak concentration of chlorophyll <u>a</u> that accrued on substrata over the 5 to 6 week period was 1 μg chl-a•cm⁻² to 2.75 μg chl-a•cm⁻² which is commonly found in low and moderately productive streams (Perrin et al. 1987, Johnson et al. 1990, Mundie et al. 1991, Stockner and Shortreed 1978, Bothwell 1989, Perrin and Richardson 1997). That range of values was also several times less than the maximum value of 10 μg chl-a•cm⁻² that is cited in Provincial water quality

guidelines for protection of fish habitat (Nordin 1985). The guideline of 10 µg chl-a•cm⁻² is conservative and is set despite the evidence cited above that fish habitat is not necessarily impacted when periphyton biomass is greater.

Diatoms typical of cool pristine streams were the most abundant algal periphyton at all stations on all dates. Common taxa included *Hannaea arcus*, *Achnanthes minutissima*, *Fragilaria* sp., *Gomphonema olivaceum*, and *Synedra ulna* which are diatoms common to uncontaminated streams in BC (Stockner and Shortreed 1978, Perrin et al. 1987, Mundie et al. 1991), and to other coldwater streams in western North America (Leland and Carter 1984, Deniseger et. al. 1986, Ward 1986).

Mayflies, stoneflies, and chironomids were the most common benthic invertebrates in both Goathorn and Tenas creeks. These taxa are typically found in other pristine, coldwater streams in western North America (Ward 1986, Leland et al. 1989, Johnston et al. 1990, Clements and Kiffney 1995, Kiffney and Clements 1996). The mayflies, in particular, are indicative of pristine undisturbed headwater streams (Kiffney and Clements 1994a and 1994b, Clements and Kiffney 1995).

1.4.2 Temporal and Spatial Variation

Water Quality

There were important and detectable differences in the electrochemical data between streams in 1997. Most importantly, alkalinity was higher in Tenas Creek than in Goathorn Creek (Table 1.1). Because alkalinity is a measure of acid neutralizing capacity (ANC), this difference suggests that Tenas Creek may be able to sustain more acid loading than Goathorn Creek before any shift in pH and potential change in biological structure and function occurs. It also means that there may be greater capacity for metals in Tenas Creek to be bound on exchange substrates and thereby made less available and less toxic to periphyton, invertebrates, and fish (Howarth and Sprague 1978, Chakoumakos et. al. 1979, Meador 1991) than in Goathorn Creek.

Periphyton

While the concentration of soluble phosphorus and nitrogen is usually the most important factor in determining biomass of stream periphyton (Bothwell 1988), many other factors can also contribute to determining periphyton biomass and composition. These factors include temperature (Bothwell 1988), substrata stability (Stevenson 1990), scour associated with water velocity and sediment transport (Stevenson 1983), current velocity (Stevenson and Glover 1993), and rate of grazing by aquatic invertebrates (Lamberti and Resh 1983, McCormick and Stevenson 1991). Any one or combination of these factors, particularly

nutrient concentration, would have produced the higher PB at upstream sites (G5 and T3) compared to downstream sites (G2 and T1), and the higher PB in 1984 compared to 1997. Many of the benthic invertebrates found in all years in both streams are known to graze periphyton. *Baetis*, *Ameletus*, and *Rhithrogena* were common in Goathorn and Tenas creeks and these insects can deplete algal biomass levels through feeding. For this reason, any variation in the abundance of these taxa has the potential to influence algal biomass. During fertilization of the Kuparuk River, Alaska, grazing insects reduced areal periphyton biomass to a concentration that was similar to that in unfertilized reaches (Peterson et al 1993). This observation is consistent with several other studies in which grazers were found to be highly effective in reducing periphyton biomass with or without fertilization (Lamberti and Resh 1983, Jacoby 1985, Rosemond 1994, McCormick and Stevenson 1991).

Given the greater water flows in Goathorn Creek compared to Tenas Creek, shear stress associated with water velocity may contribute to the observed variation in periphyton biomass between streams. High velocities (e.g., >60 cm/s) will increase shear stress, leading to increased drift and reduced immigration or colonization of diatoms (McIntire 1966, Stevenson 1983), but only extreme events that are accompanied by bedload movement cause large losses of periphyton biomass (Stevenson 1990). Moderate velocities (e.g., 20-60 cm/s) can be too low to have a scouring effect (Grimm and Fisher 1989, Stevenson 1990), but can stimulate algal metabolism by reducing boundary layer effects and optimizing diffusion through the algal mat (Whitford and Schumacher 1964, Stevenson and Glover 1993). At very low velocities (e.g., ≤20 cm/s), growth and biomass may decline due to differing supply of nutrients to diatom cells (Stevenson and Glover 1993).

Benthic Invertebrates

Many factors that influence periphyton abundance can also affect the abundance of benthic invertebrates and may have contributed to variation in benthos abundance in Goathorn and Tenas creeks.

Stream temperature determines rates of metabolism and growth and it affects the timing of adult emergence and reproductive success (Wallace and Anderson 1996). Instantaneous measurements of temperature at times of periphyton sampling showed that Goathorn Creek was warmer than Tenas Creek (Appendix 1 Table 1). However, the temperature ranges in both streams of 11°C in September to 1.5°C in October was ideal to support the abundant mayflies, stoneflies and chironomids (Wallace and Anderson 1996). For this reason temperature difference between streams was likely not enough to influence benthos abundance.

Extreme substratum variation (e.g., sand versus gravel and cobble) can select for invertebrate communities (Wallace and Anderson 1996). However, in mountain streams

like Goathorn and Tenas creeks that have a substratum of some sand but more surficial gravel, cobble and boulder, water velocity is more important in modifying invertebrate abundance (Statzner et al. 1988). A wide diversity of body types have evolved in stream benthos for purposes of optimizing use of wide ranging flow regimes around substratum particles. Stream insects are found on surfaces or under rocks or they can be found buried in gravel below surface water and rocks. Many mayflies and stoneflies occupy surfaces of rocks for feeding. In headwater streams where flows are relatively low, these taxa may occupy these surfaces for longer durations than in larger order systems where flows and particle transport may limit feeding on those surfaces. This may be one factor explaining greater mayfly and stonefly abundance and taxon richness at upstream stations in Goathorn and Tenas creeks (T3 and G5) compared to downstream (T1 and G2). Finding greater total taxon abundance upstream compared to downstream is, however, unusual. Other studies that have examined longitudinal variation in stream invertebrate communities report increasing abundance and richness with increasing stream size and order (Ward 1986, Kiffney and Clements 1996) due to increasing diversity and abundance of flow habitats and food with increasing stream size.

A most important factor explaining the inverse trend in Goathorn and Tenas creeks may be abundance of the periphyton food supply. Higher algal biomass that was found at the upstream stations (Fig. 1.3a-d) compared to downstream can increase the abundance of invertebrates (Johnston et al. 1990, Hart and Robinson 1990). The more abundant periphyton provides an improved food supply (Hershey et al. 1988) which increases invertebrate survival and greater larval abundance compared to sites where periphyton biomass is lower (Mundie et al. 1991, Perrin and Richardson 1997). The greater periphyton biomass at the upstream stations may be attributed to relatively high dissolved phosphorus concentrations at the upstream stations (Table 1.1).

Because, insects can move, mainly by crawling, they can avoid and survive extreme flood events by crawling into subsurface pore water which is called the hyporheic zone of streams. Some stonefly larvae are known to bury themselves several metres into the hyporheic zone (Stanford and Gaufin 1974). It is this process that explains why invertebrate abundance in streams is similar before and after major stormflow events (Williams 1984). For this reason, stormflows in Goathorn and Tenas creeks may not be an important factor determining benthos abundance particularly given that the timing of stormflows is likely to be similar between streams.

1.4.3 Indicator Taxa

A study conducted in Colorado coldwater streams to determine the sensitivity of attached algal communities to acid-mine drainage showed that certain species are indicative of mine pollution (Medley and Clements in press). Achnanthes minutissima and Fragilaria vaucherie were present in streams impacted by mine drainage in Colorado and in other impacted streams of western North America (Leland and Carter 1984, Deniseger et al.

1986). These same species were found in Goathorn and Tenas creeks. By recognizing these species as tolerant taxa, any increase in the relative abundance of these taxa to the exclusion of others listed in Tables 1.3-1.5 during future monitoring at downstream sites but not at control stations, would be an indication of a structural and functional change in the biological communities in Goathorn and Tenas creeks.

It is possible to recommend a few invertebrate groups that have been found to be sensitive to mine drainage and therefore useful as indicator organisms in future monitoring. Heptageniid mayflies have been found in a number of studies throughout North America to be sensitive to a range of environmental stressors (Leland et. al. 1989, Feldman and Conner 1992, Clements and Kiffney 1995, Kiffney and Clements 1996). Experiments (Kiffney and Clements 1994a) and surveys (Kiffney and Clements 1994b, Clements and Kiffney 1995) have showed that heptageniid abundance is reduced downstream of discharges of mine effluent compared to upstream reference stations. Heptageniid mayflies, particularly the genera, *Rhithrogena*, *Eporous*, and *Cinygmula*, were one of the most abundant mayfly families at Goathorn and Tenas creek stations. The disappearance of these taxa at downstream sites but not at control stations in future monitoring of Goathorn and Tenas creeks would be another indication of structural and functional change in the biological communities in Goathorn and Tenas creeks.

Another useful indicator is total mayfly abundance and mayfly taxa richness (Clements and Kiffney 1995). These measures are generally less variable in space and time compared to taxa-specific abundance measures and for practical purposes, they are robust, clear indicators. They may be particularly useful in Goathorn and Tenas creeks because mayfly abundance and taxa richness was high at all stations. Because the mayflies are a numerically important part of the stream communities, any large decline that exceeds background variability that is defined in the present data, can be regarded as a definitive change in community structure.

1.4.4 Application to Future Monitoring

The combination of water quality, periphyton and benthos data from 1983, 1984, and 1997 provide a baseline for comparison with data from future monitoring. It is expected that sampling of the same parameters will occur in any additional monitoring year. Using the same approach that was presented in this study, analyses of variance can be used to examine a location effect, year effect, and interactions between year and location on any of the measured parameters. If there is more than one year of monitoring after mine start-up, years can be used as replicates to compare with replicate years before mine operation (1983, 1984 and 1997) to examine change in parameter values between the two blocks of years. This approach is called a before-after-control-impact design (Smith et al. 1993). It can be a relatively robust analysis to examine time course change in chemical concentration or biological measures in streams between time periods. Whichever approach is used, the upstream sites control for natural factors that can influence stream community structure and function while the downstream sites may be exposed to these

factors and additional stresses. This layout and statistical analysis can separate effects of the natural factors from other stresses on community structure and function. For the effect of those other stresses to be significant, they must cause parameter values to substantially differ from the variability in measurements that are found occurring naturally across all years.

Before further assessments of stream water quality and biological communities in Goathorn and Tenas creeks can be addressed, it is essential that accurate water chemistry data be collected. To date, the data are sparse and inadequate to make decisions on the potential ecological consequences of altered chemical characteristics. Laboratories that support a detection limit of ≤ 0.001 mg•L⁻¹ for SRP, 0.002 mg•L⁻¹ for TDP and TP, 0.005 mg•L⁻¹ for NH₄⁺-N, and 0.002 mg•L⁻¹ for NO₃⁻-N should be used for future water quality analyses.

SECTION 2

FISHERIES STUDIES

Prepared by David Bustard MSc. RPBio.

2.1 STUDY OBJECTIVES

- To verify the existing fish database by repeating sampling at approximately 20 index sites throughout Goathorn, and Tenas creeks and the lower Telkwa River. These are the same locations that were sampled from 1983-85.
- To distinguish between bull trout and Dolly Varden use of all systems in the project area including key spawning and rearing habitats. The surveys were to extend into the upper portions of the Goathorn and Tenas watersheds to identify critical habitats on a watershed basis.
- To undertake more detailed fish and habitat work in Four Creek (Goathorn tributary) relative to the Tenas Pit and haul road.
- To update pink salmon spawner distribution data for Goathorn Creek and the lower Telkwa River.
- To repeat fish sampling in Helps and lower Hubert creeks and conduct additional sampling in the mid and upper reaches of Hubert Creek relative to the proposed haul road and loadout facilities.
- To collect more detailed fish and habitat information at specific road crossing sites on Goathorn Creek³ and the Telkwa River relative to proposed haul roads.
- To collate all fisheries information from past studies and incorporate new data from the 1997 studies and a recent stream reconnaissance inventory program onto a single project area fisheries map at a scale of 1:20000.

It was not an objective of this study to repeat all of the habitat measurements previously conducted and reported in earlier studies. Some summaries will be included, but the

³ Field studies assessing a proposed haul road crossing site from the Tenas Pit located on Goathorn Creek 100 m downstream from the confluence of Four Creek were undertaken during the fall of 1997. Subsequent to this evaluation, the proposed crossing site has been relocated downstream to an area in the vicinity of Site G3. The results of the field assessment at the original crossing site have not been included in this report and the assessment of the new crossing site is not complete.

reader will be referred to previous studies. As well, the results from studies of insect drift, fish diet, and metal analysis of fish tissue are presented in the appendices of the *Application for a Project Approval Certificate* and are considered adequate for baseline information.

Similarly, no further field studies were conducted on coho salmon spawning due to good baseline information in the Telkwa River for this species. A summary of ongoing coho salmon work in the Telkwa Watershed will be included in this report.

2.2 METHODS

Field studies were conducted from August through early November 1997. The main fish sampling program in Goathorn and Tenas creeks was conducted from the middle of September to early October to correspond to the same timing as past studies. High flows in Goathorn Creek during early October meant some of the fish population work had to wait until late October when flows were more manageable.

Access to all juvenile fish sample sites was either by vehicle or ATV. The mid and upper fish sample sites in Tenas Creek that had been accessed by helicopter in the 1980's were re-located to sites that allowed for vehicle access to within reasonable walking distance from newly-logged areas. The new sites were close to the original locations, and are considered representative of the reaches that were being sampled.

A helicopter was used during the spawning surveys in upper Goathorn and Webster creeks.

2.2.1 Fish Habitat Studies

Fish habitat descriptions including stream profiles, channel width, area, and gradient information for the main project area are presented in (Bustard 1983 and 1985a).

The 1997 studies extended the habitat information into upper sections of Goathorn and Tenas creeks and in Four Creek. This extension provides a more detailed evaluation over a larger area than previously available. The fish habitat data has been used in conjunction with the mapping at a 1:20000 scale.

Reach breaks were identified in the new areas using a combination of air photo interpretation, 1:20000 TRIM mapping, and ground surveys. Habitat information within each of these reaches was collected during ground surveys evaluating bull trout spawning areas, and as part of the juvenile fish sampling program.

This information was supplemented with observations made during a helicopter survey conducted on September 3, 1997. This flight was used to estimate the upper extent of

fish use in the watershed and to identify the most suited areas for potential spawning, barrier locations and potential access into tributary streams.

A total of 45 km of stream channel were identified as potential areas suitable for bull trout use and were examined by ground surveys during early September. As part of these surveys, potential spawning sites for bull trout and Dolly Varden were delineated. As well, barriers to fish migration (debris jams and falls) and areas of bank instability were noted. The ground surveys also allowed for an evaluation of potential fish use in the lower ends of small tributaries entering these stream reaches.

Additional habitat information was collected at fish sample sites and recorded on DFO/MOE Stream Survey Forms according to the procedures standardized by MOELP (1995)⁴. As well, more detailed habitat information was collected in the vicinity of proposed stream crossings in Goathorn Creek⁵ and the Telkwa River.

2.2.2 Juvenile Fish Studies

For those fish species such as steelhead and coho salmon, it is generally recognized that given adequate spawning escapements, limitation to production in these species typically occur at the stream rearing stage. Habitat differences (summer and winter) make some streams and specific reaches more suited as juvenile rearing habitat compared to others. Juvenile fish index sites provide valuable information concerning the capability of the habitat to support juvenile fish, especially if they are conducted over a range of different spawning escapements. This information, combined with a measure of adult spawner abundance, provides important background to help determine whether changes to stream habitat due to land-use activities may have led to a decline in a stream's capability to support rearing fish.

A total of 40 juvenile fish sample sites were evaluated in Goathorn and Tenas creeks and the lower Telkwa River (Figures 1.1, 1.2, and 2.1). This included 20 index sites that had been sampled during previous surveys (1983 to 1985).

An effort was made to locate these index sites at the same location as in past years. Several of the upper Tenas Creek sites were re-located to take advantage of new logging road access nearby. Sites in the Telkwa River were in the same general location, but substantial channel changes in all areas in the lower river over the past 14 years meant that the sites were not identical. Habitat conditions in sidechannel sites, in particular, were changed from past years.

⁴ The revised 1997 version of the Fish and Fish Habitat Inventory: Standards and Procedures was being tested during the summer of 1997 and not readily available for use at the time of the project development.

⁵ The location of the crossing has changed subsequent to the field surveys.

Sampling procedures varied between sites depending upon objectives. All tributary sites were blocked at their upstream and downstream ends and sampled using a Smith-Root BP-15 backpack electroshocker. A combination of bipods, rebar and ropes were used to hold the nets in place.

Key sites in Goathorn and Tenas creeks that have been sampled since 1983 encompassed large stream areas (typically 50-100 m long) and a 3-pass removal (Schnute 1983) was used to estimate populations. These sites serve as the best indicators for changes in long-term trends in juvenile fish populations in the vicinity of the proposed mine.

A decision was made to not conduct a modified Peterson mark-recapture estimate (Ricker 1975) in these sites similar to the 1983-85 period. In order to separate the bull trout and Dolly Varden juveniles, branchiostegal ray counts were conducted. The handling involved in conducting these counts would probably not allow for the full recovery of char needed to conduct a mark-recapture within a reasonable time period of initial capture.

Two-pass removal estimates (Seber and LeCren 1967) were conducted at most of these other sites. This method is fast and effective for estimating fish densities, but the confidence intervals tend to be not as tight as with the 3-pass removal. This sampling was useful for conducting assessments at sites that may not serve as long-term index sites, but are important for determining fish distribution and abundance within the stream systems. Some single-pass removal sampling was conducted at sites to determine whether fish were present or not (e.g., Four Creek).

New sites were established in upper Tenas Creek, upper Goathorn and Webster creeks, and in the Telkwa River in the vicinity of the proposed bridge site. As well, an additional 10 sites were established in Four Creek to delineate fish distribution in this tributary located in the middle of the project area.

Main channel sites in the Telkwa River were enclosed with two 15 m long seine nets held in place by rebar positioned prior to sampling. The main channel sites extended to the edge of the fast water encompassing most habitat utilized by juvenile fish. A 2-pass removal was used at these locations.

Appendix 3 Table 1 summarizes the sampling method, length of site and date of sampling for each of the juvenile fish sites in Goathorn and Tenas creeks, the lower Telkwa River, Bulkley River, and Hubert Creek.

An additional 20 sample sites were located in Hubert Creek and along the mainstem Bulkley River associated with the proposed road corridor and loadout facility (Figure 2.1). Sites in the upper free-flowing sections of Hubert and Helps creek, and in the Bulkley River were mainly sampled using 2-pass removal.



Slow-flowing and ponded sections in lower Hubert Creek were sampled using minnow traps baited with roe and set overnight. In total 56 minnow traps were used in lower Hubert and an additional 10 traps were set at WL1 (a wetland complex on the Telkwa River downstream from Goathorn Creek - Figure 1.1).

Sample site areas were calculated from measurements of length and a series of width measurements made at 5 to 10 m intervals along the site. Fish captured were sorted by species and measured to the nearest mm and most were returned to the stream at the end of sampling.

Scales for fish age analyses were retained from 157 steelhead parr (Goathorn Creek - 49; Tenas Creek - 59; and lower Telkwa River - 49). As well age analyses were conducted on scales from 15 juvenile coho taken in the lower Telkwa River. This allowed for the separation of juvenile steelhead and coho by age class. A summary of all steelhead scale information is presented in Appendix 9 Tables 1-3.

Branchiostegal ray counts were conducted on char larger than 50 mm fork length. These counts, in conjunction with head shape, were used to separate bull trout from Dolly Varden juveniles in the study. Results from previous DNA analyses have indicated that field crews have been very effective at separating these two species based on these morphometric characteristics (Bustard 1995). Bull trout counts were 26 or more while Dolly Varden were typically 25 or less.

Caudal fin clips were retained from Dolly Varden and bull trout juveniles larger than 50 mm fork length. Samples were preserved in ethanol and separated for each site. All DNA samples were shipped to Dr. E. Taylor's lab in the Zoology Department at the University of BC.

Char fry were visually separated into bull trout and Dolly Varden, but were combined for data analysis due to uncertainty associated with char identification at this small size. Char fry from the main Goathorn and Tenas creek sites were retained in alcohol for future genetic analysis.

2.2.3 Adult Surveys

2.2.3.1 Pink Salmon

Ground surveys for adult pink salmon spawners and redds were conducted on September 2 and 12 in the lower 1.5 km section Goathorn Creek. These dates correspond to peak spawning periods for pink salmon in the Telkwa Watershed based on past surveys (Bustard 1984b).

Aerial surveys planned for the lower Telkwa River were cancelled based on the low spawner numbers present in the watershed in 1997.

2.2.3.2 Bull Trout and Dolly Varden

Ground surveys looking for bull trout spawners and redd development were conducted throughout the accessible sections of Tenas, Goathorn, Cabinet and Webster creeks. The surveys were conducted during the week of September 2 to 5th by two crews.

The timing of these surveys was based on observations of two bull trout spawners moving upstream in Goathorn Creek at the upper bridge on August 14th 1996 (Bustard 1996). This is also the week of peak bull trout spawning in a population studied in the headwaters of the Finlay River (Bustard 1997a).

Ground surveys consisted of observers walking stream sections and carefully examining for evidence of either spawning fish or redd development. Observers could generally cover 5-8 km per day and used a hip chain and air photos to keep track of their location. Most stream sections had good visibility during the surveys, although heavy debris accumulations, particularly in Webster Creek did restrict observations. A wading stick was used to probe under overhanging banks and debris. Redd sites were ribboned and redd dimensions were measured. Visual estimates were made of the size of bull trout spawners.

An estimate of the area of potential bull trout spawning habitat was made during the ground surveys. These estimates of suitability were made based on a combination of velocity, depth, cover and bed material. The sites had to have the right combination of these habitat characteristics to be included as potential bull trout spawning habitat. Observers were experienced in evaluating the bull trout spawning habitat based on three years of spawning observations in bull trout streams in the upper Finlay.

Efforts to tag bull trout spawners in the study streams during these ground surveys were limited by low numbers of fish and heavy cover at spawning sites. A spaghetti tag was applied to a single bull trout spawner in Webster Creek.

Specific surveys of Dolly Varden spawners were not undertaken in the Goathorn and Tenas watersheds, since no areas of high suitability (e.g., groundwater channels and seepages) were identified during the preliminary surveys. Some potential habitat areas were noted during the bull trout ground surveys and limited spawner information was collected during the juvenile surveys.

2.3 RESULTS

This section updates the fish habitat information presented in Bustard (1985a) and presents the results of juvenile and adult fish surveys by study stream section. It is separated into five sub-sections:

- 1.) Goathorn Creek (including Cabinet, Webster and Four creeks).
- 2.) Tenas Creek
- 3.) Lower Telkwa River
- 4.) Bulkley River
- 5.) Hubert and Helps creeks

A significant addition to the fisheries baseline studies is the detailed mapping of areas that constitute fish habitat. This is presented on the 1:20000 aquatic map delineating streams with known or suspected fish habitat (marked as red on the maps) versus those that do not offer fish habitat (marked as blue). As well, the map identifies fish sample sites (historic and 1997 sites), fish spawning locations, species distribution, and significant habitat features.

This map combines information collected during habitat assessments conducted during the studies for Manalta Coal Ltd. as well as reconnaissance stream inventory work funded by Forest Renewal B.C. (FRBC) in the Telkwa watershed during 1997⁶, and other incidental studies conducted in the Telkwa Watershed.

2.3.1 Goathorn Creek

2.3.1.1 Habitat Description - Goathorn Creek

The mainstem of Goathorn Creek is accessible to fish for approximately 15 km upstream from its confluence with the Telkwa River to a 5 m rock falls located in a canyon section in Reach 4. No fish are present in the upper reaches of Goathorn Creek. A massive debris jam located 0.5 km upstream from the Cabinet Creek confluence is a point of difficult passage and is presently the upper extent of fish migration for species moving upstream from the Telkwa and Bulkley rivers. At least two other very large debris jams - are there and sediment wedges are present in this section downstream from the permanent canyon the section downstream from t barrier (Photo 1).

1990AST

During the 1980s, a 1-2 m high beaver dam located in lower Goathorn Creek used to be a point of difficult passage during the late summer and early fall period, and was the upper extent of pink salmon access (Bustard 1984b). This beaver dam is no longer present, and fish are able to move upstream into Tenas and Goathorn creeks.

⁶ Data collected by Triton Environmental Consultants Ltd. and kindly provided at a draft stage for incorporation into the project area mapping on this project.

The lower two reaches of Goathorn Creek are typically 2-3% slope and are classified as riffle-pool in the lower section and cascade-pool in the upper reaches. Reach 1 tends to have more gravels and deeper and more extensive pools than the upper reach. Moderate bed material aggradation in sections of this reach have led to channel widening and side and mid-channel bar development. Upstream from the reach break at Tenas Creek the bed material is dominated by cobbles and boulders. Streamflow tends to be shallow and rapid, and channel widening is evident. Large woody debris tends to be oriented parallel to the banks.

Ground surveys during 1982 (Bustard 1983) indicated limited spawning potential in Goathorn Creek. While the lower reach offered pockets of gravel suitable for pink salmon and steelhead constituting less than 1% of the overall stream area, upstream sites had even less habitat suitable for spawning.

Habitat conditions in Goathorn Creek do favour species such as steelhead and char that spend at least several years rearing in tributary streams. These species are able to find isolated pockets of gravels for spawning.

Goathorn Creek appears poorly suited for coho spawning and incubation due to generally low groundwater inflows and severe ice conditions that can occur in this system during the late fall spawning period (Bustard 1985a). More importantly, the system has few wetlands and sidechannel sites favoured by juvenile coho for rearing.

The cobble and boulder bed material with clean interstitial spaces provides ideal rearing conditions during both the summer and winter periods for both steelhead and char. However the highly fluctuating flow regime and tendency for channel scouring poses risk for rearing juveniles, especially during the snowmelt period in May and June.

Although steelhead and the two char species occur together in Goathorn Creek, steelhead dominate the lower sections, bull trout are predominant in the mid-reaches and Dolly Varden are most common in the upper system. The distribution probably reflects subtle differences in habitat, including water temperatures.

Other than Tenas, Four, Cabinet, and Webster creeks, most tributaries to Goathorn Creek provide little potential fish habitat due to poor access from the mainstem creek due to a distinct topographic break creating a steep drop from the bench areas down to the creek.

Cabinet and Webster Creeks

Cabinet Creek is accessible for approximately 5 km upstream from Goathorn Creek. The lower 3.4 km has a slope of 2% and is dominated by cobbles and small boulders. Sediment wedges associated with debris jams are present in this section. The channel is entrenched through much of this reach, with the lower end of a single tributary (Tributary CA3 on 1:20000 aquatic map) accessible to Dolly Varden.

Although the bed material is large, pockets of potential spawning areas are present and bull trout spawning does occur in this section of Cabinet Creek. Dolly Varden dominate fish use in this reach, and some pockets of potential spawning were noted in sidechannel areas near the Webster Creek confluence.

The creek steepens sharply upstream from the Webster Creek confluence and is accessible to a 1.5 m rock falls located 1400 m upstream. The channel has a stepped pool morphology in this section, with heavy debris accumulations across the channel (Photo 2).

Webster Creek is a major tributary to Goathorn Creek and is accessible to 6.7 kms above Cabinet Creek. Upstream from this, the creek rises sharply in a series of chutes and falls. The lower reach of Webster Creek is characterized by large cobbles and bouders and heavy debris accumulations. A large tributary in this section (Tributary WB4) is accessible from Webster Creek and Dolly Varden have been sampled up to 2.5 kms upstream during past surveys.

Reach 2 of Webster Creek has some of the best potential spawning habitat in the Goathorn Watershed, including some gravel accumulations associated with pools and debris cover suitable for bull trout use. Most tributaries entering the upper two reaches tend to be small and steep, with no potential fish use.

Four Creek

Four Creek enters directly into Goathorn Creek in the middle of the project area. This small creek has been able to cut down through the valley sidewalls of Goathorn Creek and has adequate flows to support a small resident Dolly Varden population in its upper reaches. Access for fish moving upstream from Goathorn Creek is restricted to the fan downstream from the culvert at the lower road crossing (Reach 1), a distance of approximately 100 m. This section offers potential spawning for Dolly Varden and possibly steelhead.

Four Creek climbs at a 4-5% slope for approximately 2 kms onto the bench area. Fish are present for an additional 3 kms to a point where the channels become small and steep.

Reach summaries for habitat characteristics in Goathorn Creek are presented in Appendix 4 Table 1. Individual sample site habitat descriptions are in Appendix 5.

2.3.1.2 Juvenile Fish Sampling - Goathorn Creek

Fish density estimates were conducted at 12 sites in Goathorn Creek (including Cabinet and Webster creeks) during the 1997 program. Five of these sites (G1 to G5) are index sites where sampling had also been conducted during the period 1983 to 1985. Sample

areas at these five locations were large, and effort was high (3-pass removal), compared to smaller sites and lower effort (2-pass removal) at other sites. The detailed results for fish sampling at all sites in Goathorn Creek are presented in Appendix 6.

A total of 3560 m² was sampled in 1997 over a total stream length of 297 m (Table 2.1). The greater wetted area sampled reflects higher streamflow condition in Goathorn Creek during September and October 1997 compared to past years. The shorter total stream length sampled is the result of sampling a smaller site at Site G5 than in past years due to high and fast water conditions.

The species composition (combined for the five index sites) remained similar to past years. Juvenile steelhead comprised over 70% of the catch, largely a result of high steelhead fry numbers at the lower two sites. The remainder of the catch was comprised almost entirely of char.

Char juveniles were separated into bull trout and Dolly Varden for the first time in 1997. Of the 67 juveniles estimated in the five index sites, 49 (73%) were identified as bull trout. Preliminary identification of the char fry also indicated that most were bull trout.

Mountain whitefish comprised just under 2% of the overall catch in 1997. A total of 13 whitefish (108-178 mm fork length) were sampled - all at Site G1. Only two whitefish have been sampled at the Goathorn index site in the three previous years. Similar to past years, no coho juveniles were sampled at any site in Goathorn Creek in 1997.

Juvenile Steelhead - Goathorn Creek | Que

Figure 2.2 compares the estimated number of steelhead at the two main sites in Goathorn Creek (Sites G1 and G2). The data indicate that the total number of fry estimated in 1997 is comparable to past estimates of between 300 and 500 fry in these two sites. Mean fry densities have ranged between 23-34 fry/100m² of habitat at these lower Goathorn sites (Table 2.2). Fry densities have consistently been higher at Site G1 located downstream from the confluence of Tenas Creek, and may reflect some fry recruitment into lower Goathorn Creek from Tenas Creek.

Figure 2.3a shows the decline in steelhead fry with distance upstream from the Telkwa River. No steelhead fry were sampled at sites more than 6.9 kms upstream. The pattern of declining steelhead fry with distance upstream has been similar during all four years of sampling in Goathorn Creek (Appendix 7 Table 1).

⁷ Char fry at these sites were retained for DNA analysis to confirm species identification. These samples have been sent to UBC for analysis, but results are not available at this time. See comments re char fry at each site in Appendix 6.



Photo 1. Goathorn Creek upstream from the Cabinet Creek confluence is characterized by several large debris jams and associated sediment wedges. A debris jam located 0.5 km upstream from Cabinet Creek is presently the upstream limit for steelhead and bull trout moving upstream from the Telkwa and Bulkley rivers.



Photo 2. Cabinet Creek upstream from the Webster Creek confluence is comprised of a series of stepped pools and heavy debris accumulations. This section is accessible for 1.4 km and is utilized by resident Dolly Varden.

Table 2.1. Summary of fish species and age class composition at Goathorn Creek index sites (Combined G1 to G5).

Species		198	33	198	34	198	35	199	7
	Age	Number	%	Number	%	Number	%	Number	%
		470	52.0	378	47.6	519	62.2	457	62.7
Steelhead	0+	470	52.0 11.8	138	17.4	28	3.4	7	1.0
	1+ >=2+	107 58	6.4	48	6.0	33	4.0	70	9.6
Char	0+	123	13.6	78	9.8	152	18.2	115	15.8
Bull trout	>=1+	ns		ns ·		ns*		49	6.7
Dolly Varden	>=1+	145	16.0	151	19.0	102	12.2	18	2.5
Mountain whitefish	>=1+	1	0.1	1	0.1	0	0.0	13	1.8
TOTAL		904	100	794	100	834	100	729	100
Area sampled (m^2)		3238		3323		2950		3560	
Length of stream samp	led (m)	323		323		323		297	

Table 2.2. Densities of steelhead fry and parr (fish/100m²) at the two main steelhead index sites in lower Goathorn Creek from 1983-85 and in 1997.

		Age 0+		Parr ⁸				
	G1	G2	Mean	G1	G2	Mean		
1983	49.3	12.7	31.0	10.9	6.8	8.9		
1984	38.9	9.0	24.0	12.7	8.4	10.6		
1985	42.4	24.7	33.6	3.4	3.0	3.2		
Mean 1983-85	43.5	15.5	29.5	. 9.0	6.1	7.5		
1997	25.0	20.5	22.8	3.8	3.2	3.5		

Steelhead parr numbers at Sites G1 and G2 were low compared to 1983 and 1984, but similar to the 1985 results at these sites (Figure 2.2a). Numbers of age 1+ steelhead were very low in Goathorn Creek in 1997, with only 7 estimated for the five sites combined. However, older parr numbers (≥age 2+) were the highest estimated in the four years of sampling (Table 2.1). Steelhead parr densities in these Goathorn index sites have ranged from 3 to 11 parr/100m² of habitat during the four years of study.

Similar to the steelhead fry distribution pattern, steelhead parr abundance declined with distance upstream from the Telkwa River. Steelhead parr were present in Goathorn Creek up to the Cabinet Creek confluence and in the lowest section of Cabinet Creek (Figure 2.3a). No steelhead parr were present in upper Cabinet or Webster creeks. This distribution has not changed significantly compared to past years (Appendix 7 Table 1).

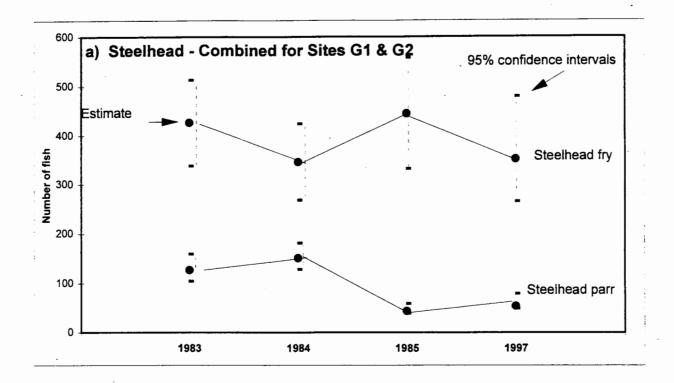
The mean fork length of steelhead fry combined for the five sites was 38.2 mm (Appendix 8 Table 1). This is in the mid-range of sizes compared to past years. Age 1+ and older steelhead averaged 78.4 mm and 112.7 mm respectively. It is interesting to note that the 1983 sample of steelhead in Goathorn Creek included fish exceeding 180 mm fork length (typical maximum steelhead smolt size) at four of the five sites sampled. Some rainbow up to 260 mm fork length were sampled, suggesting the presence of residual steelhead or a small population of stream residents. This pattern has not been noted at the index sites since 1983.

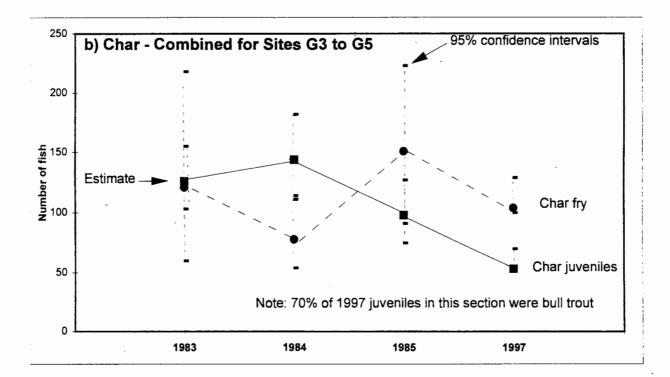
More detailed length-frequency information for Goathorn Creek fish is presented in Appendix 9 Figures 1 and 2.

Some additional fish data were collected in Goathorn Creek during the summer of 1996 as part of a Ministry of Environment project (Bustard 1996). Sampling at two locations in Goathorn Creek on August 14, 1996 yielded no steelhead fry in the catches despite 3-

⁸ Combination of Age 1+ and older steelhead.

Figure 2.2. Estimated fish numbers and confidence intervals for steelhead and char at Goathorn Creek index sites.





pass removal at enclosed sites comprising 1110 m² of habitat (Appendix 5). This sampling was conducted near Site G2, in the steelhead section of Goathorn Creek. Sampling conducted by Tredger (1986) on August 21, 1986 indicated that newly-emerged steelhead fry were present in Goathorn Creek on this date. All of these fry were less than 30 mm fork length. Some of the fry captured in mid-September during the 1997 sampling were recently-emerged. Together these observations suggest that steelhead fry emergence occurs quite late in Goathorn Creek - starting near the end of August and continuing through until mid-September.

Juvenile Char - Goathorn Creek

Figure 2.2b summarizes the estimated number of char fry at the three main Goathorn Creek index sites (G3-G5) from 1983-85 and 1997. The numbers range from a low of 78 in 1984 to a high of 151 in 1985. The results for 1997 are in the mid-range. It should be emphasized that char fry tend to be bottom-oriented and are difficult to retrieve during electrofishing in the large bed material characteristic of Goathorn Creek. Preliminary estimates suggests 84% of the char fry were bull trout (65 of 77 fish examined).

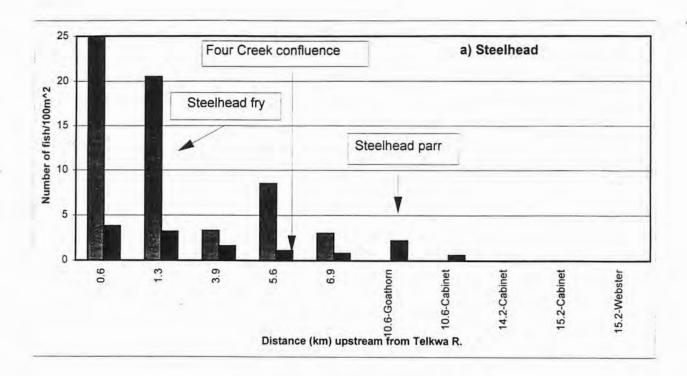
Char fry densities have ranged between 5 and 11 fry/100m² of habitat at the three best index sites (Table 2.3). The 1997 results were at the low end of this range. Fry densities have been highest at Site G4 located just downstream from the confluence of Four Creek (Figure 1.2).

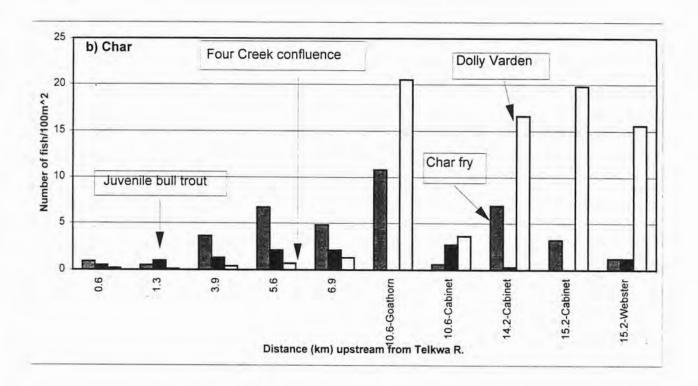
Table 2.3 Densities of char fry and parr (fish/100/m²) at the three main char index sites in lower Goathorn Creek from 1983-85 and in 1997.

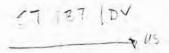
		Char	Char juveniles					
	G3	G4	G5	Mean	G3	G4	G5	Mean
1983	6.5	14.0	3.2	7.9	4.1	8.6	8.2	7.0
1984	6.6	6.6	1.8	5.0	6.8	7.2	8.2	7.4
1985	7.0	18.6	6.1	10.6	7.5	4.3	6.7	6.2
Mean 1983-85	6.7	13.1	3.7	7.8	6.1	6.7	7.7	6.8
1997	3.6	6.7	4.8	5.0	1.7	2.8	3.4	2.6

Char fry densities were also high at several of the upper sites including Site G8 in. Goathorn Creek upstream from the Cabinet Creek confluence, and at Site G7 just downstream from the Webster Creek confluence (Figure 2.3b). Field observations suggest that most of these are Dolly Varden fry. Interestingly, no char fry were sampled

Figure 2.3. Density of steelhead and char in Goathorn Creek at different distances upstream from the Telkwa River, 1997.







at Site G7 in 1984 (Bustard 1985), suggesting considerable variability between years at these upper sites.

Figure 2.2b shows the total number of char juveniles combined for the three index sites for the four years of sampling. Total numbers in the sites have ranged from 53 in 1997 to 144 in 1984, indicating considerable fluctuation between years. Densities of juveniles have ranged from 2.6 juvenile/100m² in 1997 to between 6 and 7 juveniles/100m² during the period 1983-85.

Bull trout juveniles were present in Goathorn Creek to the Cabinet Creek confluence and into lower Webster Creek. They were not present in Goathorn Creek upstream from Cabinet Creek (Site G8) or in upper Cabinet Creek (Site G9). The highest abundance of bull trout juveniles was in the mid-reaches of Goathorn Creek and lower Cabinet Creek. Bull trout juveniles did not exceed 3 fish/100m² at any of the Goathorn Creek locations in 1997 (Figure 2.3b).

Dolly Varden densities increased in the upper reaches of Goathorn, Cabinet and Webster creeks and typically ranged from 15-20 fish/100m² of habitat (Figure 2.3b). These headwater sections of streams are dominated by Dolly Varden, and achieved the highest biomass for fish at any of the Goathorn Creek sites (Appendix 10 Table 1).

Char fry averaged 51 mm fork length in 1997, slightly higher than average fry lengths measured in past years (Appendix 8 Table 1). Juvenile sizes have consistently averaged from 100-105 mm fork length for the four years of sampling. On average, juvenile bull trout were approximately 10 mm longer than Dolly Varden.

2.3.1.3 Adult Fish Observations - Goathorn Creek

Adult fish observations in Goathorn Creek concentrated on pink salmon and bull trout spawning surveys during early September.

Pink Salmon - Goathorn Creek

Two surveys were conducted in the lower 1.5 km of Goathorn Creek looking for pink salmon spawners or redds. The surveys were conducted on September 2nd and 12th - near the peak of use of the lower creek based on past observations (Bustard 1984b).

No pink salmon spawners or redds were observed in lower Goathorn Creek during the two surveys, suggesting minimal use of this system during 1997 - a year of low pink escapements throughout the Bulkley River. A single unspawned dead pink salmon was found in the lower 100 m of Tenas Creek, just upstream from the Goathorn Creek

⁹ A small number of these fish are Dolly Varden adults that typically mature in the 150-200 mm fork length range (see Appendix 9 Figure 2).

confluence on September 3rd. A local resident reports that during some years he has observed significant numbers of pinks spawning in lower Tenas Creek, but not in Goathorn Creek upstream from the Tenas confluence¹⁰.

A total of 58 pinks was observed in the lower 600 m of Goathorn Creek in 1983 (Bustard 1984b), a year of high escapements throughout the Bulkley Watershed. No pinks were observed in 1984.

Bull Trout - Goathorn Creek

Bull trout spawner and redd surveys were conducted throughout the mainstem of Goathorn, Cabinet and Webster creeks during the first week of September (Table 2.4). Approximately 28 km of creek were examined. Visibility was generally good during these surveys, however Webster Creek was difficult to survey due to extensive debris accumulations that made both redd and spawner observations difficult.

In total, 16 bull trout spawners and 6 redds were observed during the surveys. The redd sites were mainly located in a 2 km section of Goathorn Creek downstream from Cabinet Creek (Photo 3), in lower Cabinet Creek and in a section between 3.8 and 4.2 km upstream on Webster Creek. A single bull trout redd (suspected) was observed in lower Goathorn Creek. The specific redd site locations are shown on the 1:20000 aquatic map.

Eight of the 16 bull trout spawners observed were not holding in spawning locations and were thought to be moving upstream. These observations suggest that the surveys were conducted early into the spawning period. Four of the redd sites had bull trout present, including three of the redds with pairs of fish actively spawning. The detailed results of the surveys are presented in Appendix 11 Tables 1 and 3.

Goathorn Creek bull trout spawners typically ranged in size from 40-55 cm fork length, based mostly on visual estimates made by experienced observers. Three bull trout spawners that have been captured in Goathorn Creek during the years of study have ranged from 43-45 cm fork length¹¹. Redd dimensions ranged from 0.5 to 1.5 m² based on a small number of sites (Appendix 11 Table 3).

It is interesting to note that a female bull trout that was tagged at a redd site 3.8 km upstream in Webster Creek on September 4 was recaptured by an angler in the Telkwa River upstream from Goathorn Creek approximately 3 weeks later (Photo 4). This was the only bull trout tagged during the study, and suggests that Goathorn Creek bull trout spawners are probably very vulnerable to angling in the Telkwa and Bulkley rivers.

Bruce Kerr, Telkwa.

¹¹ Includes a 43 cm bull trout angled in lower Goathorn (600 m upstream) in August 1984; a 45 cm bull trout electrofished at Goat2 (upper bridge) in August 1996; and a 44 cm bull trout angled at a redd site in Webster Creek during September 1997.

Table 2.4. Summary of bull trout spawner and redd observations in Goathorn Creek during September 2-4th, 1997.

Stream Section	Length (m)	Spawners	Redds	Comments
Lower Goathorn to Cabinet Ck.	10500	7	3	Most redds and bull trout spawners observed from 8.5 to 10.5 km upstream. Single redd in lower system.
Goathorn Ck. above Cabinet Ck.	4400	0	0	Suspect no access beyond 435 m debris jam.
Cabinet Ck. to Webster Ck.	3800	7	1	Fish mainly moving upstream throughout this section.
Cabinet Ck. above Webster Ck.	1400	0	0	Appears mainly DV use of this section. No bull trout spawning potential identified.
Webster Ck. upstream from Cabinet Ck.	6700	2	2	Spawning from 3.8 to 4.2 km upstream. Difficult observations due to debris. Suspect more spawning and holding fish may use this section.
Lower Four Ck.	1350	0	0	Suspect no access beyond road culvert at 150 m. Probably too small for bull trout.

This population of bull trout is assumed to be fluvial and to reside in the Telkwa and Bulkley rivers except during migration and spawning periods in August and September.

Dolly Varden - Goathorn Creek

Dolly Varden spawning in Goathorn Creek is likely scattered throughout the upper watershed. Specific areas identified during the September ground surveys included Goathorn Creek upstream from the Cabinet Creek confluence (based on maturing fish in this section), and Cabinet Creek in the vicinity of the Webster Creek confluence (good sidechannel section and pockets of suitable gravel upstream from Webster Creek). Other



Photo 3. This good potential bull trout spawning habitat was located in the midreaches of Goathorn Creek. Most bull trout spawning occurs upstream from the proposed mine project.



Photo 4. This female bull trout was tagged at a redd site in Webster Creek in early September. It was recaptured by an angler in the Telkwa River three weeks later.

potential sites include the lower sections of Four Creek and possibly a small tributary just upstream (Tributary GT2 on 1:20000 aquatic map) where Dolly Varden were captured during the FRBC fish inventory sampling.

Based on observations elsewhere in the Bulkley Watershed in tributaries arising in the Telkwa Range similar to Goathorn and Tenas creeks, Dolly Varden spawning likely occurs at least several weeks later than the peak of bull trout spawning, typically in late September, with spawning continuing into early October (Bustard 1997c)

Four Creek

Fish abundance and distribution in Four Creek was examined in detail in 1997 due its proximity to the Tenas West Pit and the proposed haul road from the pit to the plant site. The results, based on sampling at 10 locations in conjunction with ground surveys (Figure 1.2) and additional sampling conducted during the FRBC stream inventory studies, indicated that most of Four Creek is utilized by resident fish.

Steelhead fry and Dolly Varden were present in the lower reach of Four Creek - a short fan area located downstream from the lower road crossing (Table 2.5). Two maturing Dolly Varden were captured at this location, and it is likely that some spawning may occur in this section.

Upstream from the road crossing, sampling indicated that Four Creek is utilized by a small population of Dolly Varden for a distance of approximately 5 kms (see the 1:20000 aquatic map for the distribution). No fish were captured at a site immediately upstream from the road crossing (Site F2).

However, Dolly Varden were present in the mid-reaches of Four Creek at densities of 6-11 fish/100m². Based on the catches at sites F4 and F5 and applying these to the upper 4 kms of Four Creek (i.e., excluding a 1 km steeper section in vicinity of F2 where there was no catch) leads to an estimate of just under 1000 Dolly Varden in Four Creek¹².

Dolly Varden in Four Creek are likely a resident population maturing at a small size (12-15 cm). The largest fish captured during sampling above the road culvert was 122 cm. Dolly Varden to 145 mm were captured in Four Creek during forest inventory sampling¹³.

¹² Mean fry catch of 6.7 fry/100 m and 17.1 juveniles-adults /100 m of stream length over 4 kms leads to an estimate of 268 fry and 684 juveniles and adults combined.

¹³ Fish site card information provided by Triton Environmental Consultants Ltd.

Table 2.5. Summary of densities of fish captured at sample sites in Four Creek during 1997.

Site		Fish/100m ²	
	Steelhead	Dolly	Varden
	Age 0+	Age 0+	≥Age 1+
F1	21.6	0	10.8
F2	0	0	0
F4	0	0	6.0
F5	0	7.0	11.0
Mean F4 & F5	0.0	3.5	8.5

2.3.2 Tenas Creek

2.3.2.1 Habitat Description - Tenas Creek

Tenas Creek drains an area of 63 km² or approximately one-third of the total Goathorn Watershed. Significant fish spawning and rearing occurs upstream to a 20 m falls located approximately 16.5 km upstream (West Fork). The East Fork of Tenas is accessible for approximately 4 km. At this point it rises sharply at a series of chutes and cascades. Debris jams in the lower sections of the East Fork may be barriers to fish moving upstream during lower flows.

Most of the fish-producing sections of Tenas Creek are located in a confined gully with evidence of extensive valley-wall instability. Exposed fine-textured banks are prevalent, particularly on the east side of Reach 1 (Photo 5). Sediment inputs into Tenas Creek from these areas of instability may have been accelerated by logging to the edge of the escarpment area during the 1980's (Saimoto 1996), although studies conducted by the Ministry of Forests were unable to locate sediment inputs loading into Tenas Creek caused by logging activities (Beaudry et al. 1991).

All of the tributaries entering Tenas Creek from the east side (vicinity of Tenas West Pit) are small drainages that are not accessible beyond the steep embankment along Tenas Creek. The lower few hundred meters of a tributary entering from the west side of Tenas Creek in Reach 3 (TN18) offers some potential fish habitat before rising steeply.

More moderate streamflows and a narrower and lower gradient channel make the lower 9 km of Tenas Creek particularly suited for steelhead spawning and rearing (Photo 6). Large organic debris plays a more significant role in creating habitat diversity in Tenas Creek compared to the lower reaches of Goathorn Creek. Pool areas have formed

downstream from logs and root wads, and gravel has been deposited at the tail-outs from these pools creating more spawning areas. A lower discharge in Tenas Creek has also resulted in more low velocity sections suitable for fry rearing than in the large and fast-flowing Goathorn Creek.

Potential spawning habitat is also available in Reach 2 and the lower 2 km of Reach 3 (West Fork). Definite steelhead and bull trout redds were identified in this section during the 1997 ground surveys. Specific locations are shown on the 1:20000 aquatic map.

The channel slope steepens to 5-10% in Reach 4 of the West Fork and in most the East Fork, and the channel morphology becomes stepped-pool and cascade-pool through these sections. These areas are suspected to offer potential char habitat. The presence of bull trout fry in the lower section of the East Fork suggests that some bull trout spawning occurs in this system.

2.3.2.2 Juvenile Fish Sampling - Tenas Creek

Fish density estimates were conducted at six locations in Tenas Creek during the 1997 program (Figures 1.1 and 1.2). Three of these sites (T1 to T3) are index sites where sampling has also been conducted during the period 1983 to 1985. Site T4 has data for two years while the two additional sites in the upper watershed were added to better delineate fish distribution in the watershed, particularly for the char species. The detailed results for fish sampling at all sites in Tenas Creek are presented in Appendix 6, while habitat information is presented in Appendix 5.

A total of 1317 m² of habitat over a stream length of 194 m was sampled at the three key index sites in 1997 (Table 2.6). This is comparable to sample effort during the period 1983 to 1985. The results suggest that the species composition was similar in 1997 compared to catches in the mid-1980s with approximately 90% of the total catch at the three sites comprised of steelhead trout fry and parr.

Char fry and juveniles comprised between 2-3% and 4-8% of the overall catch in all four years of sampling. Sampling during 1997 indicated that only 5 of the 28 char juveniles (18%) sampled at the three index sites were bull trout. Whitefish have only been captured at index sites in Tenas Creek during 1984, when two were present.

Juvenile Steelhead - Tenas Creek

Figure 2.4a compares the estimated number of steelhead at the three index sites in Tenas Creek (T1 to T3) over the four years of sampling. Steelhead fry numbers have ranged from a high of nearly 700 in 1983 to a low of 232 in 1984. The 1997 results of 376 fry are in the mid-range compared to past years. These September fry estimates provide a

Table 2.6. Summary of fish species and age class composition at Tenas Creek index sites (Combined T1 to T3).

Species		198	3	198	34	198	5	199	7
	Age	Number	%	Number	%	Number	%	Number	%
Steelhead	0+	701	76.8	232	56.3	452	74.1	392	76.1
AND THE REPORT OF THE PERSON O	1+	99	10.8	104	25.2	25	4.1	30	5.8
	>=2+	45	4.9	35	8.5	75	12.3	51	9.9
Char	0+	30	3.3	7	1.7	15	2.5	14	2.7
Bull trout	>=1+	*ns		ns		ns		5	1.0
Dolly Varden	>=1+	38	4.2	32	7.8	43	7.0	23	4.5
Mountain whitefish	>=1+	0		2	0.5	0		0	
TOTAL		913	100	412	100	610	100	515	100
Area sampled (m^2)		1154		1201		1094		1317	
Length of stream samp	led (m)	189		182		182		194	
*Bull trout and Dolly Varde	n were not se	eparated as diff	erent spec	ies from 1983	to 1985.				

reasonable measure of the strength of the previous year's spawner recruitment to this stream.

Fry densities combined for the three index sites have ranged from 14 to 48 fry/100m² during the four years of sampling (Table 2.7). The data suggests that fry densities have consistently been higher at the bottom two sites (T1 and T2) compared to the upper index site located in Reach 2 of Tenas Creek. The 1997 densities of both steelhead fry and parr were lower than the mean for the three years of sampling in the mid-1980s.

It is interesting to note that steelhead fry were distributed at higher densities farther upstream on Tenas Creek than in past years. Sampling at Site T4 (located 7.4 km upstream from Goathorn Creek) indicated that steelhead fry achieved relatively high densities up to at least the top section of Reach 1 in 1997 (Figure 2.5a). This reach was identified as the most suited for potential steelhead spawning during the habitat surveys. Sampling in 1984 indicated that in some years steelhead fry can be quite sparse above the lowest site (T1). Figure 2.5a illustrates the decline in steelhead fry at sample sites located in the upper reaches of Tenas Creek compared to lower sections based on 1997 sampling.

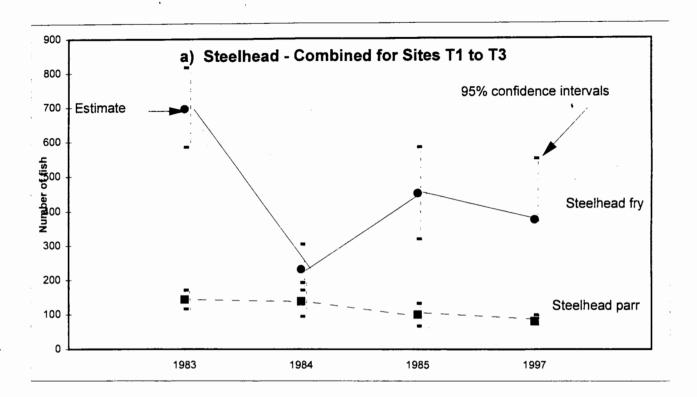
Table 2.7 Densities of steelhead fry and parr (fish/100m²) at three index sites in Tenas Creek from 1983-85 and in 1997.

		Ago	e 0 +		Parr				
	T1	T2	Т3	Mean	T1	T2	Т3	Mean	
1983	87.7	52.2	4.6	48.2	13.3	17.3	0.0	10.2	
1984	36.6	4.4	0.5	13.8	8.0	21.1	2.9	10.7	
1985	50.4	46.8	1.2	32.8	6.2	15.7	3.5	8.5	
Mean 1983-85	58.2	34.5	2.1	31.6	9.2	18.0	2.1	9.8	
1997	40.9	24.2	9.9	25.0	7.5	7.2	5.4	6.7	

Steelhead parr densities (mean for three index sites) have ranged from 7 to 11 parr/100m² for the four years of sampling (Table 2.7). Densities have been highest at Site T2 in the mid-section of Reach 1 during most years. Sampling at Site T4 located 7.4 km upstream on Tenas Creek resulted in the highest parr densities in 1997 (Figure 2.5a). Steelhead parr were present up into the West Fork of Tenas Creek over 13 km upstream. A steelhead redd was identified in this section during the 1997 surveys.

Steelhead age 1+ parr numbers were very low during the 1997 sampling program. Only 30 yearlings were captured in the three sites combined. This pattern of low yearling numbers is similar to that observed in Goathorn Creek and suggests poor fry recruitment thoughout the watershed during 1996.

Figure 2.4. Estimated fish numbers and confidence intervals for steelhead and char at Tenas Creek index sites.



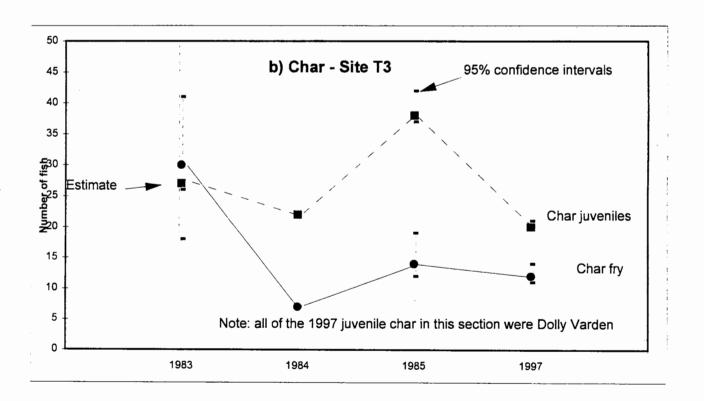




Photo 5. Naturally unstable silt banks were common along Tenas Creek. This site is located near the top end of Reach 1, the main steelhead spawning and rearing section of Tenas Creek.

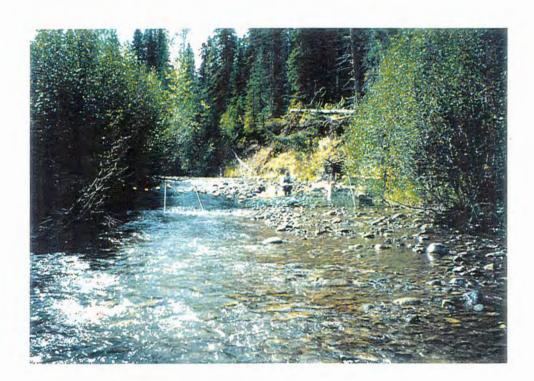
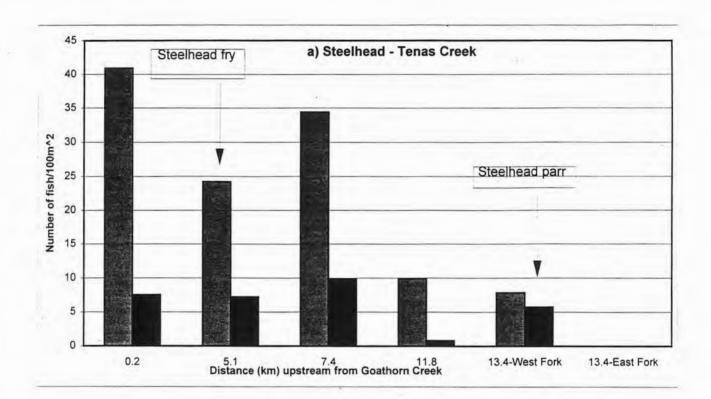
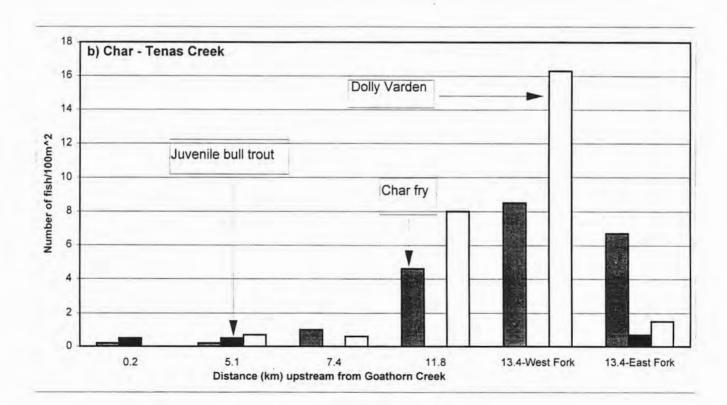


Photo 6. The lower 9 km of of Tenas Creek is heavily utilized by steelhead. The shallow cobble sections are ideal for steelhead fry and parr rearing.

Figure 2.5. Densities of juvenile steelhead and char in Tenas Creek with distance upstream from Goathorn Creek, 1997.





The mean fork length for steelhead fry for the three index sites combined was 38.7 mm (Appendix 8 Table 2). This is in the mid-range of past years results and is comparable to Goathorn Creek steelhead fry fork lengths. Yearling steelhead fork lengths were also comparable to previous years. There is considerable range in the mean length of older steelhead parr, presumably reflecting differences in the proportion of age 2+ and 3+ fish in the sample. The 1997 sample of steelhead parr was at the small end of the range. The length-frequency distribution of Tenas Creek steelhead is shown in Appendix 9 Figure 1.

Juvenile Char - Tenas Creek

The main char-rearing sections of Tenas Creek are in the upper reaches of this system (Figure 2.5b). In the main steelhead production areas, char are present at very low densities. This habitat segregation is more distinct in Tenas than in Goathorn Creek, where there were more extensive areas of species overlap between steelhead and bull trout.

Site T3 located in Reach 2 is the best index site for char abundance over the four sample years. Char fry densities at this site were highest in 1983 (Table 2.8).

Table 2.8. Densities of char fry and parr (fish/100m²) at Site T3 in upper Tenas Creek from 1983-85 and in 1997.

	Char fry	Char juveniles
1983	15.3	13.8
1984	3.3	10.5
1985	7.8	22.1
Mean 1983-85	8.8	15.5
1997	4.6	8.0

Char fry achieve higher densities in the upper reaches of Tenas Creek, upstream from the T3 index site (Figure 2.4b). Estimates of char fry densities at these upper sites range from 4-8 fry/100m² of habitat in 1997. This is comparable to char fry densities at the sites in upper Goathorn and Cabinet creeks.

Char juvenile numbers at the T3 index site have ranged between 20 and 38 fish during the four sample years (Figure 2.5b) with the lowest number occurring during 1997. Densities of char juveniles in 1997 (8 char/100m²) are lower than the past range for the period 1983-85 (10 to 22 char/100m²). This is similar to the pattern of low juvenile char numbers noted in Goathorn Creek in 1997.

Very few bull trout juveniles were present at sites throughout Tenas Creek (six fish for all sites combined). Density estimates were below 1 bull trout/100m² of habitat. These results are surprising, given the presence of bull trout spawners in this system.

Dolly Varden juvenile¹⁴ abundance increased with distance upstream with the highest densities (16 fish/100m²) at Site T6 located in Reach 3 (Figure 2.5b). These are similar to the Dolly Varden densities achieved in the headwater areas of Goathorn Creek (Figure 2.3b).

Char fry mean fork lengths at the index sites were 47.3 mm (Appendix 8 Table 2). This is slightly larger than the means reported for past years. Juvenile char mean fork length of 103.7 mm were in the mid-range of past sampling. The length-frequency distribution for char captured in Tenas Creek is presented in Appendix 9 Figure 2.

2.3.2.3 Adult Fish Observations - Tenas Creek

Adult fish observations focused on delineating bull trout spawner distribution in Tenas Creek during early September. Incidental steelhead spawning information has been gathered during past years.

Bull Trout - Tenas Creek

Bull trout redd and spawner surveys were conducted throughout lower Tenas Creek and in the lower reaches of the West and East Forks in upper Tenas Creek. In total, just under 17 kms of stream channel were surveyed. Visibility was generally good in Tenas Creek during the spawner surveys.

A total of 10 bull trout spawners and 12 redd sites were observed during the September surveys (Table 2.9). The main area for bull trout redds was in the 1500 m section below the confluence of the East and West Forks of Tenas Creek and in the lower 1200 m of the West Fork. A single bull trout redd was located in lower Tenas Creek approximately 1000 m upstream from the Goathorn confluence. The upper extent of ground surveys and redd site locations are shown on the 1:20000 aquatic map.

Nine of the 10 bull trout spawners observed were holding in the vicinity of redds. The observations included a range of spawning sites from redd locations with no fish present to sites where digging had just been initiated (Appendix 11 Table 2). These observations suggest that the surveys were conducted mid-way through the period of bull trout spawning in Tenas Creek.

¹⁴ Those fish over approximately 120 mm maturing adults that may be spawning in the fall of 1997. See Appendix 9 Figure 2 for the length-frequency of Tenas Creek char.

Redd dimensions ranged from 0.6 to 1.4 m² based on five redd site measurements in Tenas Creek (Appendix 11 Table 2).

Dolly Varden - Tenas Creek

Similar to Goathorn Creek, no specific areas of concentrated Dolly Varden spawning were noted in Tenas Creek. The system does not include extensive areas of seepage or groundwater inflows that have been noted to be heavily used by Dolly Varden spawners elsewhere when they occur in sympatry with bull trout (e.g., Bustard 1997a and 1997c).

During the September surveys, maturing Dolly Varden (typically 12-20 cm fork length) were noted in Reach 2 of Tenas Creek and in the lower end of Reach 3 (West Fork). Based on these observations and the presence of fry at sample locations, it is likely that Dolly Varden spawning is scattered throughout these sections. Specific sites identified as suited for spawning included locations approximately 900 m and 1300 m (lower end of Tributary TN18) upstream on the West Fork (Appendix 11 Table 2).

Steelhead - Tenas Creek

Little specific data describing steelhead spawning are available for the Tenas Creek system. Steelhead spawning occurs during the high flow period in late May and early June making redd and spawner surveys impractical. Most steelhead information is derived from the distribution and abundance of fry and juveniles.

However, a single steelhead redd with stranded fry isolated from the mainstem creek was located during early September 1997 at a site approximately 500 m upstream in Reach 3 (West Fork of Tenas Creek).

A small scale radio-telemetry study conducted by MOELP in the 1981/82 season tagged three steelhead overwintering in the Telkwa River in the vicinity of Pine Creek. At least one of the three tagged fish subsequently spawned 5-7 km upstream in Tenas Creek¹⁵.

Most Telkwa River steelhead appear to overwinter in the Bulkley River and move upstream into spawning tributaries during April and May.

¹⁵ Mike Lough (personal communication) - former fisheries biologist with MOELP, Smithers.

Table 2.9. Summary of bull trout spawner and redd observations in Tenas Creek during September 3-5th, 1997.

Stream Section	Length (m)	Spawners	Redds	Comments
Tenas Creek - Reach 1	9100	0 .	1	One redd observed 1 km upstream from the Goathorn Creek confluence.
Tenas Creek - Reach 2	4200	7	6	6 of 7 redds and all bull trout spawners were observed in the upper 1500 m of this section.
Tenas Creek - West Fork	2100	3	5	Spawning bull trout observed to 1200 m.
Tenas Creek - East Fork	1300	0	0	Bull trout fry present in the juvenile sample site in this section suggests spawning upstream in this system.

Total Fish Biomass

Table 2.10 summarizes the total fish biomass at the four locations where periphyton and benthic invertebrate sampling was conducted. The pattern of higher periphyton and benthic invertebrate abundance at upper sites (G5 and T3) compared to lower sites (G2 and T3) did not translate into similarly higher fish biomass estimates at these upper sites.

Although there was little difference in biomass between the upstream and downstream sites, overall fish biomass at Tenas Creek locations were almost double the levels achieved at the two Goathorn Creek sites for the four years of surveys. Benthic invertebrate total abundance was also higher at the Tenas sites compared to Goathorn Creek locations (Figure 1.4). Periphyton accumulation rates, particularly at site T1, did not show the marked differences that were apparent between the two systems (Figure 1.3).

Table 2.10. Summary of total fish biomass at periphyton and benthic monitoring sites in Tenas and Goathorn creeks.

		Total Fis	h Biomass (g/	100m^2)	
	1983	1984	1985	1997	Mean
T1	244	156	102	140	161
T3	181	140	214	133	167
G2	139	86	47	79	88
G5	113	108	97	51	92

2.3.3 Telkwa River

2.3.3.1 Habitat Description - Telkwa River

The Telkwa River from its confluence with Goathorn Creek to the Bulkley River has a low slope (<1%) and is complex and multi-channelled. Goathorn Creek is a major source of bed material to the Telkwa River, and channel widening and sidechannel development is markedly increased downstream from the Goathorn Creek confluence with the Telkwa River.

Measurements taken from air photos (Bustard 1985a) indicated approximately 18 km of sidechannel ranging from less than 200 m in length to over 2 km long were present in the lower 8 km section of the Telkwa River. Approximately two-thirds of these sidechannels (based on length) provided potentially productive juvenile salmonid habitat. Detailed typing and mapping of the different sidechannel habitat is presented in Bustard (1985a)¹⁶. The analysis indicated approximately 11 ha of potentially productive sidechannel habitat, and an equal amount of mainstem area. Measurements taken at fish sample sites during the 1980s suggest that most of the rearing occurs within 7 m of the river's edge during the late summer and fall period. Fry tend to occupy slow, shallow sites right along the stream margin.

The construction of a rock dyke just upstream from the village of Telkwa (Figure 2.1) since the earlier studies has introduced a significant change to the lower Telkwa River floodplain, and will influence future sidechannel development in the lower river.

Past fisheries studies in the Telkwa River indicate that the predominantly cobble bed material (10-30 cm diameter) provides good cover for fry and parr-sized fish, especially steelhead. Gravel areas suitable for spawning are interspersed along the lower Telkwa River, particularly in active sidechannels. These sections are utilized to a limited extent by pink salmon spawners (Bustard 1984b) and to some extent by juvenile coho.

¹⁶ This report appears as Appendix 12 of the Application for a Project Approval Certificate submitted by Manalta Coal Ltd. (1997).

The complex sidechannel habitat in the lower Telkwa River provides important refuge areas for fish subject to high turbid flows in the mainstem river for much of the early summer period. Log jams and gravel bars tend to buffer these channels during high flows. These sites are also subject to dewatering during the low-flow winter period (Bustard 1986b).

The Telkwa River is a dynamic system and channel shifting is frequent in this lower reach. Not surprisingly, investigations during the 1997 juvenile fish sampling program, indicated that substantial changes to some of the sidechannels had occurred since they were last sampled in 1985. The old SC1 location was dry, and a new location across the river was established in 1997 (Figure 2.1). Although conditions at SC2 were still suited for fish use, the channel was smaller and had lower water velocities than in the 1980s. SC3 was in the same general location but was a larger and more productive sidechannel than the site sampled in earlier years.

2.3.3.2 Juvenile Fish Sampling - Telkwa River

Fish density estimates were conducted at 13 sites in the lower Telkwa River during the 1997 program. This included eight mainstem sites, four sidechannels and a wetland complex located just downstream from the Goathorn confluence (Figures 1.1 and 2.1). The detailed results of the fish sampling at all locations in the Telkwa River are presented in Appendix 6. Past index site sampling has been conducted at all of these sites except MS8, SC4, and MS9 (habitat card only). These sites are located in the vicinity of the proposed bridge crossing of the Telkwa River.

Due to changed habitat conditions, sidechannel fish densities over time are not as directly comparable as at the index sites in Goathorn and Tenas creeks. A total of 1722 m² of habitat was sampled over a combined length of 302 m of stream channel in 1997 (Table 2.11). Approximately 50% of the area and length of channel was at sidechannel sample sites.

Similar to past years, juvenile steelhead were the dominant fish species in the lower Telkwa River index sites (Table 2.11). Various age classes of juvenile steelhead together comprised more than 70% of the overall catch. While steelhead fry numbers were higher than past years, parr numbers were down.

Juvenile coho comprised a significantly higher proportion of the index site catches in 1997, and represented over 18% of the total catch. Nearly all of the coho were sampled in two sidechannel locations (Table 2.12). Habitat conditions in these two sites appeared to be more suited for coho rearing compared to earlier sampling periods (i.e., stable low-flow sites not directly connected to surface flows from the mainstem river during the late summer period).

Table 2.11. Summary of fish species and age class composition in the Telkwa River combined for main and sidechannels.

Species		198	33	198	84	198	35	1997	
E	Age	Number	%	Number	%	Number	%	Number	%
Steelhead	0+	535	66.7	255	38.6	489	68.6	744	65.7
	1+	75	9.4	213	32.3	67	9.4	59	5.2
· · · · · · · · · · · · · · · · · · ·	>=2+	42	5.2	56	8.5	52	7.3	19	1.7
Coho	0+	34	4.2	75	11.4	55	7.7	176	15.5
	1+							36	3.2
Chinook	0+	1	0.1	11	1.7	0	0.0	4	0.4
Char	0+	0	0.0	0	0.0	1	0.1	4	0.4
Bull trout	>=1+	*ns		ns		ns		6	0.5
Dolly Varden	>=1+	7	0.9	4	0.6	3	0.4	2	0.2
Mountain whitefish	0+	105	13.1	43	6.5	45	6.3	77	6.8
	>=1+	3	0.4	2	0.3	0	0	0	0.0
Longnose dace	all	0	0.0	1	0.2	0	0.0	6	0.5
Longnose sucker	all	0	0.0	0	0.0	1	0.1	0	0.0
TOTAL		802	100	660	100	713	100	1133	100
Area sampled (m^2)		1812		2089		1853		1722	
Length of stream sampl	ed (m)	237		281	•	257		302	
*Bull trout and Dolly Varden	were not sepa	rated as differen	ent species	from 1983 to 1	1985.				

Table 2.12. Summary of juvenile salmonid density estimates at sites in the mainstem and sidechannels of the Telkwa River, 1997.

Site		Telkwa Mainstem Densities (Fish/100m^2)												
		Steelhead	d	Char	Bull trout	DV	Co	oho	Chinook	M. WI	nitefish			
	0+ .	1+	>=2+	0+	>=1+	>=1+	0+	>=1+	0+	0+	>=1+			
MS1	39.7	6.6	1.2	0	1.2	0	0	0	0	0	0			
MS2	29.4	2.1	0	0	0	0	0	0	1	0	0			
MS3	35.6	7.3	0.9	0.9	0	0	0	0	0	0	0			
MS4	25.3	6.7	0.8	0	0.8	0	0.8	1.7	2.5	0.8	0			
MS5	30.0	0.4	0.4	0	0.4	0	0	0	0	0.9	0			
MS6	31.6	1.8	1.8	0.9	0	0	0	0	0	0	0			
MS7	75.7	3.6	3.6	0.9	0	0	0	0	0	0.9	0			
Mean 1-7	38.2	4.1	1.2	0.4	0.3	0.0	0.1	0.2	0.5	0.4	0.0			
MS8	13.7	1.1	1.1	0	0	0	0	0	0	2.2	0			
Site				Telkwa	Sidechanne	l Densitie	s (Fish/10	00 m^2)						
		Steelhead	i	Char	Bull trout	DV	, ` 	ho	LN dace M. White		itefish			
	0+	1+	>=2+	0+	>=1+	>=1+	0+	>=1+	0+	0+	>=1+			
SC1	14.3	4	0.9	0	0	0.3	31.3	7.1	2.2	11.4	0			
SC2	73.2	0.7	0	0	0.4	0	26.3	4	0	11.4	2.2			
SC3	67.2	5.5	2.4	0.4	0.8	0.4	0	0	0	1.5	0			
Mean 1-3	51.6	3.4	1.1	0.1	0.4	0.2	19.2	3.7	0.7	8.1	0.7			
SC4	28.8	6.4	8.5	0	2.7	1.1	2.7	0.5	0	0	0			

Mountain whitefish fry comprised just under 7% of the total catch, again largely the result of sampling sidechannel locations (Table 2.12). Small numbers of juvenile chinook, bull trout, Dolly Varden, and longnose dace together comprised 2% of the overall catch.

Juvenile Steelhead - Telkwa River

Steelhead fry densities in Telkwa River sidechannels combined were 52 fry/100m² of channel, the highest recorded in the four years of sampling at these locations. These are nearly twice the densities measured at the Tenas and Goathorn creek index sites (Tables 2.2 and 2.7), and confirm the importance of Telkwa River sidechannels as rearing habitat for steelhead fry.

Mainstem Telkwa River steelhead fry densities were also high, averaging 38 fry/100m² of habitat. It is interesting to note that steelhead fry densities were consistent across the mainstem sites ranging from 25-40 fry/100m² at six of the seven index sites (Table 2.12).

Steelhead parr densities in both mainstem and sidechannel locations in the Telkwa River averaged approximately 5 parr/100m² (Table 2.13). These estimates are lower than mean estimates of 8 and 10 parr/100m² measured in sidechannels and mainstem sites in past years. The numbers of yearling and older age class steelhead parr were lower in 1997 compared to previous years (Table 2.11).

Table 2.13. Densities of steelhead fry and parr (fish/100m²) at side and main channel sample locations in the lower Telkwa River from 1983-85 and in 1997.

	Age 0+		Parr	
	Side	Main	Side	Main
1983	27.0	32.0	7.0	7.0
1984	9.0	16.0	15.0	12.0
1985	16.0	44.0	3.0	11.0
Mean 1983-85	17.3	30.7	8.3	10.0
1997	51.6	38.2	4.5	5.3

It should be emphasized that direct comparisons between the 1997 results and the earlier data is limited due to changes in habitat characteristics over time. As a general observation, the sidechannel locations sampled in 1997, particularly SC2 and SC3, offered more suitable steelhead fry rearing habitat than at these locations in the mid-

1980s. At the same time, steelhead parr rearing potential was lower in both SC1 and SC2 compared to the earlier years, and this may account for some of the differences observed.

The method of sampling the Telkwa River mainstem (installing rebar and then completely enclosing the site with stopnets) probably underestimates older parr numbers utilizing these habitats due to site disturbance during net installation and the inability to sample some of the deeper faster habitats utilized by older steelhead parr in the Telkwa. The same method has been used in all years of sampling.

The mean fork length of steelhead fry in the lower Telkwa River combined for mainstem and sidechannel sites was 40.7 mm (Appendix 8 Table 3). This is in the mid-range of fork length measurements for past years. Yearling steelhead fork lengths (77.1 mm) were also similar to past measurements at these sites. The length frequency distribution for a sample of 440 steelhead juveniles from the lower Telkwa River is shown in Appendix 9 Figure 1. The ageing estimates shown in this figure are based on scale analysis of 49 juvenile steelhead in the lower Telkwa River during 1997 (Appendix 9 Table 3).

Juvenile Coho - Telkwa River

Table 2.14 summarizes the catch of coho in the lower Telkwa River at index sites in sidechannels and mainstem habitat. The data suggest coho use in mainstem areas of the lower Telkwa has been consistently low, ranging from <1 to 5 coho juveniles/100m² during the years of sampling.

Coho densities in sidechannels have ranged from 2-62 coho/100m² of habitat. During the period 1983-85, sampling at SC3 accounted for the high coho densities. This channel was dry in 1985, leading to the lowest densities for all years in sidechannels, despite higher mainstem use. The data indicate that specific sidechannels provide important rearing areas for coho in the lower Telkwa River, and that densities at these locations achieve much higher levels than in the mainstem river.

Table 2.14. Densities of coho juveniles (fish/100m²) at sidechannel and mainstem locations in the lower Telkwa River from 1983-85 and in 1997.

	Sidechannel	Main
1983	9.0	1.8
1984	61.7	0.8
1985	2.0	5.3
Mean 1983-85	24.2	2.6
1997	22.9	0.4

Sampling at a sidechannel seepage complex in the project area located at WL1 (Figure 1.1), indicated coho use at this area for 500 m upstream from the mainstem Telkwa River. Minnow trapping indicated significant numbers of coho, including both fry and yearlings, were present at this site. A total of 107 coho juveniles were captured in 10 traps set in this channel (Appendix 5 Site Card WL1). There is evidence of flow throughout this channel during freshets.

Flows in this channel are suspected to be mainly derived from subsurface flows from the Telkwa River, although some surface flows may enter this area during the spring from the drainage area around the proposed tailings disposal area. Based on observations at the Km 1011 area located adjacent to the Telkwa River upstream from Pine Creek, coho fry likely move upstream into the seepage channel at WL1 during the high-flow period from late May through July, overwinter in this area, and leave as smolts after one or two years (Bustard 1997d).

The channel at WL1was sampled in 1984 (Bustard 1985a) and no fish were present. Coho fry were probably unable to access this channel in 1984 due to beaver dams in the lower section. These beaver dams had been washed out prior to the 1997 sampling, enabling fish to access upstream areas.

A second wetland complex located in the lower Telkwa project area (WL5 - Figure 1.1) was sampled in 1997 (Bustard 1997b), and similar to 1984, had no fish upstream from the first large beaver dam located near the outlet (Table 2.15).

Table 2.15. Summary of fish catches at two wetland areas in the lower Telkwa River.

Site	Location	Number of	Co	ho	Rbt
		Traps	Age 0+	Age 1+	Age 1+
WL1	200 m upstream from outlet	5	43	52	1
	600 m upstream from outlet	5	6	6	0
WL5 ¹⁷	Below beaver dam at outlet	2	0	45	0
	Ponded area above lower beaver dam	8	0	0	0

¹⁷ Sampled in June 1995 (Bustard 1997b).

Off-channel rearing areas provide important habitat for juvenile coho in the Telkwa River. A program to develop off-channel habitat in the Telkwa River has been underway since 1993 (Finnigan and Marshall 1997). As part of this project, considerable knowledge has been gained in terms of the timing and age structure of juvenile coho dispersal into off-channel areas and subsequent smolt movements out of these areas (Bustard 1997d). In addition to the main site at Km 1011, off-channel ponds have been constructed at two new location in the past two years (Km 1019 and Km 1010).

Juvenile Fish Sampling in Vicinity of Proposed Bridge Site - Lower Telkwa River

Fish sampling was conducted at the proposed bridge crossing site on the Telkwa River approximately 350 m downstream from the Goathorn Creek confluence. This site is located at the downstream end of a fast single-channel section confined on the left side by high banks (Photo 7). Below the proposed crossing, the channel widens and the flood plain broadens. The bed material at this site is dominated by cobbles and boulders, although some smaller gravel material is located at the tail-out from a pool located at the crossing site. It is unlikely that the mainstem channel in this section is utilized for spawning by any of the fish species present in the Telkwa River. A more detailed description of the habitat at this site is provided in Appendix 5 Site Card MS9.

A sidechannel is located at the crossing site (Photo 8), and a 33-m long section was sampled in this channel (SC4). The results indicate that this sidechannel provides significant steelhead fry and parr rearing habitat (Table 2.12). Steelhead parr densities (15 parr/100m²) were the highest of the four sidechannels sampled in the lower Telkwa. Juvenile bull trout, Dolly Varden and coho were also present at this site.

Sampling conducted at MS8 located on the mainstem Telkwa just below the proposed bridge site, indicated that steelhead fry and parr were the main species present along this section, with densities lower than the mean for mainstem sites located downstream (Table 2.12).

Adult Fish Observations - Lower Telkwa River

Specific adult fish surveys were not undertaken in the lower Telkwa River during 1997. There have not been any broad-based adult steelhead projects undertaken in the Telkwa River to identify spawning locations for this species. Most of the spawning information is inferred from the presence of steelhead fry. Steelhead spawn during the spring snowmelt freshet in May and early June, and the only method of identifying specific spawning sites during this time would be with the use of radio-telemetry. Most steelhead appear to spawn in tributaries to the Telkwa River such as Tenas and Goathorn, as well as sidechannel locations not subject to the high and fast water conditions typical of the mainstem Telkwa River during the spawning period.

Past observations indicate that some pink salmon spawning does occur in sections of the lower Telkwa during high escapement years to the Bulkley River. The pink run in 1997 was weak, and a planned aerial survey to evaluate pink salmon use in the lower Telkwa was cancelled due to the low numbers in the system. The location of pink salmon spawning sites identified during 1983 are shown on the 1:20000 aquatic map and are described in more detail in Bustard (1984b). The specific sites will probably change from year-to-year, especially given the frequency of channel changes and range of flow conditions in the lower Telkwa River.

Bull trout probably do not spawn in the mainstem or sidechannels of the lower Telkwa River. Characteristically this species moves upstream into the cold headwater tributaries such as upper Goathorn and Tenas creeks. The lack of char fry at the mainstem and sidechannel locations in the Telkwa River (Table 2.12) supports this view. The lower Telkwa River is utilized by sub-adult and adult bull trout for rearing. Studies of fluvial bull trout elsewhere indicate that these fish may make major migrations between overwintering locations and spawning sites, sometimes for distances of 100 kms or more (e.g., Swanberg 1997).

Dolly Varden spawning tends to be most prevalent in the smaller tributaries and headwaters of larger tributary streams. Some Dolly Varden spawning may occur in the lower ends of small seepages and tributaries on the Telkwa floodplain, although no specific sites were identified. The lack of char fry in the catches suggests that spawning is minor in these areas.

Coho salmon spawning occurs predominantly in the upper reaches of the Telkwa River. Detailed surveys were conducted during 1982 and 1984 and are reported in Bustard (1985a). Much of the spawning occurs in the mainstem river between 30 and 47 kms upstream. Lower Elliott Creek also provides significant spawning habitat.

The lower sections of the Telkwa River in the project area are not generally utilized by coho spawners, possibly due to the more severe icing conditions prevalent during the winter in the lower river, and the greater abundance of groundwater inflows, smaller bed material, and excellent rearing areas prevalent in the upper river sections.

Table 2.16 summarizes the results of helicopter counts of coho spawners that have been conducted in the Telkwa River and lower Elliott Creek since 1982. Typically, these surveys have been conducted on at least two dates in early and late November, although they have only been done during some years. The summaries suggest that the coho escapement estimates to the Telkwa in 1997 were very low and comparable to the low estimates of 1988.

These aerial counts do not represent total numbers, since coho are widely dispersed and tend to hold in debris jams and under shelf ice making visibility difficult. As well, coho spawn over an extended period. Spawners were still present in the upper Telkwa on December 23 during the 1982 surveys (Bustard 1983). It is interesting to note that a



Photo 7. Telkwa River mainstem looking downstream at the proposed bridge crossing site. The crossing site is at the lower end of a confined section, just upstream from where the floodplain widens.



Photo 8. Sidechannel SC4 located at the proposed bridge crossing site. This channel was used by both steelhead fry and parr.

comparison was made between snorkel and helicopter counts in a section of the Telkwa River on November 14, 1994. The snorkel counts of 191 coho were more than twice the aerial count of 88 fish conducted in the same section.

Table 2.16 Summary of coho salmon spawner counts in the upper Telkwa River for selected years between 1982 and 1997.

Year	Maximum Count	Date of Survey
1982	104	Nov-18
1984	117	Nov-30
198818	36	Nov-29
199419	605	Nov-01
1995	178	Oct-31
1997	54	Nov-11

2.3.4 Bulkley River

Four sites along the mainstem edge of the Bulkley River were selected for sampling during the 1997 program. These sites were located in the general vicinity of the proposed loadout facility and are indicative of fish use along the Bulkley River in this reach. Comparable data is available from the 1984 sampling program.

The results indicate that juvenile steelhead and chinook salmon fry dominate the catches along this section of the Bulkley River (Table 2.17). Both steelhead and chinook fry densities (22 and 27 fry/100m² respectively) were considerably higher in 1997 than levels measured in 1984 (9 and 6 fry/100m² respectively).

¹⁸ Data from Bustard (1988).

¹⁹ Data from 1994 to 1997 provided by Barry Finnegan, Northern Coho Stock Assessment, Department of Fisheries and Oceans, Nanaimo, B.C.

Table 2.17 Densities of juvenile fish sampled along the mainstem Bulkley River in the vicinity of Hubert Creek and the proposed reload site.

Site	В	Bulkley River Mainstem Fish Densities (Fish/100m ²)														
	;	Steelhead		Chinook	Mt. Whitefish	LN Dace										
	0+	1+	≥2+	0+	all	all										
B1	36.4	2.9	0	45.8	0	1.0										
B2	5.9	0	0	5.9	. 0	0 .										
B3	13.7	1.3	0	20.4	0	0										
B4	33.1	8.0	0	38.0	0	0										
Mean 1-4	22.3	3.1	0.0	27.5	0.0	<1.0										
1984	9.5	3.5	4.0	6.3	1.0	0										

The sampling method used in this study is effective for sampling fry species utilizing the mainstem margin, but underestimates the abundance of larger fish using faster water areas, often just beyond the margin sites. Studies conducted in September 1982 using a boat shocker (Envirocon Ltd 1984 - Section F) indicated that this section of the Bulkley River provides important rearing habitat for larger steelhead parr (age 2+ and 3+). As well, other resident species common in the boat shocking catches but not effectively sampled at the margin sites included mountain whitefish, largescale suckers and longnose dace. Low numbers of char (probably bull trout) were also present in the boat shocking catches in this section during the 1982 program.

Major migrations of salmon and steelhead move through this section of the Bulkley River, but most spawning locations are upstream in the mainstem Morice River and the numerous tributary streams. Some scattered spawning of pink salmon occurs in the mainstem Bulkley in this reach and in the section downstream from the Telkwa River confluence. The bed material tends to be large and more suited for rearing than for spawning at most locations. See Section 2.4 for a description of the sport fishery on the Bulkley River.

2.3.5 Hubert Creek

Studies in Hubert Creek focused on assessing fish distribution and abundance information in this watershed relative to a proposed road corridor and loadout facility located in the lower reach. Considerable background information is available for the Hubert Watershed based on studies conducted in 1983 and 1984 (Bustard 1984a and 1985a) and supplemented by additional, more detailed assessments in 1986 focusing on the

headwater areas of Helps Creek (Bustard 1986a). The location of Hubert Creek relative to the Bulkley and Telkwa rivers, and of all of the sample site locations is shown in Figure 2.1.

The earlier assessments focused on a rail corridor and waste disposal area originally planned for the headwater sections of Helps Creek. The revised mine plan proposes a road crossing of lower Hubert and a location on the east side with crossings in the midreaches of Hubert and Helps creeks. Additional information was needed on the mid- and upper reaches of Hubert and Helps creeks to assess these proposed crossing sites.

2.3.5.1 Habitat Description - Hubert Creek

Hubert Creek drains a 44 km² watershed comprised of low to mid-elevation areas. This stream is approximately 12 km long and its one major tributary, Helps Creek, is an additional 8.5 km in length.

Hubert Creek is not subject to the same variations in flow regime characteristic of the other streams in the project area. The combination of extensive ponding and lack of high elevation snowfields within the watershed, results in a moderated flow regime and lower turbidity levels than in the other study streams in the project area. Land-use activities, particularly agricultural clearing and livestock grazing, have resulted in considerable habitat degradation in portions of this system.

The lower reach of Hubert Creek is less than 0.5% slope and is characterized by extensive ponds and wetland areas, largely the result of beaver activity. Beaver dams restrict the movement of salmon fry (coho and chinook) to the lower sections of Hubert Creek. The location of these barriers tends to vary from year-to-year. There are short sections of potential spawning habitat in lower Hubert Creek and some coho and steelhead spawning can occur in the lower system during high-flow years when fish can access these areas.

Resident cutthroat are present in the mid-sections of Hubert Creek and in Helps Lake. The upper creek system (both Helps and Hubert creeks) has more potential spawning areas, but extensive beaver dams restrict easy movements into these upper areas.

Specific habitat information was collected in conjunction with fish sampling at each of the sites shown in Figure 2.1 during the 1997 surveys and is presented in Appendix 5. This information, in conjunction with sampling conducted during the FRBC stream inventory program²⁰ has been used to delineate fish distribution in the upper watersheds of Hubert and Helps creeks (see 1:20000 aquatic map).

²⁰ Preliminary data provided by Triton Environmental Consultants Ltd.

2.3.5.2 Juvenile Fish Sampling - Hubert Creek

Lower Reach

The fish sampling that was undertaken in lower Hubert Creek was conducted using the same methods as in 1983 (Bustard 1984a) and in 1986 (Bustard 1986). This program involved extensive minnow trap sampling in the lower 1.5 km section of Hubert Creek.

Table 2.18 summarizes the upper extent of distribution of juvenile coho and chinook salmon and steelhead trout in lower Hubert Creek for the three years of sampling. The data indicate that coho fry (age 0+) were distributed farther upstream in 1997 compared to past years. They were present upstream to a beaver dam located 1.2 km upstream (see 1:20000 aquatic map for specific locations). Yearling coho have been present up to a series of beaver dams located at 1.5 km (just upstream from Lawson Road) for all years of sampling. This suggests that coho juveniles may re-distribute farther upstream during spring high-flow periods.

Sampling conducted 200 m and 1000 m upstream from Lawson Road during 1997 suggests that coho are not found upstream from the first beaver dam above the road crossing (Appendix 12 Table 1).

Figure 2.6 shows the catch per trap (CPUE) of coho fry and yearlings (combined) at the three accessible sites (HUB1 to HUB3) for the three years of sampling. This information indicates that juvenile coho abundance throughout lower Hubert Creek was very low in 1997, despite good access for fry for a greater distance than past years. Coho fry CPUE was very high in the lowest section of Hubert Creek during 1986 (16 coho/trap). Interestingly, juvenile chinook were more abundant in the lowest section of Hubert Creek during 1997 compared to past years, and were present upstream for nearly 1 km (Table 2.18). This is a very different pattern than observed in past years, when only a few chinook juveniles have been sampled in the lowest section of the creek. The habitat in lower Hubert Creek is not characteristic chinook rearing habitat. These chinook fry have probably moved upstream from the Bulkley River mainstem, and that they are the progeny from fish that spawn in the upper Morice River, the main chinook spawning area in the Bulkley system.

No steelhead fry were sampled in the lower Hubert sites in 1997, and a small number of yearlings were present up to approximately 1 km upstream (Table 2.18). CPUE in the traps was lower than during past years (Figure 2.6).

Fish information collected in lower Hubert Creek during the three years of sampling indicates that the abundance and distribution of juvenile salmon and steelhead is highly variable between years. Important factors include the location of impassable beaver dams on the lower creek and the abundance of salmon fry recruiting upstream from the Bulkley River into Hubert Creek.

Table 2.18 Summary of the upstream distribution by species and age class of fish in lower Hubert Creek based on three years of sampling.

	Age	Year	Distance Upstream
Coho	Age 0+	1983	0.3 km
	8	1986	0.9 km
	·	1997	1.2 km
Coho	Age 1+	1983-97	1.5 km
Chinook	Age 0+	1983	<0.1 km
		1986	<0.1 km
		1997	0.9 km
Steelhead	Age 0+	1983	1.5 km
		1986	1.0 km
		1997	None present
Steelhead	Age 1+	1983	1.5 km
	5	1986	1.0 km
!		1997	0.9 km

Other fish species present in the lower sections of Hubert Creek include longnose dace and longnose suckers (Appendix 12 Table 1). A few cutthroat trout and Dolly Varden have been sampled in lower Hubert Creek in past years (Bustard 1984a and 1986a). A small tributary entering lower Hubert Creek on the east side approximately 800 m upstream from the Bulkley River (Figure 2.1) was identified as having potential fish use on a seasonal basis upstream for 1500 m (see Appendix 5 Site Card HUB5). Locals report catching fish in this system during high spring flows.

Sampling was conducted in the ponded habitat towards the top end of Reach 1 for the first time in 1997 (HUB4 in Figure 2.1). No fish were captured in 20 minnow traps set in this section. These middle ponded sections of Hubert Creek likely offer low potential fish habitat as a result of poor access due to beaver dams and water quality limitations.

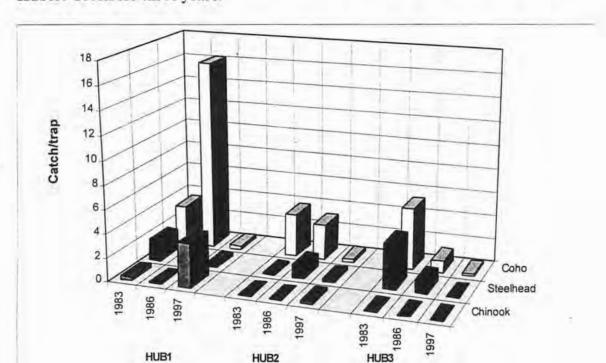


Figure 2.6 Summary of CPUE (fish/trap) at the three lower sample sections in Hubert Creek for three years.

Upper Reaches of Hubert Creek

The results of electrofishing at four location in the middle and upper reaches of Hubert Creek (Figure 2.1) indicate that the densities of both cutthroat trout and Dolly Varden were exceptionally low at all sites (Table 2.19). No cutthroat or Dolly Varden fry were captured at any of the sites.

Habitat suitability was high at the lower three sites, and it is likely that there is a recruitment problem in these systems, possibly linked to beaver dam activity in lower Hubert and Helps creeks preventing adults from moving upstream into these potential spawning and rearing sections of the creek. A limited amount of sampling conducted at one site (HUB7) using minnow traps in 1983 suggested that more cutthroat were present than in 1997.

All of the cutthroat captured in the four sites in upper Hubert Creek in 1997 ranged in size from 13-18 cm fork length. There was a complete absence of the younger age classes of cutthroat at any of the sites, further supporting the conclusion that spawners had not been able to recruit upstream into this section of stream for at least the previous three years. All of the Dolly Varden captured in the sites also exceeded 11 cm and were up to 16 cm fork length.

Table 2.19 Summary of fish densities (fish/100m²) at electrofishing sites in the mid and upper reaches of Hubert Creek, 1997.

Site ²¹	Cutt	hroat	Dolly Varden				
	0+	>1+	0+	>1+			
HUB6	0	2.0	0	0			
HUB8	0	1.0	0	0			
HUB9	0	3.6	0	1.8			
HUB10	0	0	0	6.0			

The upper extent of fish distribution in Hubert Creek is shown on the 1:20000 aquatic map, while the detailed fish sampling information is presented in Appendix 6.

2.3.5.3 Juvenile Fish Sampling - Helps Creek

The results of electrofishing in Helps Creeks at some of the same locations as in 1986 is presented in Table 2.20 The data indicate that cutthroat fry densities have dropped to very low levels in 1997 (mean of 4.9 fry/100m²) compared to sampling results for 1986 (mean of 49.3 fry/100m²). Similar to Hubert Creek, there appears to be a cutthroat spawner recruitment problem into upper Helps Creek. Presumably this is related to beaver dams occurring between Helps Lake and the main spawning and rearing sections of Helps Creek located in Reaches 2 and 3 (Figure 2.1). Most larger resident fish probably move downstream into the deeper ponded sections of these creeks during the late summer and winter period.

A number of cutthroat parr were sampled in Helps Creek in 1997. These fish ranged in size from 8-12 cm fork length and were present at sites H1 and H4. No cutthroat parr were sampled in 1986, further suggesting that fish distribution in the upper reaches of this creek is highly dependent upon suitable access for spawners to move into these upper reaches during the spring high-flow period. Based on a sample of 38 cutthroat captured in Helps Lake, cutthroat trout can achieve a size of up to 30 cm in this system (Bustard 1984a).

Surveys in Helps Creek during 1986 identified the location of key cutthroat spawning areas based on direct observations of spawners and redds during late May and early June, as well as the presence of newly-emerged cutthroat fry during August (Bustard 1986). High water temperature problems along the creek sections where riparian vegetation has

²¹ A total of 12 cutthroat and 1 Dolly Varden were sampled at HUB7 in 4 minnow traps during sampling in 1983.

been removed were identified in some of the spawning sections (Photos 9 and 10). These sites are shown on the 1:20000 aquatic map.

Table 2.20 Summary of fish densities (fish/100m²) at electrofishing sites in Helps Creek in 1986 and 1997.

Site	1986	1997	1986	. 1997
	0+ .	0+	1+	1+
H1 .	0	0	0	16.3
H2	15.8	1.1	0	0
Н3	33.6	1.3	0	0
H4	148.8	22.2	0	7.2
H7	48.1	0	0	0
Mean	49.3	4.9	0.0	4.7

Additional sampling effort was extended to other sites in Helps Creek to better delineate the upper extent of fish access on the mainstem creek and several of its tributaries during the 1997 program. Detailed fish sample site and habitat summaries for each site are presented in Appendices 5 and 6.

2.4 DISCUSSION

Steelhead

Juvenile steelhead were the dominant fish species present in lower Goathorn and Tenas creeks and the lower Telkwa River, comprising more than 70% of the overall catch. This is a similar pattern to catch results at these sites during three years of sampling from 1983 to 1985.

Figure 2.7 summarizes the results of fish sampling in Goathorn and Tenas creeks and the lower Telkwa River sidechannel and mainstem sites. The summary indicates that steelhead fry densities exceeded 20 fry/100m² of habitat in the main steelhead-producing sections of these systems. Fry abundance was highest in the sidechannels of the Telkwa River in 1997 where densities exceeded 50 steelhead fry/100m² based on sampling at three channels. These data indicate that the lower reaches of Goathorn and Tenas creeks, and the mainstem Telkwa River are important spawning and rearing areas for steelhead

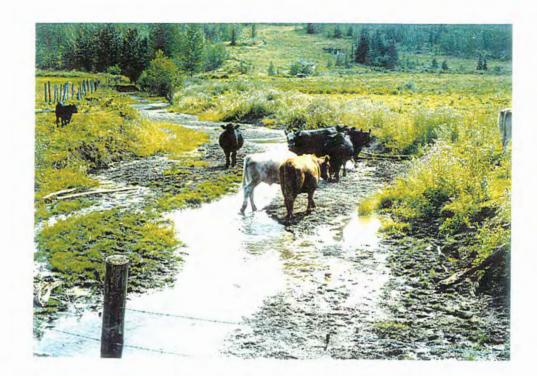


Photo 9. Sections of Helps Creek have been severely degraded by agricultural clearing, diversions, and livestock use. The loss of a riparian zone along this section has resulted in channel widening and infilling, resulting in loss of surface flows and high water temperatures in a formerly productive stream section.

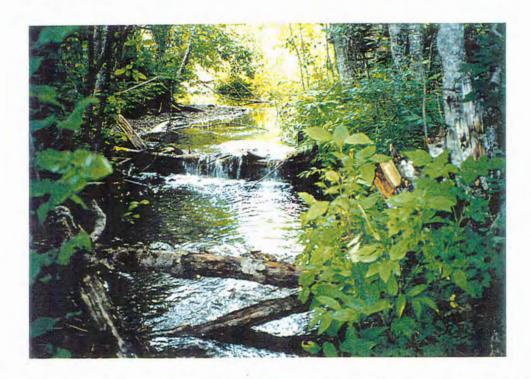


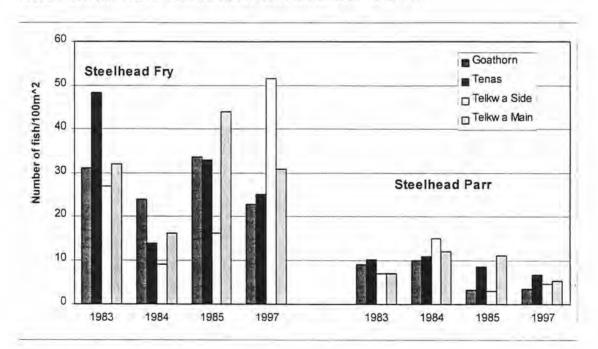
Photo 10. Helps Creek just upstream from the agricultural clearing. The riparian zone is intact and cutthroat trout spawn in this section. The proposed haul road must ensure fish passage at a crossing site in this general area.

trout, and are comparable to steelhead fry densities in known important steelhead tributaries in the Skeena Watershed²².

Steelhead fry densities vary considerably between sites and years, reflecting the strength of the adult spawning escapement and habitat differences between years. The 1997 fry densities were in the mid-range of those measured at the same sites in the past, and were definitely stronger than the 1984 estimates. It is interesting to note that in 1997, steelhead fry were distributed upstream to Cabinet Creek in the Goathorn system, and had higher densities in the upper reaches of Tenas Creek than noted in past studies.

Appendix 13 Figure 1 summarizes the Tyee Test Fishery index for adult steelhead on the lower Skeena River for the period of record (1956 to 1997). The years highlighted in black are indicative of adult run strength for those years prior to the juvenile assessments. For example, the 1982 adult run would be responsible for the 1983 fry recruitment. This index suggests that 1983 was a poor year for adult steelhead recruitment compared to the years immediately before and after, likely accounting for the poor fry numbers throughout the Telkwa Watershed in 1984. The 1996 test fishery results were near the average for all years combined.

Figure 2.7 Summary of steelhead fry and parr densities at Goathorn and Tenas creeks and the lower Telkwa River sites from 1983 to 1997.



²² Extensive juvenile steelhead index sampling was conducted by MOELP during the late 1970s to early 1990s. Data reports on file, MOELP, Fisheries Section, Smithers.

Steelhead parr remain in these systems for two or more years prior to smolting. The parr estimates obtained in 1997 were in the range of 3-7 parr/100m². In all cases, this was lower than estimates conducted in 1983-84 at these sites, and comparable to 1985 estimates. There was a distinct lack of age 1+ steelhead at all sample sites in 1997, either reflecting poor steelhead fry recruitment in 1996, or very poor survival from the fry to yearling stage in the past year.

Juvenile steelhead index surveys are no longer conducted in the Skeena drainage, so comparisons to most other steelhead systems for 1997 cannot be made. Studies in the Thautil River in 1996 indicated a relatively strong fry recruitment compared to previous years (Bustard 1997c). Skeena test fishery indices indicate that the 1995 steelhead escapement (leading to 1996 fry recruitment) was slightly below the long-term average²³.

Rough approximations of adult production derived from juvenile steelhead numbers in the lower Telkwa, Goathorn, and Tenas creeks combined ranged from 1000-1500 adults (before interception losses) or approximately 350-500 spawners combined (Bustard 1985a)²⁴.

Our observations suggest that Goathorn and Tenas creeks are the most productive steelhead tributaries in the Telkwa Watershed. Tenas Creek, in particular, stands out as an important system. It is utilized by steelhead for at least 13 km, with heavy use in the lower 9 km. Steelhead do use other Telkwa River tributaries such as Elliott, Howson and Pine creeks, but barriers are present within a few km of the mainstem river limiting access to relatively short sections of stream. Our data also indicates that the Telkwa River mainstem and sidechannels are very important steelhead rearing areas. Together, these systems probably account for much of the steelhead production in the Telkwa Watershed.

Although these tributaries themselves receive relatively minor angling use, it is likely that most steelhead that spawn in these systems hold in the Bulkley River during the fall and winter periods and comprise an important component of the summer steelhead fishery on this system.

The Bulkley River is one of the two most heavily fished steelhead systems in the Skeena Region. During the period 1994 to 1996, approximately 8000 steelhead angler days were reported for the Bulkley River representing 20-24% of the overall angling effort in the Skeena Region (Steelhead Harvest Analysis²⁵). The section of the Bulkley River in the vicinity and downstream from the Telkwa River confluence is one of the most heavily fished sections of the Bulkley River for steehead (O'Neill and Whately 1984).

²³ Steelhead Index at Skeena River Tyee Test Fishery; data on file, Fisheries Section, Ministry of Environment, Lands and Parks, Smithers.

²⁴ These estimates are based on 35% survival from part to smolt and 12% survival from smolt to adult and a 2:1 interception loss. The part and smolt survival figures are very similar to those presented in Koning and Keeley (1997).

²⁵ Steelhead Harvest Analysis; data on file, Minstry of Environment, Lands and Parks, Smithers.

Most steelhead angling occurs during a 10-week period from early September through mid-November. There are seven licensed guiding operations on the river. Nearly 70% of the anglers estimated to be present on the Bulkley on a given day during the peak of the steelhead fishery are non-residents of BC and two thirds of these are non-Canandian (MOELP draft 1997). The Bulkley River is one of 40 classified rivers (Class 2) in the province and special fees and guide restrictions are in place during the fall period.

Water clarity is an important feature of the Bulkley River steelhead fishery. During periods when the water clarity downstream from the Telkwa is poor (e.g., following a heavy rain event), anglers tend to concentrate on the clear section of river upstream from the Telkwa. During these periods, anglers from other major steelhead tributaries such as the Kispiox, Zymoetz, Suskwa and Skeena rivers tend to congregate in the clear sections of the Bulkley²⁶.

Land-use activities in the Telkwa Watershed that lead to reduced water clarity due to sediment would have a definite impact on the Bulkley steelhead fishery. A study conducted by the Ministry of Forests monitored sediment levels in the Telkwa Watershed during 1990. This study found that natural sediment sources from landslides, gully erosion, and streambank erosion dominated the sediment input in all of the major tributaries including Tenas and Goathorn creeks during the peak flow period. The study warned that "small amounts of sediment introduced into the Telkwa River during the summer and fall period could substantially alter turbidity and thus recreational activity on the rivers ... and that an active program to prevent and mitigate erosion and sediment transport in the watershed is needed" (Beaudry et al. 1991).

Other significant sport fisheries on the Bulkley River include chinook salmon from late June through early August primarily focused at Moricetown Canyon and the Bulkley-Morice confluence area. More recently, a smaller fishery has developed for pink salmon in August during good escapement years, and for hatchery coho in the vicinity of Trout Creek. There is no longer a sport fishery for wild coho in the Bulkley River due to low escapements for this species²⁷.

Bull Trout

The studies conducted in 1997 represent the first year that bull trout and Dolly Varden have been separated in the catches as two distinct species. The highest abundance of bull trout occurred in the mid-reaches of Goathorn Creek and in lower Cabinet Creek. Interestingly, bull trout juvenile densities did not exceed 3 fish/100m² at any of the

²⁶ From Angling Use Plan - Bulkley River, 1997 (draft); on file, Fisheries Section, MOELP, Smithers.

²⁷ Coho conservation concerns in the upper Skeena (including the upper Bulkley) are so great that a Coho Response Team has been set up by the Department of Fisheries and Oceans to deal with concerns for run extinctions in some coho systems within the watershed. A sharp decline in 1997 coho escapements are thought to be a result of chronic over-fishing, poor marine survivals and increasing exploitation by the Alaska troll fishery (DFO 1998).

red in the main bull trout section of

Goathorn Creek sites. The densities of char captured in the main bull trout section of Goathorn Creek were down significantly from levels recorded in the period 1983-85 (Table 2.3).

Although bull trout were present in Tenas Creek, their densities were also very low and did not exceed 1 fish/100m² at any sites except T6 in the uppermost reach. Densities were also in the range of 1 bull trout/100m² in the Telkwa River sidechannels.

Bull trout tend to achieve relatively low densities, often in specific habitat areas. McPhail and Baxter (1996), in their review of bull trout life history, indicated that densities of less than 2 juveniles/100m² was typical of studies conducted in Idaho and Washington streams where adult populations are quite low due to habitat degradation and over-exploitation. Goetz (1989) reported densities of 8 juveniles/100m² in the Flathead River, while Allan (1987) estimated 2-5 fish/100m² in Line Creek in the Kootenays. Data collected at sites in the Bulkley River tributaries in 1996 indicated densities of <4 fish/100m² in four systems²8. Extensive sampling of a relatively unexploited bull trout population in the Thutade Watershed indicates bull trout achieve a mean density of 8 juvenile/100m² with upper estimates to 17 fish/100m² (Bustard 1997a).

These comparisons suggest that Goathorn and Tenas creeks are supporting small populations of bull trout at low densities. This is confirmed by the relatively low numbers of adult spawners and redd sites located in the two systems (16 adults in Goathorn Creek and 10 in Tenas Creek - Tables 2.4 and 2.9 respectively).

There is generally widespread agreement that recreational fishing can have a major impact on bull trout abundance, as the species is long-lived and easy to catch (McPahil and Baxter 1996). Bull trout are commonly captured in the Bulkley River, and liberal catch limits in conjunction with heavy fishing pressure for other species for many years has probably resulted in a relatively diminished population of bull trout in the system. This could account for the low abundance of bull trout in stream habitat that appears ideally suited for this species.

There is a lack of good regional data describing the status of bull trout populations in the Skeena Watershed. Factors that have played a major role in the decline of bull trout populations elsewhere such as angler overharvest and habitat degradation (e.g., Brewin 1997) have probably had a significant influence on many Skeena bull trout populations. However, insufficient data are available to compare the importance and status of the Telkwa River bull trout populations to those elsewhere in the Skeena Watershed. Bull trout management is receiving an increasing emphasis provincially, including a shift to catch-and-release fisheries in some regions.

McPhail and Baxter (1996) warn that juvenile bull trout are particularly vulnerable to land use activities that cause siltation and lead to cementing of stream substrate. Loose

²⁸ Denison/Canyon/Goathorn/Cumming creeks (Bustard 1996).

bed material is essential to juvenile bull trout as cover, and for the community of aquatic insects that provide the major food source for bull trout fry and juveniles.

Dolly Varden

Dolly Varden residents dominated the fish catches in the upper watersheds of Goathorn and Tenas creeks. These fish mature at a small size (<20 mm fork length), and can achieve high densities in the headwater areas, typically up to 15-20 fish/100m² in upper Goathorn Creek tributaries (Figure 2.3b) and somewhat lower in most upper Tenas Creek sites (Figure 2.5b).

There is a strong negative association between Dolly Varden and steelhead trout in these tributaries. Dolly Varden tend to achieve low densities where higher numbers of steelhead are present. It is likely that Dolly Varden cannot compete effectively with steelhead, and will occupy sites that are marginal for steelhead (smaller channels, higher gradients and colder water temperatures).

Dolly Varden also tend to dominate the catches in smaller tributary streams in the Goathorn and Tenas creek watersheds. Resident Dolly Varden were present in approximately 5 km of Four Creek at relatively low densities. They were also present in the lower sections of several smaller tributaries in Goathorn and Tenas creeks (1:20000 aquatic map) and in the headwater area of Hubert Creek.

Dolly Varden juveniles comprise a minor component of the Telkwa River mainstem and sidechannel catch, with only five fry captured in four years of sampling (Table 2.11).

Populations of resident Dolly Varden tend to be widespread in the smaller tributary streams in the Bulkley Watershed, especially cooler mountainous systems such as those found in the Telkwa Watershed. For example, Dolly Varden were the most widespread species found in the Thautil Watershed and were present at many more sites than anadromous species such as steelhead and coho, or fluvial populations of bull trout. Due to their small size (they rarely exceed 20 cm), resident Dolly Varden populations tend to not be exploited by angler harvests. They are also protected by Forest Practices Code regulations. As a result, resident Dolly Varden populations are not at risk compared to anadromous and fluvial species in the watershed.

Coho Salmon

Coho salmon juveniles were present in lower Hubert Creek and in two sidechannels and a wetland site in the lower Telkwa River. Coho abundance was very low throughout the lower reach of Hubert Creek in 1997 compared to sampling conducted during the 1980s. This was despite good access into the lower 1.2 km of Hubert Creek, and presumably

reflects poor fry recruitment into Hubert Creek from the Bulkley River. Adult coho escapements to the Bulkley River have been very poor for most of the past decade.

Interestingly, coho juveniles comprised a higher percentage of the catch in the lower Telkwa River (18%) than in past years. This is largely the result of sampling at two sidechannel locations that were well suited for coho rearing, and may be more a reflection of the dynamic and changing habitat conditions in the lower Telkwa rather than an improvement in overall population strength in this system.

Cutthroat

Cutthroat trout were present in the upper reaches of Helps and Hubert creeks in 1997. However, sampling at the same locations indicated that cutthroat fry had a 10-fold decline in abundance in the system. It is probable that there are access problems to the upper spawning sites, largely due to beaver dams located in the mid-reaches of Helps and Hubert creeks.

2.5 LITERATURE CITED

- Allan, J. 1987. Fisheries investigations in Line Creek 1987. Report prepared for Line Creek Resources Ltd., Sparwood, B.C.
- American Public Health Association (APHA). 1980. Standard methods for the examination of water and wastewater. 15th edition.
- Ashley, K.I. and P.A. Slaney. 1997. Accelerating recovery of stream, river, and pond productivity by low-level nutrient replacement. *In*: P.A. Slaney and D. Zaldokas (eds.) Fish Habitat Rehabilitation Procedures. Watershed Restoration Technical Circular No.9. Watershed Restoration Program. Vancouver, BC
- Beaudry, P., J.W. Schwab, and D. Septer. 1991. Suspended sediment Telkwa River Watershed. Data Rept. prepared by Forest Sciences Section, Ministry of Forests, Smithers, B.C.
- Bothwell, M.L. 1988. Growth rate responses of lotic periphytic diatoms to experimental phosphorus enrichment: the influence of temperature and light. Can. J. Fish. Aquat. Sci. 45: 261-270.
- Bothwell, M.L. 1989. Phosphorus-limited growth dynamics of lotic periphyton diatom communities: areal biomass and cellular growth rate responses. Can. J. Fish. Aquat. Sci. 46: 1293-1301.
- Brewin, M.K. 1997. The bull trout task force (Alberta). *In*: MacKay, W.C., and M.K. Brewin, and M. Monita (eds.). Friends of the bull trout conference proceedings. Bull Trout Task Force (Alberta), c/o Trout Unlimited Canada, Calgary.
- Bustard, D. 1983. 1982 Investigations of adult coho salmon in the Telkwa River. Man Rept. Prepared for Read Environmental & Planning Associates Ltd.
- Bustard, D. 1984a. Assessment of benthic invertebrate and juvenile fish populations in Goathorn and Tenas creeks and the lower Telkwa River, September 1983. Prepared for Read Environmental Planning and Associates Ltd.
- Bustard, D. 1984b. 1983 Investigations of adult pink salmon in the Telkwa River.

 Prepared for Read Environmental Planning and Associates Ltd.
- Bustard, D. 1985a. Telkwa Coal Project aquatic resource assessment (1984). Prepared for Crows Nest Resources Ltd. Unpublished manuscript (Appendix 12 of Application for a Project Approval Certificate Manalta Coal).

- Bustard, D. 1985b. Assessment of juvenile fish populations in Goathorn and Tenas creeks and the lower Telkwa River, September 1985. Data Rept. Prepared for Crows Nest Resources Ltd.
- Bustard, D. 1986a. Fisheries studies in Hubert Creek near Telkwa. Man. Rept. Prepared for Crows Nest Resources Ltd.
- Bustard, D. 1986b. Some differences between coastal and interior stream ecosystems and the implications to juvenile fish production. *In*: J.H. Patterson (ed.) Proceedings of the Workshop on Habitat Improvements, Whistler, British Columbia, 8-10 May, 1984. Can. Tech. Rept. Fish. Aquat. Sci. 1483: 219 p.
- Bustard, D. 1988. Coho salmon counts on the upper Telkwa and Morice Rivers 1988.

 Man. Rept. Prepared for the Department of Fisheries and Oceans.
- Bustard, D. 1995. Results of genetic sampling for Kemess char 1995. Unpublished memo submitted to Fisheries Conservation Section, Ministry of Environment, Lands and Parks, Victoria.
- Bustard, D. 1996. Habitat requirements of vulnerable char species Bulkley tributaries data summaries. Data report prepared for Fisheries Branch, Research and Development Section, B.C. Environment, UBC.
- Bustard, D. 1997a. Kemess South Project fish monitoring studies 1996. Man. report prepared for Kemess Mines Inc.
- Bustard, D. 1997b. Surveys for potential off-channel fish habitat development Telkwa River. Man Report prepared for Pacific Inland Resources Ltd. (Watershed Restoration Program).
- Bustard, D. 1997c. Stream inventory of the Thautil River Watershed 1996. Man. Report prepared for Houston Forest Products Ltd.
- Bustard, D. 1997d. Juvenile coho studies at the Telkwa River Km 1011 Ponds 1997. Man. Rept. Prepared for Watershed Restoration Program, Province of B.C.
- Cavender, T. M. 1978. Taxonomy and distribution of bull trout, *Salvelinus confluentus* (Suckley), from the American Northwest. Calif. Fish and Game 64(3):139-174.
- Chakoumakos, C. R. C. Russo, and R. V. Thurston. 1979. Toxicity of copper to cutthroat trout (*Salmo clarki*) under different conditions of alkalinity, pH, and hardness. Env. Sci. Tech. 13: 213-218.

- Clements, W. H. and P. M. Kiffney. 1995. The influence of elevation on benthic community responses to heavy metals in Rocky Mountain streams Can. J. Fish. Aquat. Sci. 52: 1966-1977.
- Deegan, L.A. and B.J. Peterson. 1992. Whole-river fertilization stimulates fish production in an arctic tundra river. Can. J. Fish. Aquat. Sci. 49:1890-1901.
- Deegan, L.A., B.J. Peterson, H. Golden, C.C. McIvor, and M.C. Miller. 1997. Effects of fish density and river fertilization on algal standing stocks, invertebrate communities, and fish production in arctic tundra river. Can. J. Fish. Aquat. Sci. 54: 269-283.
- Deniseger, J. A. Austin, and W. P. Lucey. 1986. Periphyton communities in a pristine mountain stream above and below heavy metal mining operations. Fresh. Biology 16: 209-218.
- Department of Fisheries and Oceans. 1998. Coho Backgrounder. Prepared by Department of Fisheries and Oceans Coho Response Team.
- Envirocon Ltd. 1984. Fish resources of the Morice River system. Vol. 4 of Environmental Studies Associated with the Proposed Kemano Completion Hydroelectric Development. Prepared for the Aluminum Company of Canada Ltd.
- Feldman, R. S. and E. F. Connor. 1992. The relationship between pH and community structure of invertebrates in streams of the Shenandoah National Park, Virginia, USA. Fresh. Biology 27: 261-276.
- Finnigan, R.L. and D.E. Marshall. 1997. Managing beaver habitat for salmonids: working with beavers. *In*: P. Slaney and D. Zaldokas, (eds.) Fish Habitat Rehabilitation Procedures. Watershed Restoration Technical Circular No. 9. Watershed Restoration Program.
- Goetz, F. 1989. Biology of bull trout, a literature review. U.S.D.A., Williamette National Forest, Eugene, Oregon.
- Grimm, N.B. and S.G. Fisher. 1989. Stability of periphyton and macroinvertebrates to disturbance by flash floods in a desert stream. J. N. Am. Benthol. Soc. 8:293-307.
- Hart, D.D. and C.J. Robinson. 1990. Resource limitation in a stream community: phosphorus enrichment effects on periphyton and grazers. Ecology. 71:1494-1502.

- Healey, F.P. 1985. Interacting effects of light and nutrient limitation on the growth rate of Synechococcus linearis (Cyanophyceae). J. Phycol. 21:134-146.
- Hershey, A.E., A.L. Hiltner, M.A.J Hullar, M.C. Miller, J.R. Vestal, M.A. Lock, S. Rundle, and B.J. Peterson. 1988. Nutrient influence on a stream grazer:

 Orthocladius microcommunities respond to nutrient input. Ecology, 69: 1383-1392.
- Hogan, D. and B.R. Ward. 1997. Watershed geomorphology and fish habitat. *In*: P. Slaney and D. Zaldokas, (eds.) Fish Habitat Rehabilitation Procedures. Watershed Restoration Technical Circular No. 9. Watershed Restoration Program.
- Howarth, R. S. and J. B. Sprague. 1978. Copper lethality to rainbow trout in waters of various hardness and pH. Wat. Res. 12: 455-462.
- Jacoby, J.M. 1985. Grazing effects on periphyton by *Theodoxus fluviatilis* (Gastropoda) in a lowland stream. J. Freshwater Ecol. 3: 265-274.
- Johnston, N. T., C. J. Perrin, P. A. Slaney, and B. R. Ward. 1990. Increased juvenile salmonid growth by whole-river fertilization. Can. J. Fish. Aquat. Sci. 47: 862-872.
- Kiffney, P. M. and W. H. Clements. 1994a. Effects of metals on a Rocky Mountain stream macroinvertebrate assemblage in experimental microcosms. J. N. Amer. Benth. Soc. 13: 511-523.
- Kiffney, P. M. and W. H. Clements. 1994b. Structural responses of benthic macroinvertebrates from different stream orders to zinc. Env. Tox. Chem. 13: 389-395.
- Kiffney, P. M. and W. H. Clements. 1996. Effects of heavy metals on stream macroinvertebrates from different altitudes. Ecol. App. 6: 72-481.
- Koning, C. W. and E. R. Keeley. 1997. Salmonid biostandards for estimating production benefits of fish rehabilitation techniques. <u>In</u>: P. Slaney and D. Zaldokas (eds.) Fish Habitat Rehabilitation Procedures. Watershed Restoration Tech. Circular No. 9.
- Lamberti, G.A. and V.H. Resh. 1983. Stream periphyton and insect herbivores: an experimental study of grazing by a caddisfly population. Ecology 61: 1124-1135.
- Leland, H. V. and J. L. Carter. 1984. Effects of copper on species composition of periphtyon in a Sierra Nevada, California, stream. Fresh. Biology. 14: 281-196.

- Leland, H. V., S. V. Fend, T. L. Dudley, and J. L. Carter. 1989. Effects of copper on species composition in a Sierra Nevada, California, stream. Fresh. Biology 21: 163-179.
- McCormick, P.V. and R.J. Stevenson. 1991. Grazer control of nutrient availability in the periphyton. Oecologia. 86:287-291.
- McIntire, C.D. 1966. Some effects of current velocity on periphyton communities in laboratory streams. Hydrobiologia. 27: 559-570.
- McPhail, J. D. and J.S. Baxter. 1996. A review of bull trout (Salvelinus confluentus) life-history and habitat use in relation to compensation and improvement opportunities. Fish. Man. Rep. No. 104. Ministry of Environment, Lands and Parks.
- Meador, J. P. 1991. The interaction of pH, dissolved organic carbon, and total copper in the determination of ionic copper and toxicity. Aquat. Toxicol. 19: 13-32.
- Medley, C. N. and W. H. Clements. In press. Effects of heavy metals on stream diatom communities. Ecol. App.
- Ministry of Environment, Lands and Parks. 1995 (draft). Lake and stream inventory standards and procedures. Fisheries Branch Inventory Unit.
- MOE. 1976. Laboratory Manual for the Chemical Analysis of Water, Wastewater, Sediments and Biological Materials (2nd Ed.). B.C. Ministry of Environment, Water Resources Services.
- Ministry of Environment, Lands and Parks. 1997 (draft). Angling use plan Bulkley River, 1997. Prepared by Fisheries Branch, Ministry of Environment, Lands and Parks, Smithers, B.C.
- Mundie, J. H., K. S. Simpson, and C. J. Perrin. 1991. Responses of stream periphyton and benthic insects to increases in dissolved inorganic phosphorus in a mesocosm. Can. J. Fish. Aquat. Sci. 48: 2061-2072.
- Nordin, R. N. 1985.. Water quality criteria for nutrients and algae. B.C. Ministry of Environment. Water Management Branch. Victoria, B.C.
- O'Neil, M.J. and M.R. Whately. 1984. Bulkley River steelhead trout- a report on angler use, tagging, and life history studies conducted in 1982 and 1983. Skeena Fish. Rep. No. 83-3. Ministry of Environment, Smithers, B.C.

- Perrin, C. J., and M. L. Bothwell, and P. A. Slaney. 1987. Experimental enrichment of a coastal stream in British Columbia: effects of organic and inorganic additions on autotrophic production. Can. J. Fish. Aquat. Sci. 44: 1247-1256.
- Perrin, C. J. 1997. Phosphorus transport and periphyton accrual in the Cheakamus River, BC. Report prepared by Limnotek Research and Development Inc., Vancouver, BC, for The Resort Municipality of Whistler and BC Hydro. 126 p.
- Perrin, C.J. and J.S. Richardson.1997. N and P limitation of benthos abundance in the Nechako River, British Columbia.. Can. J. Fish. Aquat. Sci.
- Peterson, B.J., L. Deegan, J. Helfrich, J.E. Hobbie, M.A.J. Hullar, B. Moller, T.E. Ford, A.E. Hershey, A. Hiltner, G. Kipphut, M.A. Lock, D.M. Fiebig, V. McKinley, M.C. Miller, J.R. Vestal, R.M. Ventullo, and G.S. Volk. 1993. Biological responses of a tundra river to fertilization. Ecology. 74(3): 653-672.
- Rhee, G.Y. 1978. Effects of N:P atomic ratios and nitrate limitation on algal growth, cell composition, and nitrate uptake. Limnol. Oceanogr. 23:10-25.
- Rhee, G.Y. and I. J. Gotham. 1980. Optimum N:P ratios and coexistence of planktonic algae. J. Phycol. 16: 486-489.
- Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Bull. 191. Fish. Res. Bd. Can. Ottawa, Ont.
- Rosemond, A. D. 1994. Multiple factors limit seasonal variation in periphyton in a forest stream. J. N. Am. Benthol Soc. 13: 333-344.
- Saimoto R. 1996. Telkwa Watershed assessment: fisheries, fish habitat, and riparian zone assessment. Prepared for Pacific Inland Resources Ltd., Smithers.
- Schnute, J. 1983. A new approach to estimating populations by the removal method. Can. J. Aquat. Sci. Vol. 40:2153-2169.
- 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.
- Smith, E.P., D.R. Orvos, and J. Cairns Jr. 1993. Impact assessment using the before-after-control-impact (BACI) model: concerns and comments. Can. J. Fish. Aquat. Sci. 50: 627-637.
- Stanford, J.A. and A.R. Gaufin. 1974. Hyporheic communities of two Montana rivers. Science. 185: 700-702.

- Statistical Analysis System (SAS). 1990. SAS/STAT® User's Guide. Version 6, 4th edition.
- Statzner, B.J., A. Gore and V.H. Resh. 1988. Hydraulic stream ecology: observed patterns and potential applications. J. N. Am. Benthol. Soc. 7:307-360.
- Stevenson, R.J. 1983. Effects of current and conditions simulating autogenically changing microhabitats on benthic diatom immigration. Ecology 64:1514-1524.
- Stevenson, R.J. 1990. Benthic algae community dynamics in a stream during and after a storm. J. N. Am. Benthol Soc. 9: 277-288.
- Stevenson, R.J. and R. Glover. 1993. Effects of algal density and current on ion transport through periphyton communities. Limnol. Oceanogr. 38(6): 1276-1281.
- Stockner, J. G. and K. R. S. Shortreed. 1978. Enhancement of autotrophic production by nutrient addition in a coastal rainforest stream on Vancouver Island. J. Fish.Res.Board Can.35: 28-34.
- Swanberg, T.R. 1997. Movements of and habitat use by fluvial bull trout in the Blackfoot River, Montana. Trans. Amer. Fish. Society, Vol. 126(5):735-747.
- Telkwa Coal Project Committee. 1997. Draft project report specifications for Manalta Coal Ltd.'s proposed Telkwa Coal Project. Prepared under the Environmental Assessment Act.
- Tredger, D. 1986. Bulkley/Morice stock monitoring report 1986. Fisheries Improvement Section, Ministry of Environment, Lands and Parks, Victoria.
- Wallace, J.B. and N. H. Anderson. 1996. Habitat, life history, and behavioral adaptations of aquatic insects. In: R.W. Merritt and K.W. Cummins (Ed). An Introduction to the Aquatic Insects of North America. 3rd ed. Kendall/Hunt. Dubuque Iowa.
- Ward, J. V. 1986. Altitudinal zonation in a Rocky Mountain stream. Archiv fur Hydrobiologie (Supplement) 74: 133-199.
- Waters, R. F. and R. J. Knapp. 1961. An improved stream bottom sampler. Tran.Amer. Fish. Soc. 90: 225-226.
- Whitford, L.A. and J. Schumacher. 1964. Effect of current on respiration and mineral uptake in *Spirogyra* and *Oedogonium*. Ecology 45: 168-170.
- Wigington, P. J. and 9 others. 1996. Episodic acidification of small streams in the northeastern United States: episodic response project. Ecol. App. 6: 374-388.

Williams, D.D. 1984. The hyporheic zone as a habitat for aquatic insects and associated arthropods, pp. 430-455. *In*: V. H. Resh and D.M. Rosenberg (eds.) The ecology of aquatic insects. Praeger, New York, NY. 625 p.

Appendices 1-13:

Aquatic Resource Baseline Studies - Telkwa Coal Project

Appendix	1 Table 1.	Chlore	phyl	<u>a</u> cor	centr	ations on sty	rofoam substr	ata in Goathorn and	Tenas creeks, 1997 and 1984.
Date	Stream	Station	Reni	Dav	Temn	Depth (cm)	Velocity (m/s)	Chlorophyll (µg/cm²)	
05-Sep-97	Goathorn	G2	1		· Cimp	25	0.67	, , , , , , , , , , , , , , , , , , ,	
05-Sep-97	Goathorn	G2	2			22	0.63		
05-Sep-97	Goathorn	G2	3			20	0.63		
05-Sep-97	Goathorn	G5	1		1	28	0.40		
05-Sep-97	Goathorn	G5	2		-	29:	0.67	-	
05-Sep-97	Goathorn	G5	3	0		23	0.53		
05-Sep-97	Tenas	T1.	1			24:	0.55		
05-Sep-97	Tenas	TI	2			25	0.75	· · · · · · · · · · · · · · · · · · ·	
05-Sep-97	Tenas	T1	3			23	0.62		
05-Sep-97	Tenas	Т3	1		7.0	21	0.81		
05-Sep-97	Tenas	T3	2	0	7.0	23	0.64		
05-Sep-97	Tenas	T3	3	0	7.0	23	0.58		1 .
12-Sep-97	Goathorn	G2	1		11.0	17	0.63	0.13	
12-Sep-97	Goathorn	G2	2		11.0	16	0.85	0.10	
12-Sep-97	Goathorn	G2	3		11.0	13	0.53	0.12	
12-Sep-97	Goathorn	G5	1		11.0	18	0.39	0.12	
12-Sep-97	Goathorn	G51	2		11.0	18	0.54	0.11	
12-Sep-97	Goathorn	G5	3		11.0	13:	0.45	0.11	
12-Sep-97	Tenas	T1	1		10.0	14	0.56	0.31	
12-Sep-97	Tenas	T1,	2	7	10.0	17	0.77	0.19	1 1
12-Sep-97	Tenas	T1.	3		10.0	14	0.52	0.34	
12-Sep-97	Tenas	Т3	1		8.5	14:	0.77	0.11;	<u> </u>
12-Sep-97	Tenas	Т3	2		8.5	15:	0.70	0.14	
12-Sep-97	Tenas	T3	3		8.5	16	0.43	0.18	
19-Sep-97	Goathorn	G2	1		10.0	24		0.42	!
19-Sep-97	Goathorn	G2.	2		10.0	21		0.43	
19-Sep-97	Goathorn	G2	3		10.0	20		0.31	
19-Sep-97	Goathorn	G5	I		9.0	29		0.35	
19-Sep-97	Goathorn	G5	2	14	9.0	28		0.38	:
19-Sep-97	Goathorn	G5	3		9.0	26	1	0.28	
19-Sep-97	Tenas	T1	1		9.5	20		0.61	
19-Sep-97	Tenas	T1.	2		9.5	22		0.50	i i
19-Sep-97	Tenas	TI	3		9.5	20	į	0.77	
19-Sep-97	Tenas	T3	1		6.5	23		0.30	
19-Sep-97	Tenas	T3	2		6.5	24		0.33	
19-Sep-97	Tenas	T3	3		6.5	23	· · · · · · · · · · · · · · · · · · ·	0.31	
26-Sep-97	Goathorn	G2	1	21	8.5			1.20	
26-Sep-97	Goathorn	G2	2		8.5	19		1.18	
26-Sep-97	Goathorn	G2	3		8.5	16		0.80	
26-Sep-97	Goathorn	G5	1		8.0	22		0.86	i i
26-Sep-97	Goathorn	G5:	2	21	8.0	22		1.43	
26-Sep-97	Goathorn	G5	3		8.0	18		1.13	
26-Sep-97	Tenas	Tl	1		9.0	15	4	1.12	
26-Sep-97	Tenas	T1	2		9.0	20		0.95	
26-Sep-97	Tenas	T1	3		9.0	17		1.15	
26-Sep-97	Tenas	Т3	1		7.5	20		1.27	
26-Sep-97	Tenas	T3	2		7.5	19		1.30	
26-Sep-97	Tenas	T3	3	21	7.5	19		0.90	
03-Oct-97	Goathorn	G2	1	28	7.0	25	:	1.50	
03-Oct-97	Goathorn	G2	2	28	7.0	24		1.20	
03-Oct-97	Goathorn	G2	3		7.0	21		0.96;	
03-Oct-97	Goathorn	G5	1		6.5	28		1.15	
03-Oct-97	Goathorn	G5	2		6.5	29:		2.43	
03-Oct-97	Goathorn	G5	3		6.5			1.41	
03-Oct-97	Tenas	T1	1		5.0	20		1.45	
03-Oct-97	Tenas	T1	2	28	5.0	23		0.92	
03-Oct-97	Tenas	Ti	3		5.0	22		0.94	
03-Oct-97	Tenas	T3	1	28	4.5	21		2.22	
03-Oct-97	Tenas	T3		28	4.5	24	· · · · · · · · · · · · · · · · · · ·	1.69	
102 001-71	1 01143	13		40	ر.۳	24		1.09	

Appendix	1 Table 1.	Chlore	phyll	<u>a</u> cor	centr	ations on st	yrofoam substr	ata in Goathorn and	Tenas creeks, 1997 and 1984.
Data	Sterner	Station	Do-1	Davi	Toma	Donth (am)	Valority (=/s)	Chlorophyll (µg/cm²)	
Date :	Tenas	T3	3		4.5	Depth (cm)	Velocity (m/s)	2.20	
10-Oct-97	Goathorn	G2	1	35	3.0		-	2.30	
10-Oct-97	Goathorn	G2	2	35	3.0	17	`	1.51	
10-Oct-97	Goathorn	G2	3	35	3.0			0.90	
10-Oct-97	Goathorn	G5	1	35	3.0	20		1.14	
10-Oct-97	Goathorn	G5	2	35	3.0	20		2.31	
10-Oct-97	Goathorn	G5	3	35:	3.0			1.37	
10-Oct-97	Tenas	TI	1	35	1.5			0.83	
10-Oct-97	Tenas	T1	2	35	1.5	21		0.83	
10-Oct-97	Tenas	T1	3	35	1.5	19		1.01	
11-Oct-97	Tenas	T3	1	36	2.0			1.18	
11-Oct-97	Tenas	T3	2	36	2.0			1.54	
11-Oct-97	Tenas	T3	3	36	2.0			1.57	
	Goathorn	G2	1	0	2.0	19.		1.37	
05-Sep-84	Goathorn	G2	2	0					· · · · · · · · · · · · · · · · · · ·
05-Sep-84	Goathorn	G2	3	0					
05-Sep-84 05-Sep-84	Goathorn	G2	4	0!					· · · · · · · · · · · · · · · · · · ·
	Goathorn	G2		7			· .	0.63	
12-Sep-84		G2	2	7				0.63	
12-Sep-84 12-Sep-84	Goathorn	G2					1	0.441	
			41	7					
12-Sep-84	Goathorn	G2		14				0.35	
19-Sep-84	Goathorn			141					
19-Sep-84	Goathorn	G2	2				I	0.85	
19-Sep-84	Goathorn	G2	3	14				0.23	
19-Sep-84	Goathorn	G2	4	14				0.46	
26-Sep-84	Goathorn	G2	1	21				0.89	<u>i</u>
26-Sep-84	Goathorn	G2	21	21			- :	1.42	
26-Sep-84	Goathorn	G2		21:		· · ·		1.26	
26-Sep-84	Goathorn	G2		21				0.69	
03-Oct-84	Goathorn		1	28				1.73	
03-Oct-84	Goathorn	G2		28			 	. 1.83	-
03-Oct-84	Goathorn	G2		28				1.64!	-
03-Oct-84	Goathorn		4:	28				2.27	
10-Oct-84	Goathorn	G2 G2	2	35				2.27	
10-Oct-84 10-Oct-84	Goathorn	G2	3	35:	-			1.75	1
10-Oct-84	Goathorn	G2		35				2.18	
17-Oct-84								21	<u>:</u>
	Goathorn	G2	2	42			1	2.1:	
17-Oct-84	Goathorn	G2 G2		42:				2.2	
17-Oct-84 17-Oct-84	Goathorn Goathorn	G2	3	42:				1.8	
						-		2.2	
05-Sep-84	Goathorn	G5:							
05-Sep-84	Goathorn	G5		01					
05-Sep-84	Goathorn				-				i
05-Sep-84	Goathom	G5		0:				1.20	
12-Sep-84	Goathom	G5	1			i	:	1.28	
12-Sep-84	Goathorn	G5		7				1.37	
12-Sep-84	Goathorn	G5						1.74	
12-Sep-84	Goathorn	G5						1.66	<u>;</u>
19-Sep-84	Goathorn	G5		14				1.74	
19-Sep-84	Goathorn	G5	2	14				1.52	
19-Sep-84	Goathorn	G5	31	14:	;			2.18	
19-Sep-84	Goathorn	G5	4	14				1.83	
26-Sep-84	Goathorn	G5		21		:		1.85	
26-Sep-84	Goathorn	G5		21:				1.99	<u> </u>
26-Sep-84	Goathorn	G5		21		i		2.61	
26-Sep-84	Goathorn	G5	4:	21			·	1.42	
03-Oct-84	Goathorn			28		· :	i		
03-Oct-84	Goathorn	G5	2	281					

Date	Stream	Station	Repl.	Day	Temp	Depth (cm)	Velocity (m/s)	Chlorophyll (µg/cm2)		
03-Oct-84	Goathorn	G5	3	28				2.75		
03-Oct-84	Goathorn	G5	4	28						
10-Oct-84	Goathorn	G5	1	35						
10-Oct-84	Goathorn	G5	2	35			-	3.08	•	•
10-Oct-84	Goathorn	G5	3	35				2.73	· · · · · · · · · · · · · · · · · · ·	
10-Oct-84	Goathorn	G5	4	35				1.66		
17-Oct-84	Goathorn	G5	1	42			· ·			
17-Oct-84	Goathorn	G5	2	42				1.97		
17-Oct-84	Goathorn	G5	3	42				2.8		
17-Oct-84	Goathorn	G5	4	42				2.3		

Appendix 1 Table 2. List	of periphyton species found o	n styr	ofoam subs	trata in Goatho	n and Tenas	n and Tenas creeks, 1997 and 1984.				
Division	Species		code							
										
CYANOPHYTA	Oscillatoria sp.	/mm	1		-					
CHLOROPHYTA	Closterium sp.		2	-						
CHLOROPHYTA	Ulothrix sp.	/mm	3		<u>i</u>					
CHRYSOPHYTA - DIATOMS	Achnanthes minutissima		4			<u> </u>				
CHRYSOPHYTA - DIATOMS	Achnanthes sp.		5		<u> </u>					
CHRYSOPHYTA - DIATOMS	Amphipleura pellucida	1	6							
CHRYSOPHYTA - DIATOMS	Cocconeis placentula	i	7	!			· · · · · · · · · · · · · · · · · · ·			
CHRYSOPHYTA - DIATOMS	Cymbella caespitosa		8		i	<u> </u>				
CHRYSOPHYTA - DIATOMS	Cymbella cistula		9							
CHRYSOPHYTA - DIATOMS	Cymbella ventricosa		10							
CHRYSOPHYTA - DIATOMS	Diatoma hiemale		11							
CHRYSOPHYTA - DIATOMS	Diatoma tenue v. elongatum		12		1		-			
CHRYSOPHYTA - DIATOMS	Fragilaria sp.		13				•			
CHRYSOPHYTA - DIATOMS	Fragilaria vaucheriae		14		i		-			
CHRYSOPHYTA - DIATOMS	Gomphonema geminatum	-	15			-				
CHRYSOPHYTA - DIATOMS	Gomphonema herculeanum		16		:					
CHRYSOPHYTA - DIATOMS	Gomphonema olivaceum		17:			i				
CHRYSOPHYTA - DIATOMS	Gomphonema sp.		18	•		!				
CHRYSOPHYTA - DIATOMS	Hannaea arcus		19		-		•			
CHRYSOPHYTA - DIATOMS	Meridion circulare		20			-				
CHRYSOPHYTA - DIATOMS	Nitzschia linearis		21				•			
CHRYSOPHYTA - DIATOMS	Nitzschia palea		22	· · · · · · · · · · · · · · · · · · ·	;	i	•			
CHRYSOPHYTA - DIATOMS	Synedra ulna	;	23		:					
CHRYSOPHYTA - DIATOMS	Diatom subtotal		24	<u> </u>		:				
TOTAL		-	25		-					
TOTAL mm			26							

Appendix	1 Tab	le 3. Cell c	ounts, bi	o-volume	, and per	cent of to	tal bio-vo	lume by p	eriphyto	n species	code fou	nd in Goa	thorn and	d Tenas o	reeks in 1	984 and 1	997.	
Explanatio	n of s	pecies coo	ding:															
Numbers re	efer to	the numeri	c code as	signed to	each spec	ies as liste	ed in Appe	endix 1 Ta	ble 2.									
		umbers in t				· · ·												
		io-volume i																
		ent of total				s of %												
Species co	des nu	mber 1, 3	and 26 ha	ve cell nur	nbers exp	ressed as	"mm" bed	cause the	are filam	entous for	ms in which	h free cel	s do not e	xist				
	1			[i													
			Species (Coding														
Date	Site	Replicate	1N	2N	3N	4N	5N	6N	7N	8N	9N	10N	11N	12N	13N	14N	15N	16N
17-Oct-84	G2	1																
17-Oct-84	G2	2								-								
17-Oct-84	G2	3																***************************************
17-Oct-84	Ğ2	4			*****													
17-Oct-84	G5	2																
17-Oct-84	G5	3																
17-Oct-84	G5	4																
10-Oct-97	T1	1				20.53		3.73	1.87									5.60
10-Oct-97	T1	2			22.20.27	29.86		1.87	20.53				3.73		3.73			20.53
10-Oct-97	T1	3		1.87		7.47		3.73	14.93	1.87			1.87		3.73			11.20
11-Oct-97	Т3	1				120.57			12.69	63.46		76.15	139.60		164.99	12.69		
11-Oct-97	T3	2			2.14	90.43			14.28	14.28		109.46	57.11		76.15			
11-Oct-97	Т3	3				52.35	33.31		9.52	23.80		23.80	57.11		157.06			38.07
10-Oct-97	G2	1				959.17	43.93		21.97					219.66				
10-Oct-97	G2	2	1.09			404.54	66.63	- 114177000000000000000000000000000000000						475.93	19.04		4.76	
10-Oct-97	G2	3	0.64		1.26									120.38	2.80		2.80	
10-Oct-97	G5	1				894.74				9.52	4.76	52.35	28.56	33.31				
10-Oct-97	G5	2				2227.33						57.11		171.33				
10-Oct-97	G5	3	8.02			1509.37				13.60		54.39	13.60	163.17	666.30			

		. <u></u>		T*														
Appendix 1	1 Tab	le 3. Cell																
	1}																	
Explanatio	n of s	pecies co																
	<u> </u>																	
Numbers re	efer to	the numer																
N" refers to	cell n	umbers in																
V" refers to	cell bi	o-volume (Į					
PV" refers t	to perc	ent of tota																
Species co	des nu	mber 1, 3																
and the second second second second second																		
Date	Site	Replicate	17N	18N	19N	20N	21N	22N	23N	24N	25N	26N	1V	2V	3V	4V	5V	6V
17-Oct-84	G2	1																
17-Oct-84	G2	2																
17-Oct-84	G2	3																
17-Oct-84	G2	4																
17-Oct-84	G5	2		1.														
17-Oct-84	G5	3																
17-Oct-84	G5	4																
10-Oct-97	T1	1	125.05		5.60	1.87	1.87	110.12	293.02	569.24	569.24					1.44		4.78
10-Oct-97	T1	2	141.84		1.87		3.73	149.31	237.03	614.04	614.04					2.09		2.39
10-Oct-97	T1	3	126.91				1.87	154.91	302.35	630.84	632.70			11.20		0.52		4.78
11-Oct-97	Т3	1	583.80		647.26	6.35		76.15	317.28	2220.99						8.44		
11-Oct-97	Т3	2	371.22		509.24	14.28		90.43	185.61	1532.48	L	2.14			128.50	6.33		
11-Oct-97	Т3	3	490.20		409.30	14.28		42.83	157.06	1508.69						3.66	2.00	
10-Oct-97	G2	1	234.30			7.32		43.93	754.16							67.14	2.64	
10-Oct-97	G2	2	176.09		4.76			9.52	280.80	1442.06	Commence and a second	1.09	10.95			28.32	4.00	
10-Oct-97	G2	3	148.38		11.20			11.20	226.76	912.66	912.66	1.90	6.44		75.59	27.24		
10-Oct-97	G5	1	685.33		14.28				80.91	1803.76						62.63		
10-Oct-97	G5	2	1008.96	152.30	780.52			494.96	361.70	6282.22	6282.22					155.91		
10-Oct-97	G5	3	1210.21	149.58	244.76			203.97	81.59	4310.53	4310.53	8.02	80.23	-		105.66		

Appendix	1 Tab	le 3. Cell	<u> </u>																
Explanatio	ll on of s	necies co			.												· · · · · · · · · · · · · · · · · · ·		
- <u></u>											**************************************								
Numbers re	fer to	the numer																	
N" refers to	cell n	umbers in																	
V" refers to	cell b	io-volume	i		* * †														
PV" refers t	o perc	ent of tota																	
Species co	des nu	ımber 1, 3																	
					9V			401	401					401	401				
Date 17-Oct-84	G2	Replicate	7V	8V	90	10V	11V	12V	13V	14V	15V	16V	17V	18V	19V	20V	21V	22V	23V
17-Oct-84	G2	<u>-</u>	ł								a					···			
17-Oct-84	G2	2																	ļ
17-Oct-84	G2	3			· · · · · · · · · · · · · · · · · · ·	· · · ·						l		·					
17-Oct-84	G5	2																	
17-Oct-84	G5	<u>-</u>					***************************************												
17-Oct-84	G5	4			- 1		*												
10-Oct-97	T1	1	1.68		1							22.40	60.02		10.64	0.91	6.07	121.13	873.20
10-Oct-97	T1	2	18.48				2.39		1.87			82.12	68.09		3.55		12.13	164.24	706.35
10-Oct-97	T1	3	13.44	2.26		·	1.19		1.87			44.79	60.92				6.07	170.40	901.01
11-Oct-97	Т3	1	11.42	76.78		37.31	89.35		82.49	4.32			280.23		1229.79	3.11		83.76	945.51
11-Oct-97	Т3	2	12.85	17.28		53.64	36.55		38.07				178.19		967.56	7.00		99.47	553.12
11-Oct-97	Т3	3	8.57	28.79		11.66	36.55		78.53			152.30	235.30		777.66			47.12	468.03
10-Oct-97	G2	1	19.77					39.54	25.63				112.46			3.59		48.32	2247.40
10-Oct-97	G2	2						85.67	9.52		109.46		84.52	·	9.04			10.47	836.77
10-Oct-97	G2	3				-====		21.67	1.40		64.39		71.22		21.28			12.32	
10-Oct-97	G5	1		11.52	30.32	25.65	18.28	6.00					328.96		27.13			=11.1=	241.10
10-Oct-97	G5	2		= -:=		27.98		30.84	514.00				484.30		1482.99				1077.88
10-Oct-97	G5	3		16.45		26.65	8.70	29.37	333.15				580.90	149.58	465.05			224.37	243.13

					_								·						
Appendix 1	Tab	le 3. Cell																	
	إييا																		
Explanation	n of s	pecies co																	
Numbers re	fer to	the numer															·		
N" refers to	cell n	umbers in																	
V" refers to	cell bi	io-volume i			· · ·		i 1												
PV" refers t													· · · · · · · · · · · · · · · · · · ·						
Species cod																	·		
1000000																			
														· · · · · ·					
Date	Site	Replicate	24V	25V	26V	1PV	2PV	3PV	4PV	5PV	6PV	7PV	8PV	9PV	10PV	11PV	12PV	13PV	14PV
17-Oct-84	G2	1								10						trace	30	25	
17-Oct-84	G2	2							10								25	20	
17-Oct-84	G2	3				···				5							25	20	
17-Oct-84	G2	4														trace	25	15	
17-Oct-84	G5	2								10						11400	25	20	
17-Oct-84	G5	3								10				·· - · · - · ·			25	20	
17-Oct-84	G5	4														trace	25	20	
10-Oct-97	T1	1	1102.26	1102 26							<u>-</u>					liace			
10-Oct-97	T1		1063.69						0										
10-Oct-97	T1		1207.25																
11-Oct-97	T3						· · · · · · · · '						3						
11-Oct-97	T3		1970.05		128.50								3			3		3	
11-Oct-97	T3		1857.16		120.50						· · · ·					2			
10-Oct-97	G2		2566.49						0	0			2		!			4	
10-Oct-97	G2		1177.77		10.95				3	<u>.</u>									
10-Oct-97						!			2	0									
	G2	3	895.27		82.03			8	3								2		
10-Oct-97	G5	1	751.58						В				2	4	3	2	1		
10-Oct-97	G5		4470.66						3						1		1 :	11	
10-Oct-97	G5	3	2183.00	2183.00	80.23	4			5				1		1	0	1	15	

Appendix '	1 Tab	ia 2 Call					T							
Appendix	i lab	ile 3. Celi			-			· · · · · · · · · ·						
Explanatio	n of s	nocine co												
Explanatio	li Oi s	pecies co						· · ·						
Numbers re	fer to	the numer												
N" refers to														
							ļ							W-17 MOR -17 -4
V" refers to							ļ							
PV" refers t														
Species co	des nu	ımber 1, 3					ļ							
Date	Site	Replicate	15PV	16PV	17PV	18PV	19PV	20PV	21PV	22PV	23PV	24PV	25PV	26PV
17-Oct-84	G2	1					20				15	100	100	0
17-Oct-84	G2	··· 2				20					25	100	100	0
17-Oct-84	G2	3				15	15				20	100	100	0
17-Oct-84	G2	4				15	20				25	100	100	0
17-Oct-84	G5	2				5	20				20	100	100	0
17-Oct-84	G5	3				5	25				15	100	100	0
17-Oct-84	G5					10	15				25	100	100	Ō
10-Oct-97	T1	1		2	5		1	Ō	1	11	79	100	100	0
10-Oct-97	T1	2		8	6		Õ		1	15	66	100	100	0
10-Oct-97	T1	3		4	5				0	14	74	99	100	0
11-Oct-97	T3	1			10		43	0		3	33	100	100	0
11-Oct-97	T3	2			8		46	0		5	26	94	94	6
11-Oct-97	T3	3		8	13		42	0		3	25	100	100	Ō
10-Oct-97	G2	i 1			4			0		3 2	88	100	100	Ō
10-Oct-97	G2	2	9		7		1			1	70	99	99	1
10-Oct-97	G2	3	7		7		2			1	. 69	92	92	8
10-Oct-97	G5	1			44		4				32	100	100	0
10-Oct-97	G5	2	<u>.</u>		11	3	33			12	24	100	100	0
	G5	3			26	7	21			10	11	96		4
10-Oct-97	G5 G5	1 2 3			44		33 21				32 24	100 100	100 100	

	1				10.1.01
Division	Order	Family	Species	Stage	Species Code
nsecta	Ephemeroptera	 	Ephemeroptera A	adult	1.
nsecta	Ephemeroptera	Baetidae	Baetis sp		2
1secta	Ephemeroptera	Siphlonuridae	Ameletus sp	i	3
nsecta	Ephemeroptera	Ephemerellidae	Ephemerella doddsi		4, :
nsecta	Ephemeroptera	Ephemerellidae	Ephemerella flavilinea	 	5
1secta	Ephemeroptera	Ephemerellidae Ephemerellidae	Ephemerella spinifera		6.
nsecta nsecta	Ephemeroptera Ephemeroptera	Heptageneidae	Ephemerelia sp Rhithrogena sp	 	8
nsecta	Ephemeroptera	Heptageneidae	Epeorus (Iron) sp		9
nsecta	Ephemeroptera	Heptageneidae	Cinygmula sp		10:
nsecta	Ephemeroptera	Leptophlebiidae	Paraleptophlebia sp		11:
nsecta	Ephemeroptera		Ephemeroptera subtotal	<u> </u>	12,
nsecta	Plecoptera	D 1 C1	Kathroperla sp		13
nsecta	Plecoptera Plecoptera	Perlodidae Perlodidae	Diura sp	 	14
nsecta	Plecoptera	Perlodidae	Arcynopteryx sp		16
secta	Plecoptera	Perlodidae	Isoperla sp	-	17
isecta	Plecoptera	Perlodidae	Megarcys sp	!	18
secta	Plecoptera	Perlodidae	Skwala (curvata)		191
nsecta	Plecoptera	Perlodidae	Skwala (paralella)		20
secta	Plecoptera	Chloroperlidae	Chloroperia sp	+	21:
isecta	Plecoptera	Chloroperlidae	Hastaperia sp	-	22
nsecta	Plecoptera Plecoptera	Chloroperlidae Chloroperlidae	Suwalia sp Sweltsa sp group		23
nsecta	Plecoptera	Leuctridae	Leuctra sp	!	25
nsecta	Plecoptera	Nemouridae	Nemoura sp1	i	26
nsecta	Plecoptera	Nemouridae	Nemoura sp2	;	27
nsecta	Plecoptera	Nemouridae	Malenka sp		28:
rsecta	Plecoptera	Nemouridae	Podmosta sp		29
secta	Plecoptera	Nemouridae	Visoka cataractae	!	30:
nsecta	Plecoptera	Nemouridae	Zapada sp		31
nsecta nsecta	Plecoptera Plecoptera	Capniidae	Capnia sp	<u>:</u>	32
nsecta	Plecoptera	Taeniopterygidae	Taenionema sp Plecoptera subtotal	<u>!</u>	34
nsecta	Megaloptera	Corydalidae	1 recopiera subiota	-	35.
nsecta	Trichoptera		Sericostoma sp.		36
nsecta	Trichoptera	Psychomyiidae	Tinodes sp. larva	llarva	37:
nsecta	Trichoptera	Psychomyiidae	Tinodes sp. pupa	рира	381
nsecta	Trichoptera	i	Trichoptera Unid J	juvenile	39!
nsecta	Trichoptera	Hydropsychidae	Arctopsyche sp		40
nsecta	Trichoptera	Hydropsychidae	Parapsyche sp	-	41:
nsecta	Trichoptera Trichoptera	Leptoceridae Brachycentridae	Leptocella sp Brachycentrus sp		42
nsecta	Trichoptera	Limnephilidae	Unid Juv	juvenile	441
nsecta	Trichoptera	Limnephilidae	Ecclisomyia sp	Javenne	451
nsecta	Trichoptera	Rhyacophilidae	Rhyacophila acropedes or vao	<u> </u>	46
nsecta	Trichoptera	Rhyacophilidae	Rhyacophila angelita	1	471
nsecta	Trichoptera	Rhyacophilidae	Rhyacophila vaccua	1	48
rsecta	Trichoptera	Rhyacophilidae	Rhyacophila sp		49
nsecta	Trichoptera	Glossosomatidae	Glossosoma sp		50
nsecta	Trichoptera	Chicanomidae	Trichoptera subtotal		51 52
nsecta	Diptera	Chironomidae Chironomidae	L P	larva	52
nsecta	Diptera Diptera	Chironomidae	A	pupa	54
rsecta	Diptera Diptera	Chironomidae	Chironomid subtotal		55
isecia	Diptera		Diptera Unid L	Larva	56
secta	Diptera	:	Diptera Unid A	adult	57
secta	Diptera		Brillia sp	!	58
secta	Diptera		· Curdiocidoras sp		59
secta	Diptera		Corynoneura sp	i	60
secta	Diptera		Cricotopus sp		61
secta	Diptera		Epoicocladius sp Eukiefferiella sp	ļ	62
secta	Diptera Diptera	1	Euryhapsis sp	 	64
secta	Diptera		Parorthocladius sp		65
secta	Diptera	 	Psectrocladius sp		66:
rsecta	Diptera	· · ·	Rheotanytarsus sp	!	67
secta	Diptera	1		<u> </u>	68
nsecta			Thienemanniella sp		69
secta	Diptera		Thienemannimyia sp		70
	Diptera	Simulidae L	Prosimulium sp	larva	71:
rsecta					72!

100

THO I

Division	Order	Family	Species	Stage	Species Code	

secta	Diptera	Simulidae A	Simulium sp	adult	73	
secta	Diptera	Simulidae	Simulium sp	1	74	
secta	Diptera	Empididae	Empididae	larva	. 75	
secta	Diptera	Empididae	Empididae	pupa	76	
secta	Diptera	Empididae L	Chelifera sp	:	. 77	
secta	Diptera	Empididae	Weidemannia sp		78	
secta	Diptera	Ephydridae	Ephydridae	larva	79	
secta	Diptera	Ephydridae	Ephydridae	pupa	80	
secta	Diptera	Muscidae	Muscidae	!	81	
nsecta	Diptera	Ceccidomylidae	Ceccidomylidae		82	
isecta	Diptera	Blephariceridae	Agathon sp		83	
rsecta	Diptera	Blephariceridae	Blephariceridae	:	84	
secta	Diptera	Blephariceridae	Philorus sp.	;	1 85	
secta	Diptera	Ceratopogonidae	Culicoides sp		86.	
secta	Diptera	Ceratopogonidae	Palpomyia sp		87	
nsecta	Diptera	Tipulidae	Tipula sp		88	
secta	Diptera	Tipulidae	Antocha sp		89	
secta	Diptera	Tipulidae			90	
secta	Diptera	Tipulidae	Hexatoma sp		91	
secta	Diptera	Rhagionidae	Atherix sp		92	
secta	Diptera	Rhagionidae	Undescribed athericid	:	93	
secta	Diptera	Psychodidae	!Pericoma sp	-	94	
secta	Diptera	Deuterophlebiid	Deuterophlebia sp	1	95	-
nsecta	Diptera	Сусіоптарна	Cyclorrhapha	1	96 i	
nsecta	Diptera	- 0,000	Diptera others subtotal	Ilarva	97	
	Lepidoptera	+	Lepidoptera Unid L	1	98	
	Coleoptera	Hydrophilidae	Deplete one 2		99	
	Coleoptera	Psephenidae			100	
	Homoptera	Aphidae (terrestrial)			101	
	Homoptera	Ceropidae (terrestrial)			102	-
	Homoptera	i coroproue (terresuma)	Homoptera subtotal		103	\rightarrow
	Hymenoptera	Braconidae (terr)	Braconidae (terr)		104	-
	Hymenoptera	Formicidae	Formicidae	.	105	
	Hymenoptera	i cimiciae	Hymenoptera subtotal		106	-
	Collembola		Bourletiella spinata		107	
	Collembola		Hypogastrura sp		108	
	:Collembola		Isotomurus sp	 	109	-
	:Collembola	Sminthuridae	Sminthurides		110	- :
	Ostracoda	Ostracoda	Candona sp		111	
	Hirudina	Ostracoda	Candona sp			-
	Oligochaeta	1			112	
	Oligochaeta	• • • • • • • • • • • • • • • • • • • •	Enchytraeidae	:	113	
	Acarina		Acarina Unid J/D	-	115	
	Acarina		Lebertia sp		116	
	Acarina		Neumannia sp	•	117	
	Acarina			 		
	Acarina		Sperchon sp Wandesia sp	1	1101	-
	 			:	119	-
	Acarina		Orbibatei		120,	
	Aranaea		: Aranaea (terr.)		121	
	Sphaeridae		·		122	
	Turbellaria		Polycelis coronata		123	- !
	Nematoda	:	Nematoda	i	124	- 1

					pecies code ir	Goathern an	d Tenas creek	s in 1983, 198	4 and 1997.	L	l	1	l	<u> </u>	l		L	1	l
Specie	s codes are de	scribed in Ap	pendix 2 Tab	le 1.		i	1			1					l	l	i	1	1
	I			1	1	1				1		1							_[_
	ļ	SPECIES COL	E						T					I					T
Site	Replicate		1	3	I	4 5	6	7		8 5	10	l1	12	2 13		15	16	i 17	7
D TI	l!		2	?		3			31	1 2		1	6:	3 3	11		19		I
ı Ti	1 1		3	1		2	1		1	3	1	I	6: 3: 9:	9	2	L	26	1	.1.
3 TI]3			!		4	1		44	4]		99	9 1	l		40		. I
3 Ti	1 4	!	3]	1	9			19	9 1		3			ı	I	32		
3 T	l	1		1 4		3			16	6		9	3:	5 7			13	4	
3 Ti		.,,		3]	l	<u> </u>	L		44	4	2] 3	64	4 9	I		47		Ι-
3 12 3 12	[]		29	7 6]			9	9		4	4	7 1	i		17		1
3 12	1		29	3		5			57	7		4	367	2 13	3		41		7
3 72	1		27	В		6			22	2 7	1	5	318	B 13	6		28		
3 T2	4		14			7			24	4 5	1		18	7 9	4		54		7-
3 12		i	12	2		5	1		91	i 4		1	23	3 11	4		43		\top
3 T2			6	9		1			19	9 1	1		90	6	2		35		7
3 G2		1		18		1			1	2			2	1			13		1
3 G2	2			6		7	1		20	6	1		40	5	l ————		12		7-
3 G2 3 G2]]	[B	I	1	[1	9	t		18	B 1	1		11		1
13 G2		1	T	5	I	7	l		22	2	1	1	34		i		13		1
3 G2	[1		5		3	F			4	T		1:	3 10			7	/	1-
13 G2	[5	1	1	1			1	1 2	1		7	!		3	1	1
3 G5	[]	I	3:		1	3[6		58	B 2	l	I	101	1 6	6	I	49		1
3 G5	2		10	6 2	I	4			47	7	!		7:	3 11	3		45	·[1-
3 G5		I	6	3	1	4	3		i iii	1	1	1	190				81	i 	1-
3 G5			2	9 3	I	7	6		10	3 8	1]	159	9 10	1	T	79	4	1
3 G5 3 G5	1		2	3		3			13	3		1	40	11			21		-
3 G5	(1 33	B 20		2	1		49			1	9				37	/	1-
4{T		I	2	4 3		1	1		1	2 4		3	37	7	8		10	/	7
4 Ti				7]	2	1		4	4		1	1	5	2		5		
4 TI]			B	1	2	1		1	5 7			24	1	1		2		
иті	. 4			5		2	1		13	3 12	2		34	1	1		3		-1-
4 TI 4 TI 4 12 4 12			10	2	-	2			1	7 17		3	34 41	i]	12			,	1
4 TI			1	4		6	1		13	3	2		32	3	6		13	1	1
4 12	1		7:	5	1	6	1		31	12		6	130	0	7		28	,	1
4 T2	2		19	9		5			is is	5 1			40	5			. 8	,	
4 172]	1		5		2			11	4	i ī		34	5	1		4		-1-
4 T2		1	9:	5		6			1	6	†	i	124	i	· · · · · · · · · · · · · · · · · · ·		14	it	1.
4 12			7.	2	:	7			23	29		1	132	1	23		19	/	1-
4 12		1	2.		1	il			19	21		2	66	5			4		1-
4 (G2		1		7	1	8			-	6			21		·		2		1-
4 G2			i ii	2	11	o	1		21	1 2	1		46	5	1		3		-1-
4 (62	3	1		3	7	4			23	1			31	i	6		5	J	1-
4 (12	4			3]	2	2		ic				24		5		16	,	1
4 G2				9 1	1	1	I		25	5 2	2		50	0	3		2	1	1
4 G2			1	1		3	T		-	6. 2		I	21	3	1		3		1-
4 G5	L !	L	1 . 3	1	I	5			72	2 3			114		3		4	4	Ι.
14 G 5	L 3		1	2	I	3	2		31	1	6	I	55	5	8	L	5	1	. [
4 G5		il	14	1	1	7	I		36	В	1		60	0	2		7	4	
4 G5	L	1	ļ !!	5	1	9]]3		41	!]5	1	79		6	L	12		_[_
и GS	L		1 !!	2 3	l	3	2		29	9 6	4		59 78	2	6	l	10	4	. []
4 G5	L	4	3:	9		6)	l <u>.</u> ii]3i	! 4	L 2	L	75	1		l	1	1	. [.
77 G2	L 1		ļ.,			1	l	i	1	4	2		1	1	l		L		I.
7 G2	ļ 3	ļ <u>.</u>	I	3 4	L	2	I	3	1	!!		l		1	l		1	1	1_
7 G2	ļ l	<u> </u>	ļ <u></u> .:	2	L :	<u> </u>	ļ	8	21	! 3	2	1	43		l	L	I	4	1_
77 G2	} · 5] 2	<u> </u>		3(ļ		35	5] 15	18		94	5	ļ		l	4	1.
77 G2	J	l		73	l	4	I		17	7	1	l	49		ļ		I	1	
7 G2	ļ ·	ļ			ļ ·	9	ļ		ļ <u> </u>	5 2	ļ <u>·</u>	I	16			L	ļ		. .
7 G5	ļ!		1!	! !		L			l !	1	2	l]		ļ		1	1	1
7 G5	ļ <u>-</u>		J	4			ļ		ļ3	3 2	I?	ļ	41		L	L	ļ		
71G5	_		2	! 4		! !			19	2	12	l	61	<u> </u>	L	l	1	1	
7 G5			. 	2	l	2				1 4	L ii		4	5	ļ	l 	ļ	1	.
77 G5	ļ <u>.</u>			B					10	6	36	1	86		l				
7 G5	ļ <u> </u>	l		21				2	l	1	9		39		l		ļ	4	4.
77 TI	ļ!	ļ	. J	2	ļ . 	4	L		L 4	·			1	5	_		1		1
7 TI	J		L	2					9	2	11		26		1			1	
77 TI	L				I	y] 19	8	5	l	56		1	l	1	1	1.
7 Ti	ļ <u>.</u> <u>.</u> <u>.</u>	1	1		1	1			to) 8	1	1 1	34	!!!	1	l	1	1 7	Л.,
77 TI			3	3		1		i	41	19	8		103		l	l	1	1	
7 TI	ļ		4	2 i	J	!		i	I	3	2		20		l	[1	12	
77 T2	L	1	20	<u> </u>	1	1		5	1	7 6	40		261		l	l	1	1	5
7 72	1		30 25	7 5	1	5		6	9	10	34	[376		1	[1	1	ıL.
7 12	1	11	250	6 3	I	1		i	2	12	14	[291	11	1	[1	1	[
17 IT2	1	1	18 5	B	L	5		2]3	3	9	[212	1	1	[1	1	ų[,
7 T2	1	il	1 5	31 2	1	1		3		1	10		79 385	i	1	ī	1	1 1	Ι.

Appendix 2 Ta	ble 2. Sample co pecies codes are c	un Se				7														
Date Sit	e Replicate								-											
16-Sep-83 T1 16-Sep-83 T1 16-Sep-83 T1		19	20	21	22											7				
				- 1				24	25	26										_
16-Sq-83 T1 16-Sq-83 T1 16-Sq-83 T1 23-Sq-83 T2 23-Sq-83 T2 23-Sq-83 T2 23-Sq-83 T2 23-Sq-83 T2		110 110 100 100 100		3	******					6	6		29	36	3	ļ	32		<u> </u>	
23-Sep-83 17 23-Sep-83 17 23-Sep-81 17				5			***			29	15						3	34	35	
	4			22						7	7						-	64		
23-Sep-83 T2 16-Sep-83 G2 16-Sep-83 G2	6			7						10	43							58 92		
16-Sep-83 G2 16-Sep-83 G2 16-Sep-83 G2				15						8	18							33		
16-Sep-83 G2 16-Sep-83 G2 16-Sep-83 G5	5			. 6							29							150		
16-Sep-83 G5	2										ļ							101 87		!
10-Sep. 01 Cc	3			4					18			-						33 30 is		
16-Sep-83 G5 16-Sep-83 G5 16-Sep-84 T1 2-Sep-84 T1	6			28					7			-						44		
2-Sep-84 Ti	2 3			20					- 8	<u>1</u>								27		
Sep-84 Ti	4 5			-	4				2]	5			-			-	-	75		Market W
Sep-84 172 Sep-84 172 Sep-84 172					- 22													57 112		
Sep-84 12	3				5				4				-			2 3		21		
Sep-84 12	5				4				11							7		7 29		
9-84 G2	2			-	13				3							27		32 24		
P-84 G2 P-84 G2	4				- 3				4]	-				79 18 32		**************************************
P-84 G5	6			-	10											22		128		
-84 G5	3		-		19	-			8 3				-			3		30 10		
84 G5					9				- 4							15		36		
97 G2 97 G2	1				8				3						-	10		18		
70	3 4						1		7 -							26 8		52		
7 G2	6	1				1	1									48		43		
GS GS	2														2	31		62		
G5 G5 G5	4											3				9	15	30	-	
TI	6					2						6				30	ii	78 72		
	3							1			-	14				28 15	101	16	1.	1
	5 5							2				25	- 2	68	22	ij :	16	7		
			F			1				-				2	69		1 10			1
									-			- j		24 17	19 38 53		21			1
						- 2					+	6	ľ	121	53 142 60	6	98	1		
		11			2	<u>'</u>					-	56		167 188 89	60 110 36	84	- 60		·	

endix Z	Table 2	Sample coun											1							T^{-}
	Specie	codes are de					1			1			·						·	+
			1				1	† · · ·	i	1			†	†			 	 		+-
			İ					† ·	1					 			· · ·		 	
5-Sep-83 5-Sep-83	Site	Replicate	37	38	39	40	41	42	43	44	45	46	41	46	49	50	51	52	53	3
-Sep-83	<u>TI</u>		3													3		52 82	1	2
-Sep-83	<u> </u>						!								I	1	4			\perp
-Sep-83	<u> </u>		ļ <u>2</u>												ļ <u> </u>	3		·		1
-Sep-83 -Sep-83	<u> </u>						1	ļ								2	!!	1		3
-Sep-83	†:												l		2	ļ	ļ	3:		
-Sep-83	172			···				·· ·· !						ļ	٠ <u>'</u>	ļ <u>l</u>	ļ	2:		₹
-Sep-83	12	· · · · · · · · · · · · · · · · · · ·	4				· · · · · · · · · · · · · · · · · · ·				l	ł			 	 				3
-Sep-83	12	3	1				†·				···-	 					1		 	+
-Sep-83 -Sep-83	T2	4	5				†**	 			 				·		12			<u>-</u>
-Sep-83	12	5	j				1		† · - · · - · 	† -	·				ļ	20				1
-Sep-83	172	6	6				1	1	1		· · · · · · · · · · · · · · · · · · ·					† -	13			il
-Sep-83	CI2	1	i					1						•	·		1	6		11
-Sep-83	G2	2					I		1	1				·····		ii	1	11	1	1
-Sep-83	G2		 	L		l	1			1				I	I	Ii		16		
-Sep-83	G2	4		ļ						ļ				L	1	i	1	13		iL
-Sep-83	[2]		ļ <u>6</u>	ļ						L					1]2	1	84		3
-Sep-83		6		ļ				<u> </u>	ļ		ļ <u></u>				l	<u> </u>	l4	100		1
-Sep-83		···		ļ					ļ		L				4		ļ 8	15	ļ	2
-Sep-83 -Sep-83	ii.	}	ł <u>2</u>	ļ					ļ	ļ	 	ļ	ļ		ļ	ļ	ļ <u>-</u>	22		2
-Sep-83	Ğ			· · · · · · · · · · · · · · · · · · ·			·	ļ			ł		 	 		├ <u>²</u>	ļ			-l
-Sep-83	GS			 									 		ł	ļ -	-	17		4
-Sep-83	GŠ			t			† 	 					t			-	<u> </u>	25		1
-Sep-84	Ti	i		† · · · · · · · · · · · · · · · · · · ·			···	1			· · · · ·		i	 	†	† -	j	180		i
-Sep-84	Ti	2	2	<u> </u>			T		1	f			t	†			†	57		1
2-Seo-84 l	TI	3								†					ti	<u>-</u>	i	1		
-Sep-84	<u>T1</u>	4	2	I			5						-			6	13		1	i
-Sep-84	Ti	5													2	8	12	17	1	1
-Sep-84	TI.	6		ļ											1	2	. 4	12		1
-Sep-84	T2	!					3										. 6	2		
-Sep-84							3									<u>_</u>		2		
3-Sep-84 3-Sep-84	#	3	ļ 													l	3			
-Sep-84	12															3	6			4
-Sep-84	T2	···					29								ļ		36		ļ	
-Sep-84	G2 -]			· · · · · · · · · · · · · · · · · · ·								!		26		ļ	4
-Sep-84	G2		i				- ·a				ļ					-	·		_	
Sep-84	G2	j	2				†								· · · · · · · · ·	- - -		l	 	
-Sep-84	G2	4	6													i	13	 		2
-Sep-84	G2	5	3												t		3	1		1
-Sep-84	G2	6	I													3	5	1	1	1
Sep-84			6				3	1							1	3	13	5		
-Sep-84	G5		4							<u> </u>					L		4	1		1
Sep-84	G)		ļ <u>ļ</u>	ļ ļ						L			1		l		L	!		
-Sep-84 -Sep-84	<u></u>		4	ļ			ļ						ļ		ļ <u> i</u>	2			L !	!
Sep-84	G5		 	łI			ļ				ļ			ļ			ļ . 2	10	ļ !	!
Sep-97	Ğ		<u>-</u>													ļ	ļ	ļ		4
-Sep-97	G2			t						<u> </u>	····					ļ	ļ <u>2</u>	·	·	+
-Sep-97	G2	3	 	t I				† · ·					-			<u> </u>	† ··	ļ'		-
-Sep-97	G2	4		<u> </u>		· · · · · · · · · · · · · · · · · · ·	†			i			 	 -	t · · ·		ļ	J		il
-Sep-97	G2	5				<u>2</u>							† -					i	i	11
-Scp-97	G2	6		[1	· · · · · · · · · · · · · · · · · · ·		'			1 3					1 - i	1	
-Sep-97	G5	i	l			i	I	I					1		1		- ·· ·	1]	ś
-Sep-97	G5			1 l			1						I		I			{··		2
-Sep-97	G5	3		Ļ .						2]	l	1	I	5	I	L	2
-Sep-97	(i)	<u> </u>	~	ļ ļ						L	1		3				4	1	1	3
-Sep-97	GS			· · · · ·							2		3			ļ	6]	4
-Sep-97 -Sep-97	T1											!	!				2		1	4
-Sep-97	<u></u>			t · · /		· :		L									. !		ļ <u></u>	
-Sep-97	Ťi · · · ·	├ - {		····		<u>+</u>							∤ 				3			-
-Sep-97	Ťi- · · ·												} <u>}</u>		ļ .		6		}	<u> </u>
-Sep-97	Ti					, , , ,				10	} ··· {		1		+		14	1 4	25	<u>:</u> • •
-Scp-97	Ti	6				··· '¦								'			36 7	'		í ··
-Scp-97		· · · · · · · · · · · · · · · · ·		t i		····· - ;				🐇							ļ. iš	· · · ;		اه
-Sep-97	72	· · · · · · · · · · · · · · · · · · ·		t/		ıó											17		··· · · i	ii i
-Sep-97	T2		L	1		2							"		···				l - · · · · · '	4
-Scp-97	T2	4		1		10								l i			11	l •	3	3
9-Sep-97 9-Sep-97	12	5		'''''													1 1	3	1	1
e- 07	T)	6	· '	. 1		6		, ,		i	1 1		l s	l 2	1		14	l ï	1 3	3

Annandia 2	Table 2	. Sample coun	Γ΄			1	1	1												
	Specie	s codes are de		ł																
) Petro	1			1	1		·					· · · · · - · ·	·						
i					1		1													
Date	Site	Replicate	55	56	57			60	61	62	63	64	65	66	67	68	69	76	71	77
16-Sep-8	: ::::::::::::::::::::::::::::::::::::																		·	ļ1
16-Sep-8 16-Sep-8 16-Sep-8	TI	3	,									·		·			 	†		
16-Sep-83	3 TI	4												1		1			2	
16-Sep-83 16-Sep-83	111		32																	
23-Sep-83	172	1			-												+	 		{·-
23-Sep-83	3 T2	2					1											ļ		
23-Sep-83 23-Sep-83	172																		3	1
23-Sep-83	12					·										 		ļ		
23-Sep-83 23-Sep-83	12	6															·			
16-Sep-83	G2	1	68		I														†i	
16-Sep-83 16-Sep-83	G2	2																		
16-Sep-83	G2	1 3	14				}				ł · · ·							 :	· · · · · · · · · · · · · · · · · · ·	
16-Sep-83	G2	5	87									l	l	l						
16-Sep-83	I G2	6	101																	
16-Sep-83 16-Sep-83	GS	-	21								·									
16-Sep-83	G5	3	12								·	 								
16-Sep-83	GS	4	21																	
16-Sep-83 16-Sep-83	G5	5	31			<u></u>							ļ							
12-Sep-84	Ti -	i	182	1																
12-Sep-84 12-Sep-84 12-Sep-84	Ťì	2	182 57	1																
12-Sep-84 12-Sep-84	<u>T</u>																			
12-Sep-84	Ti-		17																	
12-Scp-84 12-Scp-84	Ti	6	13	1							·									
28-Scp-84	172]	2														1	·		İ
28-Sep-84	172	2																		
28-Sep-84 28-Sep-84	12	4		1										···					···	
28-Sep-84	T2	5		1															i	
28-Sep-84 28-Sep-84	<u></u>																			
28-Sep-84	G2	} · · · · · · · · · · · · · · · · · · ·	2					··· • • ··• · · · · · · · · · · · · · ·												ļ
28-Scp-84	G2	1 3	4				~												 	
28-Sep-84	G2	4																		
28-Sep-84 28-Sep-84	G2											ļ		ļ ————					ļ	
20-Sep-84	GS	<u>-</u>																		
20-Sep-84	G5	2																		
20-Sep-84 20-Sep-84	GS																			
20-Sep-84	Gis	3	- ii														· ·			
20-Sep-84	G5	6																		
18-Sep-97	<u>G2</u>								1						1					
18-Sep-97 18-Sep-97	G2	2																		
18-Sep-97	G2	4				1					i									
18-Sep-97	G2										6								1	
18-Sep-97 19-Sep-97	GS																			
19-Sep-97	GS	2	2			· · · · · · · · · · · · · · · · · · ·														
19-Sep-97	GS	3	2						2											
19-Sep-97	GS										2								['. i	
19-Sep-97 19-Sep-97	GS					3					19				11					
16-Sep-97	Ti		i						2		i							• • • • • • • • • • • • • • • • • • • •		***
16-Sep-97	Ti	2	2						2		1						1			
16-Sep-97 16-Sep-97	<u>-</u>		2						!		4									
16-Sep-97	T1	3	32			2		· i			27								,	
16-Sep-97	TI	6	4					i	2		1				i	4	1.	i i	1	1
19-Sep-97	172		12					!	6		24				!	i				1.
19-Sep-97 19-Sep-97	T2		3					!			11								2	
19-Sep-97	172										12					i i	1		1	
19-Sep-97 19-Sep-97	172	5	3]				1											
19-Sep-97	12	6	4												2	2				

:_ 7 T	abla 1	C1				· · · · · · · · · · · · · · · · · · ·														
		Sample coun						ļ.			ļ <u> </u>									
	Species	codes are de											l	L	l		1			
														l						ļ
i															L				<u> </u>	
	Site	Replicate	73	74	75	76		78	79	80	81	82	83	84	85	86	67	88	85	·
6-Sep-83	¥								<u>2</u>									ļ		·
6-Sep-83 6-Sep-83	₩																	ļ		-
4 S- 93	+																			
6-Sep-83 6-Sep-83	;;																			+
6.Sm.81	; ;								· -		·	·							 ··	
6-Sep-83 3-Sep-83 3-Sep-83												<u> </u>			·					
3-Sep-83	12	··· -			l								 	ł					·	
3-Sep-83	12				t				· ·- ·							 			ļ	+
3-Sep-83	T2	4			† 												 		 	
3-Sep-83 3-Sep-83	12	5			1 1							·				l			†	1
3-Sep-83	T2	6										-	l			l	t		<u> </u>	1
6-Sep-83	G2 l	1			3						1		·						i	
6-Sep-83	G2	2			i i				2									1		
6-Sep-83	G2	3													i				1	1
6-Sep-83	CC2				I	I	I	I	1		1	[I	L			L	L		1
6-Sep-83	G2	5			[i				I		1			L			I		L	1
6-Sep-83	C2	6			I				l						l		l:		1	1
6-Sep-83	GS	1			4	l			l		1		ļ		l		L	ļ	ļ	1
6-Sep-83	<u> </u>	2			ļ <u>\$</u>		l				L		ļ. —— ——	ļ	l		L		 	
6-Sep-83 6-Sep-83	<u> </u>				<u> </u>			ļ 			L	ļ		ļ	ļ				ļ	
0-Sep-83	<u></u>	4			ļ 1				ļ <u>!</u>				ļ	ļ	ļ		ļ	ļ <u>'</u>	ļ	
6-Sep-83	떑				ļ <u>4</u>			ļ 	ł						ļ		ļ	ļ	 -	
6-Sep-83 2-Sep-84	딸				ļ <u>. 5</u>							·	ļ	ļ	ļ		 		·	+
2-Sep-84									ļ <u>-</u>								 			
2-Sep-84	#:	·			···															4
2-Sep-84 2-Sep-84	;;																			·
Z-Sco-34 I	¥1 I								·			l	—		 	L	 		ł	
2-Sep-84	Ťi · · · ·									·	 									+
2 Cam 9 A I	Tra I	···									<u> </u>								 	+
8-Sep-84	T2	2															 		<u> </u>	†
8-Sep-84	77	3				= •			5	. – . – – – –	t ·			· · · · · · · · · · · · · · · · · · ·					1	1
8-Scn-84	T2 I	4																	1	1
8-Sco-84	T2 Ì	5																		1
8-Sep-84	T2	6			L												I		L	Ι
8-Sep-84	G2												[I	
8-Sep-84	G2	2																	l	
8-Sep-84	<u>@</u>										1		<u> </u>	l					l	-l
8-Sep-84	쯢				L				-		i			ļ	L			- 		·}
8-Sep-84	<u>~</u>																		ļ	.
8-Sep-84 0-Sep-84	<u></u>			·	<u>-</u>						 		l	<u> </u>	+	 	ļ		. 	
0-Sep-84	ត 							ļ ·			· · · · · · · · · · · · · · · · · · ·	··		 		<u> </u>		·	'	
0-Sep-84	ĕ ∤				-								···-		· · · · · · · · · · · · · · · · · · ·	···-		ł ·	+	+
0-Sep-84	GS -											·			·	;		 	+	.
0-Sep-84	GS -												·			·		 	†	+
0-Sep-84	GS								1								i	l	1	·
8-Sep-97	G2	···-									· · · · · · · · · · · · · · · · · · ·			1	1	1	t	t	1	1
8-Sep-97	G2 Ì	2												1	t · - ·	1	†	T	1	1
8-Sep-97	C2	3			I				l					1	1	1	1	I	I	
8-Sep-97	C2	4			I				i						1		l	1	1	1
8-Sep-97	C2				I			T.			I		i i	I	L	I	I	I	1	
8-Sep-97	G2	6			l								L	I		1	L	l	1	4
9-Sep-97	G5	!			l											1	L			
9-Sep-97	G5				ļ			L	l		l <u>_</u>					l				
9-Sep-97	<u> </u>	3									l				ļ 	l	I		1	
9-Sep-97	<u></u>	4						!	l		ļ 			ļ · · · · · -		i	ļ			
9-Sep-97	<u></u>																ļ		ļ · · ·	
9-Sep-97 6-Sep-97	뜻											ļ	l	ļ		l	ļ		4	
6-Sep-97	井…니								ļ .		ļ			ļ			∤ '			
6-Sep-97	# ∤		···								1			ļ	ļ · · -	ļ · · · · · · · · · · · · · · · · · · ·			į	
6. Sam. 07	Tri I	3												<u> </u>			1			4
6-Sep-97	#							2					· ·		1		l			1
6. Sep. 07	#													1	1			-		1
6-Sep-97 6-Sep-97 9-Sep-97	끊~~	<u>0</u>						:						ł- ·	•	F	ł		1	1
9-Sep-97	# <u> </u>						·-···	! _!					 -	l		· · · · · · · · · · · · · · · · · · ·				1
9-Sep-97 9-Sep-97	1 2										· · · · ·			 				1		-
9-Sep-97	荒一十											· • · · · · ·		t	1 .			1	1	1 .
9-Sep-97 9-Sep-97	172	5													ł			1	1	1
					i									ŀ.	1	· · ·		1	1	} .

.

Appendix 2	Table 2. Sample cou	in .																
-	Species codes are d	e																
Dete 16-Sep-83	Site Replicate		I						- 1								•	
		91		93		95	- 1		+									
16-Sep-83 16-Sep-83	1	20 May 1000 1000 100 100 100 100 100 100 100					96	97	98	99								
16-Sep-81 23-Sep-81	5 6				+	****					100	LOI	102	103	104			
16-Sq-83 16-Sq-83 16-Sq-83 16-Sq-83 16-Sq-83 23-Sq-83 23-Sq-83 23-Sq-83 23-Sq-83	2						2	8								105	106	107
23-Sep-83 T 23-Sep-83 T 23-Sep-83 T2								·			l l							
16-Sep-83 G2	6				-			5										
16-Sep-83 G2 16-Sep-83 G2 16-Sep-83 G2 16-Sep-83 G2	3		2									-						
16-Sep-83 G2	4			THE RESIDENCE OF THE														
16-Sep-83 G5	6				-			2						<u>_</u>				
16-Sep-83 G5 16-Sep-83 G5 16-Sep-83 G5	3				-			- 4										
16-Sep-83 G5 16-Sep-83 G5 12-Sep-84 T1 12-Sep-84 T1	5		. 1	-	-			91										
2-Sep-84 T1	1		2			-		4										
2-Sep-84 T1 2-Sep-84 T1 2-Sep-84 T1	3					-		7										
-Sep-84 T1	5		2					1										
Sep. 84 T2	2					-		1										
Sep-84 172 Sep-84 172 Sep-84 172	4		2						-									
ep-84 (72 ep-84 (72 ep-84 (72	6		1			1		-										
Ф-84 G2	2 3					-												
P-84 G2	4				3		3								-	The same of the sa	-	
p-84 G5	- 6				-1]	.2							
84 G5		3									+==		-					-
84 G5 -84 G5 -97 G2	3																	
97 G2 97 G2	1												1	1		-		
7 02	3						- 2		2									
702	5	1	- 2											1		1	[+	
GS	2						6 14											
GS	4						<u>11</u> 24											
C3	6		2				2											
	2						58										1 -	
	- 4		4-				3	- 1	-							"		.i., .
2	- 6			5			12	1.					- 7				-	
	3						51											
	4 5						21					- 1		1	- 1	-		- 1
							- 13			. 1		1.		- 1.	. 1			J

Appendix 2.3	Cable 2	Sample coun																
	Specie	codes are de																
Date	Site	Replicate	109	110		112	113	114	115	116.	117	118	119	120	121	122	123	124
16-Sep-83	TI	1						1										
16-Sep-83	Ti	2				1												
16-Sep-83	TI	3				1												
16-Sep-83	<u> </u>	4						!										
16-Sep-83	<u> </u>	· · · · · · · · · · · · · · ·				?		i										
71.Sm.83	 -	}																
Date 16-Sq-83 16-Sq-83 16-Sq-83 16-Sq-83 13-Sq-83 16-Sq-83 T2	2				24 HALLI III													
23-Sep-83	T2																	
23-Sep-83	12	4																
23-Sep-83	12	5																
23-Sep-83	12				ļ											3		
16-Sep-83	G)	} ;						-										
16-Sep-83	G2	1																
16-Sep-83	CI2	4				3												
16-Sep-83	G2	5						3										
16-Sep-83	G2																	
16-Sep-83	G5				ļ <u></u>	5												
16-Sep-83	G5	+						2										
16.Sq-83 16.Sq-83 16.Sq-83 16.Sq-83 16.Sq-83 16.Sq-83 16.Sq-83 16.Sq-83 16.Sq-83 12.Sq-84	GS	4				7												
16-Sep-83	G5	5																
16-Sep-83	G5	6												2				
12-Sep-84	<u> </u>	<u>!</u>				i		L										
12-Sep-84	#																	
12-Sep-84	₩							i										
12-Scp-84	Ti	5				6		1									L	
12-Sep-84	TI	6				4											ļ	
28-Scp-84	T2					·		ļ										
28-Scp-84	12	J						·				f						
28-Sep-84																		
28-Sep-84	12	3		1	1													L
28-Sep-84	12	6	1	1													ļ	
28-Sep-84	G2	ļ <u>!</u>																
28-Scp-84	G2	ļ				-		ļ										
28-Sep-84	G2	 	il	ŧ	· · · · · · · · · · · · · · · · · · ·			1										
28-Sep-84	G2		5			1		1										
28-Sep-84	G2							3										
20-Sep-84	G5							3								· · · · · · · · · · · · · · · · · · ·		
20-Sep-84	G5			ļ · !		10	ļ · ·											
20-Sep-84	G5	· · · · · · · · · · · · · · · · · · ·				† - ii											1	I
20-Sep-84	GS		5			17												
20-Sep-84	G5		5	1														
18-Sep-97	CZ													 				
18-Sep-97	02	 	tt			·										1	i	
11-Sep 44 11-Sep	<u> </u>											İ	1	I		I	3	
18-Scp-97	G2	1	5		2			I					1		!			
18-Scp-97	G2																ļ ļ	
19-Sep-97	G5		!													1		· ·
19-Scp-97	G5	 			·												ii	
19-Sep-97	65	t												1			1	Ι
19-Sco-97	GS		5		2				2		1	I	1					
19-Sep-97	G5		6	1				1	I									
16-Sep-97	TI .		1										,,					
16-Sep-9	TI		2									· · · ;					1	-
16-Sep-9	111		3		1	ŧ						'	1	1	1		i	1
16-Sep-9	11	+	5						*****			3			1	1		1
16-Sep-9 16-Sep-9 16-Sep-9 19-Sep-9 19-Sep-9	ii -		6					1		1		1		1	1			
19-Sep-9	172	T	1		1		1	1				!						
19-Sep-91	12		2						1				-					
17-300-7	1112		}	ļ!					;						ļ			1
19-Scp-9	12 :	:	5						· · · · · · ;									1
19-Scp-9 19-Scp-9	12		6		1										<u> </u>	l		
19-acp-9	1+4									· · · · · · · · · · · · · · · · · · ·	-							

Appendix 3 Table 1. Site locations, length sampled, method and date of sampling, 1997.

SYSTEM	SITE	LENGTH	REACH	METHOD	DATE
		(m)	:	:	
TENAS	T1	83	1	3-pass	Con 16
IENAS	T2	67	1		Sep-16
	T4	33		3-pass	Sep-20
	T3		1	2-pass	Sep-19
West Fork	T6	44	2	2-pass	Sep-17
East Fork		24	3	2-pass	Sep-18
	T5	33	1	2-pass	Sep-18
Trib TN31	T7	70	2	1-pass	Oct-14
GOATHORN	G1	62	1	3-pass	Sep-22
00111110111	G2	70	2	2-pass	Sep-22
	G3	45	2	3-pass	Oct-30
	G4	68	2	3-pass	Sep-27
Crossing site	G4a	45	2		
Crossing site	G4b	73	2	1-pass	Nov-04 Nov-03
Crossing site	G5	53		Habitat card only.	
	G8	33	2	3-pass	Oct-24
Cabinet	G6a	25	3	2-pass	Sep-24
Cavillet	. G7		1	2-pass	Sep-24
	G9	28	1	2-pass	Sep-25
Webster	G10	23	2	2-pass	Sep-25
webster	GIU	21	1	2-pass	Sep-27
Four	F1	15	2	2-pass	Sep-29
	F2	20	2	2-pass	Sep-29
	F3		2	Habitat card only.	Oct-14
	F4	10	3	1-pass, spot shocked.	Oct-01
	F5	30	4	2-pass	Oct-08
	F6		5	Habitat card only.	Oct-14
	F7	75	6	1-pass, spot shocked.	Oct-08
Four Trib FT1	F8	45	2	1-pass	Oct-22
Four Trib FT2	F9		1	Habitat card only.	Oct-14
•	F10	70	1	1-pass, spot shocked.	Oct-08
TELKWA TELKWA	SC1	76	1	2-pass	Sep-30
	SC2	54	1	3-pass	Oct-01
	SC3	25	1	2-pass	Oct-01
Bridge Site	SC4		1	3-pass	
	1		1	3-pass	Oct-21
	MS1	23	1	2-pass	Oct-09
	MS2	20	1	2-pass	Oct-09
	MS3	16	1	2-pass	Oct-09
	MS4	21	1	2-pass	Oct-09
	MS5	33		2-pass	Oct-03
	MS6	17	1	2-pass	Oct-03
	MS7	22	1	2-pass	Oct-03
Bridge Site	MS8	19	1	2-pass	Oct-21
Bridge Site	MS9		1	Habitat card only.	Nov-01
	WL1		1	Minnow Trap - 10	Nov-3-4
BULKLEY R.	B1	20			
OLKLEI K.			6 '	2-pass	Oct-02
	B2	23	6	2-pass	Oct-02
	B3	22		2-pass	Oct-02
1	B4	21	6	2-pass	Oct-02

Appendix 3 Table 1. Site locations, length sampled, method and date of sampling, 1997.

HUBERT	HUB1		; 1	Minnow Trap - 12	Aug 12-14
	HUB2		1	Minnow Trap - 12	Aug 12-14
	HUB3		1	Minnow Trap - 12	Aug 12-14
	HUB4		1	Minnow Trap - 20	Oct 15-16
	HUB6	38	2	2-pass	Aug-09
	HUB8	30	3	2-pass	Sep-22
	HUB9	30	4	2-pass	Aug-07
	HUB10	35	4	2-pass	Sep-07
Trib HT1	HUB5		I	Habitat card only.	Nov-13
HELPS	Hi	30	2	2-pass	Aug-17
	H2	33	2	2-pass	Aug-07
	H3	33	2	2-pass	Aug-07
	H4	37	3	2-pass	Aug-07
	H7	33	3	2-pass	Aug-09
	Н9	35	4	2-pass	Aug-07
Trib HP1	H3a	30	1	2-pass	Aug-07
Trib HP3	H6a		1	Habitat card only.	Aug-08
Trib HP4	Hlla		1	Habitat card only.	Aug-09
Trib HP4	H11	40	2	1-pass	Aug-07

Appendix 4 Table 1. Summary of habitat features for Goathorn and Tenas creek reaches.

Reach	Slope	Length	Widt	th (m)	Area	Bed Mate	erial (cm)	Comment
	(%)	(m)	Wetted	Channel	Wetted	D50	D90	
Mainstem Goath	orn	!	<u> </u>				<u> </u>	~~~
l l	2.8	1140	10.5	20.1	11970	11	28	Riffle-pool c
2	2.5	9130	12.3	33.4	112299	11	26	Cascade-pool
3	2.2	3186	5.6	10.2	17842	9	18	Cascade-pool c
4	5.6	3000	4.7	6.9	14100		66	Step-pool b
5	1.3	2330						Riffle-pool g
Cabinet Creek		<u> </u>						
1	2.2	3360	8.6	19.2	28896	15	40	Riffle-pool c
2	7.8	1500	5.5	6.7	8250	15	33	Step-pool _b
3&4	13.7	2000						
Webster Creek								
1	2.8	3500	7.8	8.4	27300	12	40	Cascade-pool
2	3.4	4.2	12.6				35	Riffle-pool c
Tenas Creek			! :					1
1	1.8	9000	7.8	9.8	70200	16	29	Riffle-pool c
2	3	4400	5.7	10.8	25080	24	40	Riffle-pool c
West Fork 3	3	2100	4.4	8.4	9240	7	28	Riffle-pool c
4	7.8	1800		:			1	Step-pool _b
East Fork 1	4.5	2000	4.5	12.5	9000	16	40	Cascade-pool b
2	10	1000	!				i	Step-pool r

Appendix 5. DFO/MOE Stream Summary Forms for all 1997 sample sites.

Stre	am Name	e (gaz)	Go	athorn Creek						(local)	Goathori	n Creek							Acces	s	V	2	Meth	ad
Wat	ershed C	ode	46	50-42	227-096				-								ReachNo.		1	Lngth(um)		1	.2	
Loca	ation	Upper	net !	10 r	n below PNG	crossin	g.					Map#	093L0	65			SiteNo.	(1	LthSur	v(m)		6	2	
												U.T.M.					FishCard	P) N		C	Field	X	His	t.
Date	Y.M.D		9	7 0	9 2 2	Time	100	00	Agency	C87	Crew	RD/CP/C	M Ph	otos	B3/15,	16	AirPhotos								
C		P	ARA	ME	TER	V	ALUE		METH				SPEC	IFIC	DATA						T	OBS	TRUC	TION	s
_	Ave. Ch	an. Wic	tth (m)			20.1			24.9,	17.1, 16	5.9, 18.4, 20).5, 22.5									C	Ht(m)	Туре	Loc'n
R252	Ave. We	t. Widt	h (m)		100	10.5			12.0,	10.7, 9.	5, 9.8, 10.0	, 10.9												110
機能	Ave.Max	.Riffle	Dep	th (c	cm)		54			42, 8	5, 35													111	1.0
3	Ave.Max	.Pool I	Dept	h (c	m)		45			41,4	8, 47							~							
519	Gradien	t %					1.5-2.	0		C	BE	D MATER	IAL		%	C	BAN	KS					10		10.00
3	% Pool	5	R	ffle	40 Run	45	Other	10	FLATS	290	Fines	clay,silt,san	id (<2mm)	-	5	湖	Hejght(m)	1.7	%Unsta	able	0	25			
53	Side Cha	n.%		T	0 0-10	10-4	0 :	>40		礁。	Gravela	small (2-16	šmm)		10	態	Texture	Ð	G)L	R		San Logis	7-11		
6		Area%			0 0-5		530	>15		122		large (16-6	4mm)		10	富	Confinemen	1		EN	со	FC	ос	(UC)	N/A
100	Debris	Stable	9%				15			3000		sm. cobble	(64-128mr	n)	1:	磁	Valley:Char	nel Ra	tio	0-2	2-5	5-1	0 1	0+)1	N/A
標	COVE	R: Tot	al%				70			Carry	Larges	ige. cobble	(128-256m	nm)	2:	1	Stage	•		Dry	L	M) (Flo	od
	Comp.	Dp.Pool	L.	O.D.	Boulder	InVeg	Ove	rVeg	Cutbank	100	100	boulder(>2	56mm)		3:	2	Flood Signs	Ht(m)		1.2	Braide	d	Y		0
100	sum 100	10		10	80					當	Bedrock					120	Bars (%)	1	30	рН	7.	.5	O2 (p	pm)	1100
250	Crown Cl	osure %		T	5	C	Aspe	ct		424	D90(cm)	50 C	Compac	tion	L OH	房	WaterTemp	(C)	6.0	Turb(cm)	cl	Condi	25C)	100
588							DISC	HARG	E		/50	18				Т			REA	CH SY	MB	OL			
100	Para	meter			Value	Meth	nod			Spe	cific Dat	ta				1				(F	ish)				
Nig.	Wetted V	Nidth (r	n)					Creek	dischar	ge is a	t mediu	m to high	flows.			1									
推	Mean De	epth (m)													7									
题	Mean Ve		_													1									
TER.	Discharg	e (m3/	s)					-								(We	dth Valley/Chan	el, Slop	•1					BedMa	itenal

			FISH SUMM	ARY		- X.I		STREAM/VALLEY CROSS-SECTION		
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L	(Looking Downstream)		R
123	SST	139	28-53	F	R	EF		PLANIMETRIC VIEW	2	
714	SST	24	75-143	J	R	EF				
1	CHAR	6	47-53	F	R	EF				
1	BT	3	103-200	J	R	EF				1
19	DV	1	113	J	R	EF				
1	MW	13	108-178	J	R	EF	1			
							-			
ti.	All char	fry we	ere identified a	s BT with	the					
源	exception	n of 2	which were D	V						
643		1					15			
9								COMMENTS		
BE	Channe	l Stab	ility _ D	ebris 🗌		Managemen	nt Concerns	Obstructions Riparian Zone Valley Wall Pr	ocesses	Etc.
36	Site cons	ists of	riffle-run hab	itat with s	ome	flats along th	ie margins. Bed m	naterial is mainly boulder and cobble.		
8	Difficult	to hol	d nets in due t	o high flow	vs ar	nd the large n	umber of leaves flo	owing into the net.		
13										
late!										
學										
126	/									
400										
34										
									-	
15									Edited by	CP
AC.									Date Y M D	97/11/26

DFO / MOE

											STR	EAN	SUR	VEY FO	RM												
Map # 931.065 Szeho. G2 LinSunding 70 N Sile Field Hist	Stre	am Nam		(gaz	z) Go	athor	n Creek						(local)	Goathe	orn (Creek						Acce	ss	V	2	Metho	d
Site Site	Wat	ershed C	ode		460-42	227-09	6												ReachNo.	2		Lngth((km)		9.	1	
Date Y.M.D 9 7 0 9 1 5 Time 1020 Apexcy C87 Crew DB/CP/GM Protos B3/1, 2 APProtos	Loc	ation	Abov	ve lo	wer cr	ossing	; lower	net at \	Vater S	urvey				Map #	1	093L065			SiteNo.	G	2	Linsu	n (m)		7	0 .	7
PARAMETER VALUE METH SPECIFIC DATA OBSTRUCTIONS	,,		Site.								-			U.T.M					FishCard	0) N	1	Gills	Field	dX.	His	
Ave. Chan. Width (m) 14.8 12.7, 12.5, 13.4, 15.2, 16.7, 17.1, 16.2 C No. Wet. Width (m) 13.3 12.7, 12.0, 13.4, 14.2, 13.0, 13.5, 14.0 Ave. Wet. Width (m) 47 50, 40, 45, 45, 65, 45, 40 Ave. Max.Pool Depth (cm) 48 Ave. Max.Pool Depth (cm) 49 Ave. Max.Pool Depth (cm) 40 Ave. Max.Pool Depth (cm) 41 50, 40, 45, 45, 65, 45, 40 BED MATERIAL 50 Gradient % 4. Pool Fines day, sa, sand (<2mm) 4. Heighti(m) 4. Nuinstable 25 Areaw 4. Pool Areaw 4. Pool Areaw 50 C DO-10 1 10-40 40 40 40 40 40 40 40 40 40 40 40 40 4	Dat	Y.M.D	7 1	9	7 0	9	1 5	Time	1020)	Agency	C87	Crew	DB/CP	/GM	1 Photos	B3/	1,2	AirPhotos								- 17
Ave. Chan. Width (m)	C			PAI	RAME	TER		V	LUE		METH					SPECIFIC	DA	TA						OBS	TRUC	TIONS	5
Ave.Max.Riffle Depth (cm)		Ave. Ch	an. W	/idth	(m)			-	14.8			12.7	, 12.5, 1	3.4, 15.2,	16.7	, 17.1, 16.	2							C	Ht(m)	Type	oc'n
Ave.Max.Pool Depth (cm) D		Ave. We	t. Wie	dth (m)				13.3			12.7	, 12.0, 1	3.4, 14.2,	13.0	, 13.5, 14.	0							100	3		
Gradient %	T	Ave.Max	c.Riffi	e De	pth (cm)			47			50, 4	10, 45, 4	5, 65, 45,	40										10.00		
N Pool	88	Ave.Max	c.Poo	I De	pth (c	m)			09															500			
Side Chan.% 0		Gradien	t %						2.5			C	BI	ED MATE	RIA	L	1	%	C BAI	NKS				200			
Area% 0	175	% Pool			Riffie	95	Run	5	Other		1	B/5	Fines	clay.sit.s	and	(<2mm)			Height(m)	4.0 9	Uns	table	25	緣	231		
Debris Stable% 50	Dia.	Side Cha	n.%			0 🗆	0-10	10-4	0 >	40	-	\$1.30 Gales	Gravels	small (2	-16mr	m)		10	Texture	F(3 [)R					
Debris Stable% 50	ETE.		Areas	4		0		•	_	15		基礎		large (16	5-64m	nm)		10	Confineme	_	-		ćo	(FC)	ОС	UC I	VA
COVER: Total% S0		Debris	Stat	ole%		_				_		100	4	sm. cobb	ole (64	4-128mm)		30	Valley:Cha	nnel Rati	ю	0-2	2-5	5-1	0 10	+ N	A
Comp. Discription Discri		COVE	R: To	otal%	6				50			Stad	Larges	ige, cobb	ole (12	28-256mm)		30	Stag	e		\rightarrow		Ø	M	Floo	d
Sum 100 0 0 80 5 0 5 Bedrock Bars (%) 10 pH 7.6 O ₂ (ppm)	No.		_			Bo	ulder	InVeg		/eq	Cutbank	200						20	400			-	_	_	_	_	
Crown Closure % <5 Aspect D90(cm) 40 Compaction Left WaterTemp(C) 7.0 Turb(cm) -35 Cond(25C) 100		1000	-		0		80	-	-	-	5	(A)	Bedroc	k					Bars (%)	1	0	рН	7.	.6	O ₂ (pp	m)	
DISCHARGE /50 10 REACH SYMBOL Parameter Value Method Specific Data Wetted Width (m) Estimated 8-10 m³/s discharge. Mean Depth (m) Mean Velocity (m/s) Discharge (m3/s) FISH SUMMARY FISH SUMMARY STREAM/VALLEY CROSS-SECTION (Looking Downstream) R PLANIMETRIC VIEW SST 24 73-146 J R EF CHAR 4 50-55 F R EF CHAR 4 50-55 F R EF CHAR 4 50-55 F R EF	VIA:		osure	%		-	5	C	Aspec	t		1999	D90(cm	40	C	Compaction	L6	9	WaterTem	p(C)	7.0	Turb	(cm)	~35	Cond(2	5C)	100
Parameter Value Method Specific Data Wetted Width (m) Estimated 8-10 m³/s discharge. Mean Depth (m) Mean Velocity (m/s) Discharge (m3/s) FISH SUMMARY FISH SUMMARY C Species No. Size Renge(mm) Life Phase Use Method/Ref SST 118 30-44 F R EF CHAR 4 50-55 F R EF CHAR 4 50-55 F R EF CHAR 4 50-55 F R EF CHAR 4 50-55 F R EF CHAR 4 50-55 F R EF	Site.				-				DISCI	IARG	E	-	/50	10			_			-	REA	CH S	YMB	OL		_	
Wetted Width (m)	37	Para	meter	1		Va	lue	Meth	_	35.15		Spe	cific Da	ita			_					(1	Fish)				
Mean Velocity (m/s) Discharge (m3/s) Middle Valley/Channel Slope) BedMaterial	125		_							Estim	ated 8-1	0 m ³ /	s discha	irge.													
Discharge (m3/s)	15	Mean De	epth (m)															_								
Species No. Size Range(mm) Life Phase Use Method/Ref L	f.H	Mean Ve	elocity	(m/	s)																						
Species No. Size Range(mm) Life Phase Use Method/Ref L	ģ ie	-	_	_															(Width Valley/Char	wel.Slope	,					BedMate	rial i
C Species No. Size Range(mm) Life Phase Use Method/Ref L (Looking Downstream) R																											
SST 118 30-44 F R EF				FIS	H SUI	MMAF	RY			I					STR					ION		1				_	
SST 24 73-146 J R EF CHAR 4 50-55 F R EF BT 5 84-146 J R EF	C	Species	No.	Size	Range	mm) L	_		thod/Ref		L						150		ream)							R	
CHAR 4 50-55 F R EF BT 5 84-146 J R EF	-	SST	-		30-44		F	R	EF	1	1				PLA	NIMETR	IC V	IEW									
BT 5 84-146 J R EF	E.	SST	24		73-146	5	_	-	EF	1	2															5	
	1	CHAR	4		50-55		_	-	EF		-															34	
DV 1 105 J R EF	NE	-	5			5	_	-		-																	
	10	DV	1		105		J	R	EF	1	_															-	
	12					-				-	_																
			-	-		-				+			_		_			_					_				_
	E.S.					+				+	-																_
	FE I		-	-	_	-		-		-	-																_

COMMENTS

Obstructions [

Riparian Zone

Valley Wall Processes

Etc

97/11/26

Edited by

Date Y M D

Management Concerns

Difficult to hold in nets due to the high flows. Upper net partially blew out at the end of the 2nd pass. Difficult to

Channel Stability

remove fish in fast water.

Debris 🗌

Heavy rain for 2-3 days prior to sampling resulted in medium to high flows.

tre	am Nam	0	(ga	z) G	oathor	n Creel	k					(local)	Goathorn	Creek							Acces	ss	A'	ΓV	Meth	boi
Vat	ershed C	ode		460-	227-09	96		3.8									Re	chNo.		2	Lingth(km)	V-	9	.1	
.oca	ation	Dr	ove d	own ol	d road	to Goa	thorn C	. Top	of site l	ocated at			Map#	093L06	5		Sit	No.	10	G3	LthSur	rv(m)		44	1.5	
		the	end	of the	road.								U.T.M.	-			Fis	hCard	Y	N C		C	Field	X	His	st.
ate	Y.M.D		9	7	1 0	3 0	Time	100	10	Agency	C87	Crew	RD/CP/D	A Pho	tos /	45/11, 1	2 Air	Photos								
G/			PA	RAM	TER		V	ALUE		METH				SPECI	FIC I	DATA						1	OBS	TRUC	TION	s
197	Ave. Ch	an.	Widt	h (m)				50			-			- 2									C	Ht(m)	Туре	Lo
	Ave. We	t. W	idth	(m)				12.4			14.0,	13.7, 13	.5, 11.7, 9.	2									ST.		Vil.	Τ
	Ave.Max	c.Rif	fle D	epth	(cm)			40			40, 4	4, 35											趋》			Τ
R	Ave.Max	c.Po	ol De	epth (cm)			па															in a	710		
	Gradien	t %						2			C	BE	D MATER	IAL		%	C	BAN	IKS			- 7	a.			\vdash
量	% Pool		1	Riffie	90	Run	10	Other		10	100	Fines	clay,sitt,san	d (<2mm)		5	400	ight(m)	3.0	%Unst	able	0	35			T
	Side Cha	n.%		100	0 🗶	0-10	10-4	0 :	40	100	N. S	Gravela	small (2-16	mm)		15	Те	dure	F	G)L	R					T
		Are	1%		0	0-50		5	>15		623		large (16-6	4mm)			Co	nfineme		_	_	co	FC (oc	UC	NIA
g:	Debris	St	able%	6				40			414		sm. cobble	(64-128mm	,	15	Va	ley:Cha	nel R	atio	0-2	2-5	5	_	1 +0	V/A
	COVE	R:	Total	%		_		70			225	Larges	ige, cobble	(128-256mr	m)	30		Stag	9		Dry	L	6M	5 н	Flo	ood
	Comp.	Dp.I	Pool	L.O.D.	Bo	oulder	InVeg	Ove	Vea	Cutbank	经治		boulder(>25	-		35	Fk	od Signs	_)	-	Braide	_	Y		N
	sum 100	Ť	0	5		80	0		5	10		Bedrock					Sime.	rs (%)	_	40	рН	n		O ₂ (p)		۲
32	Crown Cl	osur	9 %	+	-	5	C-	Aspe	ct		65.00	D90(cm)	32 C	Compacti	ion I	1	dice	terTemp	(C)	3.0	Turbi		ta	Cond	_	0
-				_	_		10 800 20 80		HARG	F	SOFT	/50	14			-	- Compa		10/		CH SY		_			1.0
Garage Garage	Para	met	er		Tva	alue	Met		1		Spec	cific Dat			-	_						ish)				
- Th	Wetted \		_				11191		Water	levels a	_				-											
2	Mean De				-				11,410.	icicio iii	- 1110	30111111					9	_	_	_					_	0
	Mean Ve	-	<u> </u>	/s)				_		_	_				-		21.									
200	Discharg	_			1						_	_			_			llev/Chan	est Clea			•			BedMa	

			FISH SUMM	ARY					STREAM/VALLEY CROSS-SE	CTION		
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L		(Looking Downstream)	_	R	
200	SST	18	39-51	F	R	EF	147	-	PLANIMETRIC VIEW	-		
(3)	SST	9	100-132	J	R	EF				_		= 5
	CHAR	20	46-58	F	R	EF						
1000 1000 1000 1000 1000 1000 1000 100	BT	7	92-124	J	R	EF						
缝	DV	2	77-103	J	R	EF						
	Char fry	were	identified as B	T with the	e exc	eption	-					
	of 5 fry v	vhich	were DV.			I Gallati						
		, 13		-								
2.00												
18								CON	MMENTS			
	Channe	_		ebris 🗌		Managemen	t Concerns		Obstructions Riparian Zone \	Valley Wall Process	es Etc.	
Al-4			ly tannic in co		_							
樹	Primaril	y fast	boulder-riffle	habitat - ş	good	for parr reari	ng. Some good	fry hab	itat is present along the margins.			
-	Difficult	site to	sample. Nets	had to be	cons	tantly cleaned	due to the con	tinual b	uild up of leaves.			
96												
		_		_	_							_
		_			_							
025												_
SEE:		_										
74											l on	_
C.F.	-	_			_						Edited by: CP	
相替											Date Y M D 97/11/2	6

DFO / MOE

								STR	REAM	SURV	- EY FORI	M												
Stre	am Nam	• (gaz) G	oathorn Cree	k					(local)	Goathorn	Cre	eek						Acce	ss	v	2 1	Aetho	id
Wate	ershed C	ode	460-4	1227-096												ReachNo.		2	Lngth(km)		9.1		
Loca	tion	~400 n	u/s fro	m old coal mi	e site.						Map#	093	3L065			SiteNo.	ĭ	34	LthSur	V (m)		68		
\Box											U.T.M.					FishCard	Y	2			Field	X	Hist	
Date	Y.M.D	T	9 7	With From old coal mine site.																				
100			ARAMI	ETER	V	ALUE		METH				SP	ECIFIC D	ATA							OBS	RUCT	IONS	;
GE-0 G-	Ave. Ch	an. Wie	ith (m)			26,1			31.6,	31.0, 25.	9, 19.3, 20	.2, 2	8.5									Ht(m) T	уре	Foc,u
September 1					T				+															
201722220				(cm)	1	_			+															
H. Charles					<u> </u>				+	_			_							ヿ			一	
Springers.					1			1			MATER	IAL.	T	%	C	BAN	KS			┪	44	_	\dashv	
CC2-CPLX	% Pool		Pime	75 Pun	20		П	+	Sharman.	_		-	mm)	Ť	7073677			%Unsta	ible	35		_	1	
22.00			 	+			<u>~</u> —	 	enterteets	_			+	1 5	- 100000	_				-	100	_	-	
2007	0,00 0,14	_	++	+=				 							ACCOUNT.				_	_	-	~	i	MΔ
	Debris		<u> </u>	0 0-0	1		-10_	 	400 M					-	20216	_		tio.			${}$			_
K TA					-	-		┼	A LUCIO			_	-		STORES.	<u> </u>			-		_		_	_
		T		I Davidson	 				*************	Larges			-	_	AR P000				_		_		_	_
	Comp.				Inveg	Ove		Cutbank	milesenen		boulder(>25	omm)	21_	125		_			1		-			<u> </u>
	sum 100				C			-	72,00,000,000		1 az 10	£	I.		44		щ,		-	ь				
2.23	Crown Cl	osure %		<2		· · · · · ·		<u> </u>	開放	D90(cm)	35	Con	npaction L	(B)H	1	WaterTemp		_	·		_	Cond(25	C)	90
1777				1			HARG	E							4			REAC			OL.			
				Value	Met	hod			_						4				,,					
200.00			·	1	 		Estim	ated 20 c	c.f.s. di	scharge					4									
		'- `	<u> </u>	 	₩	_	\vdash								4									
				<u> </u>	┞		₩								4					İ				
	Discharg	e (m3/	s)	1			<u> </u>								(746	th:Valley/Chan	nel,Slop)				E	ledMat	inta)
		F	ISH SU	MMARY			T				ST	RE/	AM/VALL	EY C	ROS	S-SECTI	ON		-					_
c.	Species	Map # 933.065 State G4 Lindworth G8																						
12 614 12 614	SST	67	32-5	1 F	R	EF					PL	.ANI	METRIC	VIEW	1									
and of	SST	9	101-14	41 J	R	EF	\neg	-															•	
(22)	CHAR	51	38-62	2 F	R	EF	\neg	-															•	
¥.	BT	17	80-12	6 J	R	EF	\neg	-																
1000	DV	6	73-12	6 J	R	EF		-																
1,22								-																
andr.	All char	fry wer	e identif	ied as BT with	the ex	eption		-															•	
	of 5 fry w	vhich w	ere DV.		T																			
		П			\sqcap	-	\neg	-																
200							\neg	-																
		J I								COMM	ENTS				_									
- 25	Channe	Stabil	ity 🛣	Debris 🏋	N	lanage	ment (oncems					Riparia	n Zon	ne :	Valle	ev W	all Pro	cess	es	=		Etc.	
112												<u></u> -			-		-,							
					he mar	gins. b	oulder/	obble an	d run/	nool are	as provide	e par	d cover fo	r par	т.								_	
						53, D		ali		Pooral	p. 01.01	- 500		/41										
																					_			
				o the build un	of leav	es in th	e net:	ets had	to be c	ontinua	lly cleaned	l to n	revent th	em fr	om									
2.03000				ab		•••					,	p												

Date Y M D

97/11/26

blowing out.

Stre	am Name	ga (ga	z) G	oathorn Cree	k					(local)	Goathorn	Creek					Acce	ss	V2	Meth	lod
Wat	ershed C	ode	460-4	227-096	- 300										ReachNo.	2	Lngth	(km)	9	9.1	
Loc	ation	Goathor	n Cree	k river right	side cha	nnel at p	propos	ed bridg	e		Map#	093L065			SiteNo.	G4a	LihSu	rv(m)	-	45	
		crossing									U.T.M.				FishCard	Υ. ((I)	C Fie	M Die	His	st.
Date	Y.M.D	9	7 1	1 0 4	Time	1212	2	Agency	C87	Crew	RD/DA	Photos	A5/22	23	AirPhotos						
C		PA	RAME	TER	V	ALUE	Y	METH				SPECIFI	C DATA		-			ОВ	STRUC	CTION	s
_	Ave. Cha	n. Widt	h (m)		1	6.8			6.8,	4.2, 8.3,	7.9							C	Ht(m)	Туре	Loc'n
	Ave. We	t. Width	(m)			2.5	-		2.3,	3.7, 1.1,	2.7							糖	d d		
主义	Ave.Max	.Riffle D	epth (cm)		<5												()	200		
	Ave.Max	Pool D	epth (c	m)		35												95	2		
節	Gradient	1%			1	1.5			C	BE	D MATER	IAL	%	C	BAN	KS		100	2		
100	% Pool	90	Riffle	10 Run		Other	1		2:33	Fines	clay,silt,san	d (<2mm)	1	0	Height(m)	0.5 %Un	stable	30	1000		
THE REPORT OF	Side Cha	n.%	T	0 0-10	10-4	0 >	40		1200	Gravela	small (2-16	mm)		5	Texture	(F)G	LR	5 to 1	2		
		Area%		0 0-5	7 5-1	5 X >	15		53.5		large (16-6	4mm)		0	Confinemen		EN	CO FC	oc	(UC)	N/A
	Debris	Stable?				50			O IN		-	(64-128mm)	1 2	5	Valley:Char	nel Ratio	0-2	2-5 5	-10 1	6+)	N/A
To the	COVE	R: Total	%			20			250	Larges	ige, cobble	(128-256mm)	1	5	Stage	9	(ry	0	и н	Flo	bod
lesi.	Comp.	Dp.Pool	LO.D.	Boulder	InVeg	Overv	/eq	Cutbank	2163		boulder(>25		_	5 18	Flood Signs		-	Braided	T Y		(M)
	sum 100	80	0	15	0	1	5	0	933	Bedrock			-	100	Bars (%)	nr	рН	nr	O2 (p	_	
	Crown Clo	sure %		5	C	Aspec	t		SEC.	D90(cm)	22	Compaction	10	動	WaterTemp	(C) 2.	0 Turb	(cm) cl	-		nr
· 图数						DISCH	ARGE		-	/50	10		-	1				YMBOL			-
	Para	meter		Value	Meth	nod	-		Spe	cific Dat			-	1			9-19-	Fish)			
	Wetted V	Vidth (m			1	-	Estima	ated 0.5					-	1							
(Sa)	Mean De										,			1	-	_					-
	Mean Ve		/s)		1								_	1							
300	Discharg		_						-					-	dth Valley/Charu	at Flame		J.		BedMa	tenal

			FISH SUMM	ARY			11	STREAM/VALLEY CROSS-SECTION	-	
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L	(Looking Downstream)	-	R
引						1		PLANIMETRIC VIEW	E	
AL 5										
	Sampled	uppe	r 45 m of a 420	m long si	de cl	hannel at				
100	proposed	d brid	ge crossing.		1					
100	100		NO CATCH.							
72										
48										
93										
110										100
6-1										
en		- 3						COMMENTS		
1	Channe			ebris X	_	Managemen		Obstructions X Riparian Zone Valley Wall Proc	esses	Etc.
	Below 4	m se	ction sampled,	channel is	dew	atered; susp	ect this side cha	nnel is seasonally wetted.		
160			beaver dams a	re presen	t d/s	of sample site	and discharge i	is a trickle flow in the lower 20 m of channel flowing into m/s		
13	Goathor	n C.								
3.5										
4/7										
12		_								
0.00		_								
ist.		_							· Present	On.
Lon	-	_			_					CP
1731									Date Y M D	97/11/26

	ode	460-4	227-096							Creek			Res	achNo.	2	L	ngth(k	m)		9.	1
ocation	Propose	d bridg	e crossing site	-100	m d/s fron	n Four C.			Map #	093L065			Site	No.	G4b	L	thSurv	(m)		10	0
	conflue	nce.							U.T.M.				Fis	hCard	Y	1)		Field	X	Hist.
te Y.M.D		9 7 1	1 0 3	Time	1300	Agency	C87	Crew	RD	Photos	A5/	13-1	7 Airi	Photos							
3	PA	RAME	TER	V	LUE	METH				SPECIFIC	DA	TA						10	DBS	RUCT	TONS
Ave. Ch	an. Widt	th (m)			40		34, 4	2, 45										100	C.	Ht(m)	Type L
Ave. We	t. Width	(m)			11.5		11, 1	2										690			
Ave.Max	x.Riffle I	Depth (cm)		30													2			=1
Ave.Max	x.Pool D	epth (c	:m)		70														1		
Gradien	t %				2	-	C.	BE	D MATER	AL	9	6	C	BAN	KS						
% Pool	25	Rima	60 Run	15	Other		400	Fines	clay,silt,sand	i (<2mm)		10	He	ight(m)	1.5 %0	istab	le	10		15.5	
Side Cha	ın.%		0 0-10	10-4	0 >40		模型	Gravels	small (2-16	mm)	1	5	Te	xture	FG)L	R		in.		
	Area%	1215	0 0-50	5-1	5 >15		Mark.		large (16-6-	lmm)			Co	nfinement		T	EN (со	FC	(c)	UC I
Debris	Stable?	6			40		煙		sm. cobble	64-128mm)		35	₩ Va	ley:Chanr	nel Ratio		0-2	2-5	5(1	0) 10	+ N
COVE	R: Tota	1%			60		學	Larges	ige, cobble	128-256mm)		25	學	Stage			Dry	C) M	Н	Floo
Comp.	Dp.Pool	L.O.D.	Boulder	InVeg	OverVeg	Cutbank	以左		boulder(>25	6mm)		15	Flo	od Signs	Ht(m)		1.1	Braide	d	Y	(
sum 100	30	15	50	200		5	测统	Bedrock) Ba	rs (%)	70		pH	n	-	O2 (pp	m)
Crown Cla	osure %		<5	C	Aspect			D90(cm)	28 C	Compaction	LE)·	Wa	terTemp(C) n	r	Turb(c	cm)	cl	Cond(2	5C)
Mean De		n/s)											(Wath V	alley/Chann	el.Slope)						BedMan
Discharg	ge (m3/s))		<u></u>		~					_										
Discharg			MMARY						SI	REAM/VA	LLEY	/ CF		SECTIO	ON			_			
Discharg	FI	SH SUI	MMARY	Use Me	thod/Ref	1.			SI	REAM/VA				SECTIO	ON		1.1				R
	FI	SH SUI		Use Me	thod/Ref	ı		-			king D	ownst	coss-	SECTIO	ON						R
	FI	SH SUI		Use Me	thod/Ref	Ĺ				(Loo)	king D	ownst	coss-	SECTIO	ON		11 0				R
	FI.	SH SUI		Use Me	thod/Ref	i.		-		(Loo)	king D	ownst	coss-	SECTIO	ON		11 0				R
	FI.	SH SUI	mm) Life Phase	Use Me	thod/Ref	i		-	PL	(Loo)	king Di	EW	coss-	SECTIO	ON						R
	FI.	SH SUI	mm) Life Phase	Use Me	thod/Ref	i.			PL	(Loo)	king Di	EW	coss-	SECTIO	ON						R
	FI.	SH SUI	mm) Life Phase	Use Me	thod/Ref	i		-	PL	(Loo)	king Di	EW	coss-	SECTIO	ON						R
	FI.	SH SUI	mm) Life Phase	Use Me	thod/Ref	i i		-	PL	(Loo)	king Di	EW	coss-	SECTIO	NC						R
	FI.	SH SUI	mm) Life Phase	Use Ma	thod/Ref			COMM	PL SEE HAI	(Loo)	king Di	EW	coss-	SECTIO	ON						R

Edited by

CP

97/11/26

17 - river right seepage channel at bridge crossing site.

Proposed crossing site appears to be an active area of lateral channel movement.

dry at the time of survey.

There are 2 flood channels on river left bridge crossing site with channel widths of 2 m and 3 m respectively. Both were

The river right seepage channel has a channel width of 4-5 m with a gravel bed and trickle flow discharge.

Strea	am Nam	0	(gaz) G	oatho	rn Creel						(local)	Goathor	Creek						Acce	955	1	V2	Meth	DOC
Wate	ershed C	ode		460-4	227-0	96												ReachNo.	2	Lngth	n(km)		9	.1	
Loca	tion	Uppe	r Go	athor	n Cr	eek, ~1 k	m u/s f	rom up	per bri	dge site.			Map#	093L	065			SteNo.	G5	Lins	urv(m)		5	2.6	
													U.T.M.					FishCard	0	N	C	Fiel	d X	His	st.
Date	Y.M.D		9	7 1	0	2 4	Time	100	ю	Agency	C87	Crew	RD/CP/I	A P	hotos	A4/9-	12	AirPhotos			2-1-1				
G.			PAF	AME	TER		V	ALUE		METH				SPEC	CIFIC	DAT	1					OBS	TRUC	TION	S
_	Ave. Ch	an. W	ldth	(m)				43			40,3	8, 50										C	Ht(m)	Туре	Loc'r
	Ave. We	t. Wie	tth (m)				11.6			13.3,	11.4, 8.	6, 12.0, 11.	4, 12.9											
200	Ave.Max	k.Riffl	e De	pth (cm)			36				+										the state			
盆	Ave.Max	x.Poo	Dep	oth (c	m)		1	na														辦			
	Gradien	t %						2			C	BE	D MATER	IAL		%	C	BAN	KS			136			
8	% Pool			Rime	7	5 Run	20	Other	5	FLATS	1000	Fines	clay,sitt,san	d (<2mn	n)		5	Height(m)	2.5 %U	nstable	0	翻			
	Side Cha	n.%			0	0-10	10-4	: 00	40		102	Gravels	small (2-16	imm)			5	Texture	F G	LR					
		Area?			0	0-50	5 -	15]	>15		100		large (16-6	4mm)			0	Confinemen	ı	EN	co	FC	ОС	UC	N/A
1	Debris	Stat	le%					95					sm. cobble	(64-128n	nm)		0	Valley:Char	nel Ratio	0-2	(-5	5-	10 1	0+ 1	N/A
515	COVE	R: To	otal%					75			1	Larges	ige. cobble	(128-256	imm)		0	Stag	9	Dr	L	0)(H) Flo	bod
趣	Comp.	Dp.Po	ol	L.O.D.	В	oulder	InVeg	Ove	Veg	Cutbank	253		boulder(>2	56mm)			0	Flood Signs	Ht(m)	1.2	Braid	ed	Y		(D)
95	sum 1009	%		5		90				5	5.00	Bedrock					18	Bars (%)	60	pH	1	8	O2 (p	pm)	
拉克	Crown Cl	osure	%	T		<5	C	Aspe	ct		200	D90(cm)	85 C	Compa	action	L M	oli	WaterTemp	(C) 2.	0 Turt	o(cm)	cl	Cond	25C)	
								DISC	HARG	E		/50	19				+		RE	ACH S	YMB	OL			
2	Para	mete	r		V	alue	Met	hod			Spec	cific Dat	ta				7				(Fish)				
FT2	Wetted \	Width	(m)						Creek	at mode	rate t	o high f	lows.				7								
(tie	Mean De	epth (m)																						
15	Mean Ve	elocity	(m/s	5)																					
199	Discharg	ge (m	3/s)														7	Moth: Valley/Chan	sel Sione)					BedM:	atenal

			FISH SUMMA	ARY				STREAM/VALLEY CROSS-SECTION	-	
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L	(Looking Downstream)		R
100	SST	18	34-46	F	R	EF		PLANIMETRIC VIEW	-	
* *	SST	5	95-126	J	R	EF				
63	CHAR	28	33-61	F	R	EF				
188	BT	12	68-114	J	R	EF				-
5	DV	8	77-127	J	R	EF	(Z)			-
+121							3.			
38			25-6-1							
领范										
the plan						E				-
15								·		-
		_						COMMENTS		_
	Channe	Stab	oility D	ebris		Managemen	t Concerns	Obstructions Riparian Zone Valley Wall Pro	cesses	Etc.
679		_			site !	_		nstem were sampled separately but consecutively. The data was the	en	
	combine									
SE IN	Creek at	mode	rate to high flo	ws.						
			stern Spotted F		augh	t in the side c	hannel.			
3		_		-				ue to high flows.		
100			smaller bed ma							
100	Side chai	inci.	maner ocu ma	10.1121	COIL	and the state of t	711110 1110 110	31011		
		_			_					
	_				_				Edited by:	СР
									Torten of-	

ream N	ame	(ga	z) Up	per Goathor	n Creek			(local	Upper G	oathorn Cre	cek				Access	I	FT	Method
atershe	d Co	de	460-42	27-096									ReachNo.	3	Lngth(km)		3.	.1
cation	1	-80 m u	s from	confluence w	ith Cabi	net Creek			Map#	093L055			SiteNo.	G8	LthSurv(m)	3	7 .
									U.T.M.				FishCard	(A)	C	Fiel	d X	Hist.
te Y.N	M.D	1 9	7 0	9 2 4	Time	1500	Agency	C87 Crew	CP/RD/C	M Photos	B3/1	19, 2	1 AirPhotos	1			-	
2		PA	RAME	TER	V	ALUE	METH			SPECIFIC	DA'	TA				OBS	TRUC	TIONS
-	Char	. Widt	h (m)			10.2		9.4, 7.8, 10.	4, 13.1							C.	Ht(m)	Type Lo
-	_	Width				5.6		6.3, 4.3, 5.7	6.0							80		
-			epth (c	m)		18		16, 18, 19								45		
	_		epth (cr	-		40		30, 38, 49, 4	3							1000		
Grad	_			-		2		C B	ED MATER	IAL	1 9	6	C BAN	IKS		3000		
% Poo		15	Rime	70 Run	15	Other		Fines	clay,sitt,sar				Height(m)	0.5 %Uns	table 0	100		
Side	_	_		0 0-10				Gravel				5	Texture	F)G I	R	Will state		
22	-	rea%		0 0-5	5-1			FA ISB	large (16-6	4mm)		10	Confinemen	nt	EN CO	FC	(oc)	UC N
Debri	. +	Stable%		0_ 00	T	20		Biar	_	(64-128mm)		50	Valley:Char		0-2 2-		_	0+ N/
		: Total	_	_	-	75	_	Larges		(128-256mm)		35	Stage		-	~	Эн	_
6		_	1	Boulder	latter		Cidhank	20500	boulder(>2		+	0.0	Flood Signs		0.3 Bra	_	Y	6
Comp	-	p.Pool	L.O,D.	50	InVeg 0	OverVeg 5	Cutbank 10	Bedroo		~1111)	-		Bars (%)	40	pH pH	7,2	O ₂ (pp	_
		_	1 20	20	Ca		10	SCHOOL STATE	T In	Compaction	5	-	WaterTemp		-	_	Condi	
Grown	n Clos	ure %		20	AND LOCKED	Aspect	_	D90(cm	7 15	Compación	100	-	water remp	-	CH SYM	_	Conda	(30)
		-1		Value	Man	DISCHARG	E .	Specific Da			_	-		KEA	(Figh)	BOL		
-	aram	idth (m		Value	Meth	_		0 c.f.s. discha			_	-						
		-		-		Estin	iated o-1	o c.i.s. dischi	rge				-					_
-	_	th (m)	64		-		_	_			_	-						
-		(m3/s)			-		_		_	_	_	-	(Wath Valley/Chan		- 1			BedMate
		FI	SH SUM	MARY		_ 3			S				ROSS-SECTI	ON	3			
Specie	es I	No. Siz	e Range(n	nm) Life Phase	Use Me	ethod/Ref	L			(Loo	king D	owns	tream)					R
SS	T	4	116-126	6 J	R	EF	_		P	LANIMETR	IC VI	EW						
CH	AR	21	49-62	F	R	EF												
D	V	36	71-171	J	R	EF												
9																		
The c	char f	ry were	visually	y identified a	s a mix		200											
of BT	T and	DV.																
171 n	mm D	V was a	maturi	ng female.		-												
164 n	mm D	V was a	ripe m	ale.			-											
9.																		
Si .																		
0-1		-	- T					COM	MENTS									
Cha	innel	Stability	X	Debris X	M	anagement (Concerns	s 🗀 O	bstructions	Ripa	rian 2	Zone	e Valle	ey Wall P	rocesses	- 5	1	Etc.
Exce	llent	site; go	od fry h	abitat along	the mar	gin. Unembe	dded cob	bles, cutban	k, LOD, and	pools prov	ide g	ood	cover.					
Dyna	amic,	unstabl	e creek;	observed se	everal se	diment wedge	es and m	assive debris	jams ω/s.									
1																		
N.																_		
0.																		
9																		

97/11/26

Date Y M D

Edited by: CP

Data Y M D

97/11/26

Strea	m Name) (gaz) Ca	binet Creek						(local)	Cabinet 6	Cree	k						Access	F	Т	Metho	bd
Wate	rshed C	ode	460-4	227-096-485											= ~	ReachNo.	1		Lngth(km)		3	.5	
Loca	tion	Lower	Cabinet	C. fan, 100 m	u/s fron	Cabine	t - Go	thorn			Map #	09	3L055			SiteNo.	G6		LihSurv(m)		2	5	
	4.00	conflu	ence. Sar	mpled a large	side cha	nnel.					U.T.M.				-	FishCard	0	N	C	Field	X	Hist	. \square
Date	Y.M.D		9 7 0	9 2 4	Time	113)	Agency	C87	Crew	RD/GM/	CP	Photos	B3/17,	18	AirPhotos	12.76				11		
C		P	ARAME	TER	V	ALUE		METH				SF	PECIFIC	DATA						OBS	TRUC	TIONS	
變數	Ave. Ch	an. Wid	th (m)			26,6			25.0,	27.8, 27	.0									C	Ht(m)	Туре	Loc'n
Ties.	Ave. We	t. Widt	h (m)			6.7			6.8,	5.4, 6.4, 8	3.3									1			
W.A.	Ave.Max	Riffle	Depth (c	m)		25			26, 2	5, 27										100		1	ÌΕ
	Ave.Max	.Pool [Depth (c	m)		65			-											是特	4		100
	Gradien	1%				2.5			C	BE	D MATER	IAL		%	C	BAN	IKS			位置			
	4 Pool	10	Riffle	50 Run	30	Other	10	FLATS	CONTRACT	Fines	clay,sitt,sar	nd (<	2mm)	5	100	Height(m)	2.5 %	Jnstal	ble 0	は 連り の が の の の の の の の の の の の の の			
	Side Cha	n.%		0 0-10	10-40	× >4			證監	Gravels	small (2-16	6mm)		10	羅	Texture	FG	<u>}-</u>	R	觀經			. 1
53		Area%		0 0-5	5-15	5 □ >1	5 🗌		羅門		large (16-6	4mm)	la Ti	聽	Confineme	nt		EN CO	(FC)	ОС	UC	N/A
	Debris	Stable	%			10			550		sm. cobble	(64-1	28mm)	10		Valley:Char	nnel Ratio		0-2	5) 5-1	0 10	+ N/	Α
A)*	COVE	R: Tota	al%			60			學學的	Larges	ige, cobble	(128-	256mm)	45	題	Stag	9		Dry L	() H	Floo	d
	Comp.	Dp.Pool	L.O.D.	Boulder	InVeg	Over	/eg	Cutbank	超越		boulder(>2	56mm	1)	30	题	Flood Signs	Ht(m)		1.0 Brai	ded	8) 1	4
	sum 100	20	5	75					翻	Bedrock					簡	Bars (%)	40		рН	7.0	O ₂ (pp	om)	
1	Crown Clo	sure %		<5	C	Aspec	t		湯	D90(cm)	40 C	Со	mpaction	L OH	隐	WaterTemp	(C)	7.0	Turb(cm)	cl	Cond(25C)	70
						DISCH	ARG			/50	17				Т		R	EAC	H SYME	OL			
38	Para	meter		Value	Meth	od	1		Spe	cific Data	a				1				(Fish)				
使計	Wetted V	Vidth (n	n)				Estim	ated 20 d	.f.s. d	ischarge	in sample	cha	nnel.		1								
44	Mean De	epth (m)								0.75													
新教	Mean Ve	locity (n/s)																				
	Discharg	e (m3/s	5)												(Wid	th: Valley/Chan	nel,Slope)					BedMat	enal
	_	F	ISH SU	MMARY				_	_		S	TRE	AM/VAI	LEY CE	ROS	S-SECTION	N	_		_			-
C	Species	1		mm) Life Phase	Use M	ethod/Ref	\dashv	L			7			ing Downs								R	
	SST	1	106	J	R	EF	\neg				PI	LAN	IMETRI	C VIEW					_			7.0	
279	CHAR	1		ed through ne	t	EF	+												-				
- 年	BT	4	73-138		R	EF		-															
	DV	4	74-14	_	R	EF	1	-														10	_
- 4	DV	2	168-17		S/M	EF		7.1															
M							_	-														- 17	
	170 mm	DV was	a ripe m	ale.																		- 4	
Jhean				ng female.																			
1								-															
1																						-	
16							_			COMM	ENTS												
63	Channe	Stabili	ty X	Debris	N	lanagen	nent C	oncems	0	Ob	structions	-	Ripar	ian Zone	е -	Valle	y Wall	Proc	cesses			Etc.	
10	Mainly b	oulder-	riffle hab	itat with one p	ool with	nin the si	te.																
ŢĮ.	Good fry	habitat	present	along the mar	gins.																		
100 H	Wide, un	stable c	hannel in	the lower 25	m of thi	s creek.																	

Ctr	am Nam	. 1	(007)	Cal	inet Creek	_		-	311	LAN		Cabinet	_	l.	-	-	-	_	-	_	Acce	22	v	, 1	Metho	d
_		_			7-096-485	-		_	_		(Iocai)	Cabinet	Cree	•		-		ReachNo.		1	Lngth		-	3.	_	_
	ershed C	_	_			0.11			_	-		T.4 #	loo	3L055	-			1,000		G7	-			27	_	_
Loc	ation	Upper	net 2	U m t	elow main	Cabine	t C. brid	ige.	_		_	Map #	09.	TNOO	_			SiteNo.	-	5	LthSu	C(m)	Field	_	_	
-			-1-	Lal	al al a	I-	1		1	Tana 1		U.T.M.	_	L	Inze			FishCard	0		4	300	FIER	Δ	Hist	-
_	Y.M.D		9 7	0	9 2 5	Time	120	0	Agency	C87	Crew	DB/CP	-	Photos		-	,	AirPhotos		_	_	_				
C		_	PARA	_	ER	-	ALUE	_	METH				_	ECIFI	CDA	IA	-		-	_	_	-	_	RUCT	_	
	Ave. Ch			_		-	11.9			-		.5, 10.2, 1	_	2.4	_	_	_		_		_	-	Security.	Ht(m)	Type II	oc'n
	Ave. We	_				-	10,5	_	-	-		3, 8.9, 9.6,	10,8			_	_		_	_	_	\dashv	20.20 国際		-	-
NO.	Ave.Max	-	-	-		-	34	-		28, 30	0, 38	_	_		_	-	_	_	-		_	-	and and and and and and and and and and	-		_
FEET OF	Ave.Max		Depti	(Cn)	1	ns	-	-	C		D 444 TCT	NAL		Τ.	,	C	BAN	IVC	_		-	製造		-	_
SESSION.	Gradien	1 %	L	. T	or la	5	1	FT		45-7-46-2		DMATER	_	- /	9	0	9		-	%Uns		10	95X		-	_
35.00	% Pool		RM	_	95 Run		Other	40		Treatment of	Fines	clay,sitt,sar	_	mm)	+	-	ALC:	Height(m)	-	G	~	10			-	_
Taryon.	Side Cha	_	+	-		_				经验	Gravels	small (2-1		-	+		50h	Texture			_	~	29401			_
200	Debris	Area%	-01		0-5] 5-		15_		単記書 京の他		large (16-6	_		+	30	高 用 用 用	Confineme	_	-	1	2-5	FC 5-1	00	+ N	_
	16.3	Stabl	_	_	_	-	na	_	-	200	300	sm, cobble	_		-	-	90	Valley:Cha	_	atio	0-2	-	-	_	_	_
100	COVE		_	- [Boulder	cir.	75		270.773		Larges	ige, cobble	_	_	-	40	35	Stag	_		Dry 1.5	Braid	_	Y	Floo	(V
	Comp. sum 1009	Dp.Poo	i L.C	,D,	90	InVeg	Over	10	Cutbank	2000 C	Bedrock	boulder(>2	somm,	-	1	23	100	Flood Signs Bars (%)	I HI(m	5	pH	-	.0	_	-	2
TIES A	Crown Clo	_	_	Н	5	C	Aspe	_		COLUMN TO SERVICE SERV	D90(cm)	40 C	N.		D	-	(B)	WaterTemp	101	6.5	-	-	-	O ₂ (pp Cond(2	_	70
(900c)	Crown Cit	usule v	0		3	COLUMN		HARG	_		/50	15	Con	npaction		н	80	vvateriem	(C)		CH S			Cona(2	30)	70
WIN.	Dara	meter	_	T	Value	Mo	thod	TAKG	-	Span	ific Dat		-	_	-	_				KEA		Fish)	JL			
S(1)	Wetted V		m)	-	value	IVIC	uiou	Fetim	ated 1 n	_	_			_	-											
OUR.	Mean De	-		+		-	-	Estin	ateu I II	i /a uta	cuarge.					=	1	_	-	_	-	_			_	
	Mean Ve			-		-			_	-	_	_				7										
77.4N	Discharg	-	-	7											_	_	-	th Valley/Char	nel Sin	200					BedMate	lenel
100-1		, princip	-/	_		_	_	-						_	_	_					_	_	_	_	-	_
			FISH S	SUMI	MARY				7			S	TREA					S-SECTI	ON						77	Т
C	Species	No. S	Size Rar	ge(mr	n) Life Phase	Use N	lethod/Ref		L					(Loc	oking De	ownst	ream	1)							R	
一竹	CHAR	10	31	-45	F	R	EF					P	LANI	METR	IC VI	EW					9					
5	DV	46		129	J	R	EF																			
31	BT	1	6	5	J	R	EF		4																	
24					-			-	_																	
24				_		1		-	-																	
20					-	+		-			_										_					_
Section		\vdash				\vdash			-																	
E.			_	_	-	1	_	-	4																	_
							_	_								_						_	_	_		_
-7	01			_	=	-	A 2000	N 7 4	ON INC.		COMM		-		200.0		_		76.		273		_	_		
3	Channel	_	_	_	Debris		_	ment C	oncerns	_	Ob	structions		Ripa	arian Z	cone		Vall	ey V	/all P	rocess	es			Etc.	_
33			_	_	oblems i.e.	no wine	i/leaves.	G .									_		_			_			_	_
	Low BT	numbe	rs cau	ght a	t this site.	_	-	-								_			-	-				-		
. 0																										

Edited by

Date Y M D

CP

97/11/26

Stream	Name	(ga	z) Cı	binet Creek	-					(local)	Cabinet (Creek								Acce	ss	1	/2	Meth	od
Waters	hed C	ode	460-4	227-096-485									8			Reac	nNo.		2	Lingth	(km)	1	1	.6	
Locatio	n	Approxi	mately	400 m u/s fro	m Web	ster C.	conflue	ence.			Map#	093	L055			SiteN	0.	G	9	LihSu	rv(m)	1	2	23 .	
											U.T.M.					Fish	ard	Y) N		C	Fiel	dX	His	st.
Date Y	r.M.D	9	7 0	9 2 5	Time	160	0	Agency	C87	Crew	DB/CP		Photos	B3/	24, 25	AirPh	otos								
C		PA	RAME	TER	V	ALUE		METH				SP	ECIFIC	DA	TA						7	OBS	TRUC	TION	s
1.00 miles	e. Cha	n. Widt	h (m)			6.7			5.2,	5.8, 6.4,	8.1, 7.9											C	Ht(m)	Туре	Loc'n
Ave	e. Wet	. Width	(m)			5.5			3,3,	1.2, 5.4,	8.1, 6.3											额	-		
Ave	e.Max	.Riffle D	epth (cm)		22			30, 1	5, 20												福祉			i.
Ave	e.Max	Pool De	epth (c	m)		43			41, 4	2, 46															
Gra	adlent	%				7			C	BE	D MATER	IAL		9	6	Cil	BAN	KS				125			
% P	Pool	3	Riffie	97 Run		Other		-	施約	Fines	clay,silt,san	d (<2r	nm)			Heigh	nt(m)	2.0	%Unst	able	0	E			
Sid	le Char	n.%		0 0-10	10-4	0 :	40		150	Gravels	small (2-16	(mm)				Texts	ire	F	G(L)R	Q.	100			
12.5		Area%		0 0-52	_	5 :	>15	10.00	10.000 A.000 A.000		large (16-6	4mm)		10		Conf	nemen			EN	co	FC	ос	UC	N/A
Det	bris	Stable%	4			50					sm. cobble	(64-12	8mm)		10	Valle	y:Chan	nel Ra	tio	0-2	2-5	5-	10 1	1 +0	N/A
湖 (COVE	R: Total	%			75			華城區	Larges	ige. cobble	(128-2	56mm)	1	30	100	Stage	,		Dry	(76) H	Flo	bod
Cor	mp.	Dp.Pool	L.O.D.	Boulder	InVeg	Over	Veg	Cutbank	1		boulder(>2	56mm)		-	60	Floor	Signs	Ht(m)		1.0			Y		(M)
sum	n 100%	5	5	90				5	組織	Bedrock						Bars	(%)	2	0.0	pH	1	7.1	O2 (p	pm)	
Cro	own Clo	sure %	1	<1	C	Aspe	ct		40	D90(cm)	33 C	Com	paction	0	н	Wate	rTemp	(C)	7.0	Turb	(cm)	cl	Condi	(25C)	90
			_		1000000	DISC	HARG	E	-	/50	15	_			\neg				REA	CH S	YMB	OL			
	Parar	meter	77	Value	Meti	hod			Spe	cific Dat	a									- 1	Fish				
We	etted V	Vidth (m))				Estim	ated 10-1	5 c.f.	s. discha	rge.				\neg										
Me	an De	pth (m)											-		\neg										-
-		locity (m	/s)												\neg										
-24		e (m3/s)	_													Width: Valle	w/Chane	el Sione						BedMa	aterial

			FISH SUMMA	ARY				STREAM/VALLEY CROSS-SECTION		
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L	(Looking Downstream)		R
原	DV	23	63-130	J	R	EF		PLANIMETRIC VIEW	T	
10億	CHAR	3	35-44	F	R	EF				
Err		lici		P 198_4						
題個										
							13			
N										
1							1			
			-			-				
No.						1				
Jul 1								COMMENTS		
	Channe	Stat	oility _ D	ebris 🗶		Manageme	nt Concerns	Obstructions Riparian Zone Valley Wall Proc	esses	Etc.
(III)	Only DV	were	caught at this	site.						
	Lower ne	t loca	ated on d/s side	of bridge	. No	upper net; 1	sed log drop	(40 cm) as upper barrier.		
TO SE	No leaf p	roble	ms with this cr	eek.		Torre				
12										
塑										
題										
ME										
Ħ									Edited by:	CP
3									Date Y M D	97/11/26

	am Nam	0	(gaz) W	ebster Creek					-	(local)	Webster	Creek		_	-		-	_	Acce	988	'	/2	Metho	_
Vat	ershed C	ode	460-4	227-096-485-3	46										Rea	ichNo.	1	_	Lngth			_	.2	_
oc	ation	1.4 kr	n w/s from	main road s	our 120	G.					Map #	093L055			Site	No.	GI	_	_	rv(m)		_	1	
								_			U.T.M.		-			Card	0	N	-	C	Field	Z	Hist	t
ate	Y.M.D		9 7 0	9 2 7	Time	1200	_	ency	C87	Crew	DB/CP		s B4/		AirF	Photos		_	_					
C		_	PARAME	TER	V	ALUE	ME	ETH				SPECIF	IC DA	TA			_	_	_	-	_	_	TIONS	_
M	Ave. Ch	_				8.4		_	-	_	7.6, 7.2				_							Ht(m)	Туре	Lo
	Ave. We					7.8	-		_	0, 7.7, 6	6.7, 6.1			_		_	_	_	_	-				_
類			Depth (25			23, 23					_				-			1000	_		_
7		_	Depth (ci	m)		53	_		60, 50	_			_		201			_						
100	Gradien	t %	Total Control		111	2	-		C		MATER		- '	%	C	BAN	_		Section 1	12	S224	_		_
34	% Pool		Riffle	60 Run	40	Other			500 SEC. 100	Fines	clay,silt,san		-		400	ght(m)	1.5 %	_		0	到他还			-
100	Side Cha	_	-1-1	0 0-10	_		40		259	Gravela	small (2-16		-		dist.	dure	F(~	也是			L
	Dahrie	Area%		0 0-52	5-1		15	_	Quality.	-	large (16-6		-	10	100	nfinemen			EN	<u>@</u>	FC	_	UC I	_
1	Debris	Stabl				75		_	登録			(64-128mm)	-	20	便是 Val	ley:Char	_	0	0-2	_)+ N	
-	COVE	_		The state of		70			10 mm	Larges		(128-256mm)	40	525 (635)	Stage		-	Dry	_	_		Floo	
SE.	Comp.	Dp.Poo	_	Boulder	InVeg	OverVe		tbank	Fig. 100	21.1	boulder(>2	semm)	_	30	21.00	od Signs	1		-	Braic	_	Y		N
12	sum 100%	_	5	65	C	20		10	18000000	Bedrock	40 C	1	-		Appeals .	5 (%)	0		pН	_	7.5	O ₂ (p		-
ij.	Crown Cl	osure %	6	10	C	Aspect				D90(cm)	40 999	Compactio	n O	ИН	€ Wa	terTemp		5.0	_	(cm)		Cond(25C)	g
3	-				1	DISCH	ARGE	_		/50	12			_			F	REA	CHS	YMB (Fish)	OL			
9		meter		Value	Met	-				ific Data		_												
	Wetted V					- 1	Estimated	1 30 c	.f.s. dis	charge			_	_		_		_	_	_			_	4
	Mean De	-	_			-		_	_		_		_	_										
9	Mean Ve					-				-	-		-	_						1				
3	Discharg	e (ma	/s)												(Width: Va	illey/Chan	nel, Slope))					BedMat	en:
			FISH SU	MMARY							s.	TREAM/V	ALLE	Y CF	coss-s	SECTI	ON							
C	Species		FISH SUI		Use Me	ethod/Ref	-				s		ALLE'			SECTI	ON						R	
C	Species DV			mm) Life Phase	Use Me	ethod/Ref							ooking D	ownst		SECTI	ON		11 5				R	
C	-	No.	Size Range(r	mm) Life Phase	_		L					(Lo	ooking D	ownst		SECTI	ON		17. 17.				R	
C	DV	No. 25	Size Range(i	mm) Life Phase 7 J 9 J	R	EF	L					(Lo	ooking D	ownst		SECTI	ON		17. 17.				R	
C	DV BT	No. 25	54-137 100-10	mm) Life Phase 7 J 9 J	R R	EF EF						(Lo	ooking D	ownst		SECTI	ON		11. 11.				R	
C	DV BT	No. 25	54-137 100-10	mm) Life Phase 7 J 9 J	R R	EF EF	-					(Lo	ooking D	ownst		SECTI	ON		17 17				R	
(1) (1) (2) (3) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4	DV BT	No. 25	54-137 100-10	mm) Life Phase 7 J 9 J	R R	EF EF						(Lo	ooking D	ownst		SECTI	ON		11 11				R	
Control of the Contro	DV BT	No. 25	54-137 100-10	mm) Life Phase 7 J 9 J	R R	EF EF						(Lo	ooking D	ownst		SECTI	ON						R	
	DV BT	No. 25	54-137 100-10	mm) Life Phase 7 J 9 J	R R	EF EF						(Lo	ooking D	ownst		SECTI	ON						R	
	DV BT	No. 25	54-137 100-10	mm) Life Phase 7 J 9 J	R R	EF EF						(Lo	ooking D	ownst		SECTI	ON		THE LOW				R	
	DV BT	No. 25	54-137 100-10	mm) Life Phase 7 J 9 J	R R	EF EF					PI	(Lo	ooking D	ownst		SECTI	ON		AT JOH				R	
20 日本日本日本日本日本日本日本日本日本日本日本日本日本日本日本日本日本日本日本	DV BT	No. 25	54-137 100-10	mm) Life Phase 7 J 9 J	R R	EF EF				СОММ	PI	(Lo	ooking D	ownst		SECTI	ON						R	
51 年代 高田 中国 中国 中国 中国	DV BT	No. 25 25 2 2	54-137 100-10 30-32	mm) Life Phase 7 J 9 J	RRR	EF EF EF	L L	cerns	_	-	PI	(LC	ooking D	EW	ream)		ON ey Wa	III Pro	ocess	sees			R	
2000年間の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の	DV BT CHAR	25 2 2 2 Stabi	54-137 100-10 30-32	mm) Life Phase 7 J 9 J F	RRR	EF EF EF		_		Ob	PI ENTS structions	(LC	RIC V	EW	ream)			II Pro	ocess	sees				
50 上げるのでは、一方には、竹香りは	DV BT CHAR	No. 1 25 2 2 2	54-137 100-10 30-32	mm) Life Phase J J F Debris	R R R	EF EF EF	ute was m	arke	d with	Ob	PI ENTS structions	(LC	RIC V	EW	ream)			III Pro	ocess	ses				
	DV BT CHAR	No. 125 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Size Range(e 54-137 100-10 30-32 lity short hill er 30' net awning in	mm) Life Phase J J F Debris off new road i was ~2' too sh this section.	R R R	EF EF EF	ute was m	arke	d with	Ob	PI ENTS structions	(LC	RIC V	EW	ream)			II Pro	ocess	ses				
	DV BT CHAR	No. 125 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Size Range(e 54-137 100-10 30-32 lity short hill er 30' net awning in	mm) Life Phase J F Debris Debris off new road i	R R R	EF EF EF	ute was m	arke	d with	Ob	PI ENTS structions	(LC	RIC V	EW	ream)			II Pro	ocess	ses				
	DV BT CHAR	No. 125 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Size Range(e 54-137 100-10 30-32 lity short hill er 30' net awning in	mm) Life Phase J J F Debris Off new road i was ~2' too sh this section.	R R R	EF EF EF	ute was m	arke	d with	Ob	PI ENTS structions	(LC	RIC V	EW	ream)			III Pro	ocess	ses				
	DV BT CHAR	No. 125 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Size Range(e 54-137 100-10 30-32 lity short hill er 30' net awning in	mm) Life Phase J J F Debris Off new road i was ~2' too sh this section.	R R R	EF EF EF	ute was m	arke	d with	Ob	PI ENTS structions	(LC	RIC V	EW	ream)			III Pro	ocess	ses				
	DV BT CHAR	No. 125 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Size Range(e 54-137 100-10 30-32 lity short hill er 30' net awning in	mm) Life Phase J J F Debris Off new road i was ~2' too sh this section.	R R R	EF EF EF	ute was m	arke	d with	Ob	PI ENTS structions	(LC	RIC V	EW	ream)			III Pro	ocess	ses				
	DV BT CHAR	No. 125 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Size Range(e 54-137 100-10 30-32 lity short hill er 30' net awning in	mm) Life Phase J J F Debris Off new road i was ~2' too sh this section.	R R R	EF EF EF	ute was m	arke	d with	Ob	PI ENTS structions	(LC	RIC V	EW	ream)			III Pro	ocess	sees				

Date Y M D

97/11/26

Stre	am Nam	e (ga	z) Te	nas Creek						(local)	Tenas Cr	eek						Acce	ess	7	2	Meth	od
Wat	ershed C	ode	460-4	227-096-049											F	ReachNo.	1	Lingth	(km)		9.	1	
Loc	ation	~30 m u	s from	old bridge sit	e.						Map#	093L	065		8	iteNo.	T1	LthSu	irv(m)		83	3	
											U.T.M.				F	ishCard	(2)	N	C	Fiel	X	His	st. 🗌
Dat	Y.M.D		7 0	9 1 6	Time	900	0	Agency	C87	Crew	RD/CP/G	M P	hotos	B3/3, 4	1	irPhotos	-						
C		PA	RAME	TER	V	ALUE		METH				SPE	CIFIC	DATA						OBS	TRUCT	TION	s
灵	Ave. Ch	an. Widt	h (m)			10.0			7.9, 1	10.3, 12.7	7, 10.9, 8.8	9.3								C	Ht(m)	Туре	Loc'n
	Ave. We	t. Width	(m)			7.8			7.5, 5	9,2, 7.6, 8	3.4, 8.3, 5.7									Go.	1.11		
200	Ave.Max	.Riffle D	epth (cm)		14		1	17, 1	2,13										1			
	Ave.Max	.Run De	pth (c	m)	-	35		-															
ESS.	Gradien	t %				1.5			C	BE	D MATER	IAL		%	C	BAN	KS			124		91	
Federal Federal	% Pool	20	Riffle	70 Run	10	Other			(4Ke	Fines	ciay,sit.san	d (<2mm	n)	5	副	eight(m)	1.3 %Un	stable	0	63			
Will see	Side Cha	n.%		0 0-10	10-4	0 >	40		版技术	Graveis	small (2-16	mm)		20	聯	exture	FG	L R	- 0	77			
	-	Area%		0 0-50	5-1	5 3	15		Silver .		large (16-6	4mm)			100	Confinemen	1	EN	co	FC	(oc)	UC	N/A
47	Debris	Stable?				30		17.00			sm. cobble	(64-128m	nm)	35	1	/alley:Chan	nel Ratio	0-2	2-5	1	10) 10)+ 1	N/A
SERVE	COVE	R: Total	%			70				Larges	ige. cobble	(128-256	mm)	30	36	Stage		Dn	L	Ø	5 H	Flo	bod
Cale	Comp.	Dp.Pool	L.O.D.	Boulder	InVeg	Over	Veg	Cutbank			boulder(>25	6mm)	.=4	10		lood Signs	Ht(m)	0.4	Braid	ed	Y		(M)
	sum 100	20	10	60	0		5	5	1000	Bedrock						Bars (%)	12	pH	7	.7	O ₂ (pp	(mc	
	Crown Cl	osure %	T	15	C	Aspe	ct		Sale	D90(cm)	30 C	Compa	action	LME	圖	VaterTemp	(C) 8.0	Turt	(cm)	100	Cond(2	25C)	120
						DISC	HARG	E	-								RE	ACH S	YMB	OL			
	Para	meter		Value	Met	hod			Sper	cific Dat	a				1				(Fish)				
HE	Wetted \	Vidth (m					Tenas	C. at me	oderat	te flows.					1								
68	Mean De						Slight	colour i	n wate	er from l	heavy rain	5.			1				T	-			3
130	Mean Ve	4 - 4 - 4	/s)	1											1								
1,500	Discharg					_									-	Valley/Chann	sel Slone)					BedMa	tenal

			FISH SUMMA	ARY				STREAM/VALLEY CROSS-SECTION		
С	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L	(Looking Downstream)		R
13	SST	232	29-52	F	R	EF		PLANIMETRIC VIEW		2.5
(EE)	SST	46	66-152	J	R	EF				
(80)	CHAR	1	42	F	R	EF				165-3
1	BT	3	106-127	J	R	EF				
20		-		11						
		11.5								
3				100						
							_			
(SA)							_			0
200										
-								COMMENTS		
100	Channe	Stab	oility 🗌 D	ebris 🗶		Managemen	t Concern	Obstructions Riparian Zone X Valley Wall Process	es	Etc.
90	Good SS	T par	r rearing in the	cobble-r	iffle s	ections and n	noderate !	y rearing along the margins.		
	Flows ar	e mod	erate and wate	r is slight	ly col	oured due to	heavy rai			
5	A large o	lebris	jam and a side	channel a	are pr	esent within	the site.			
OF	Same site	e locat	tion as 1984.							
潘	A lot of	lebris	collecting in th	e net due	to he	avy alder ove	rstory wi	hin the site.		
47										
3						82.50				
1										
131/										
2010									Edited by:	CP
Series City									Date Y M D	97/11/26

									STR	EAR	A SURV	EY FO	RM	1											
Stre	am Nam	0	(gaz) Te	enas Creek						(local)	Tenas (Cree	ek							Access	F	Т	Meth	od
Wat	ershed C	ode	1	160-4	227-096-049													ReachNo.	1		Lngth(km)		9	.1	*
Loc	ation	Lowe	r Te	125 C	, hiked in fro	m edge	of bloc	k.				Map #	7	093L065				SkeNo.	T2		LthSurv(m)		6	7 .	
	20.211											U.T.M				T		FishCard	(1)	N	C	Fiel	d X	His	t. 🗌
Date	Y.M.D		9	7 (9 2 0	Time	930)	Agency	C87	Crew	RD/GN	1/IF	Photos	B3/	13, 1	4	AirPhotos	\sim						
C	_		-	_	TER	V	ALUE		METH		1			SPECIFIC	DA	TA						OBS	TRUC	TION	s
200	Ave. Ch	_	_	_	WED.		7.6		-	8.4.	6.9, 8.3,	6.8. 7.7							_			C	Ht(m)	Туре	Loc'n
200	Ave. We		_	-			6.3			_	6.4, 6.9,	_			90							識			
district.	Ave.Max		_		cm)		25		1	-	28, 24											25			
	Ave.Max						52			55,	48					_						2		17	
delle	Gradien	_				1	1.5			C	BE	D MATE	RIA	AL	9	6	C	BANI	(S			E SUR		100	
31.	% Pool	10	1	Riffle	50 Run	30	Other	10	FLATS		Fines	clay,sitt,s	_			5	4700	Height(m)	1.3 %	Unsta	able	75			
	Side Cha	_	7	T	0 0-10	10-	_	40			Gravels	small (2-	-		1	0	雞		FIG	_	_	1000 p			
-0		Area%		†	0 0-53	đ 5-	15 >	15		A STATE	8	large (16	-64m	nm)	1			Confinement	_	_	EN CO	FC	(00)	UC	NVA
ST.	Debris	Stab	_	_	1	1	75			Sec.	1			4-128mm)		15	(Tig	Valley:Chann	el Ratio		0-2 2-	_	~	1 +0	_
-27	COVE	R: To	tal%	0			60	_		200	Larges	-		28-256mm)		40	186	Stage		7	Dry L	. 64	5 H	Flo	od
居林	Comp.	Dp.Por	_	O.D.	Boulder	InVeg	Over	Vea	Cutbank	廳		boulder(>				30	100	Flood Signs I	tt(m)		1.0 Brain	\rightarrow	Y	_	N
21	sum 100	10	-	10	65	-	-	10	5	100	Bedrock						-	Bars (%)	10	17.1	рН	7.3	O2 (p)	pm)	
	Crown Cl	osure 9	6	Т		C	Aspec	et		55.2	D90(cm)	32	患	Compaction	LN	A		WaterTemp(c) [5.5	Turb(cm)	80	Cond	_	90
ma.	-					-		HARG	E	1000	/50	19	-		1 - /-				_	_	CH SYME	_			
	Para	meter			Value	Me	thod			Spe	cific Dat										(Fish)	7,5			
SIN	Wetted \		_					Lowe	Tenas (_	moderate		_	_											
13	Mean De										22.77							-							
1	Mean Ve		_)									_		_		1				- 1				
E0.	Discharg		-														(Made	h Valley/Channe	(,Slope)		110			BedMa	terral
			FISH	SU	MMARY	_							STR	REAM/VA	LLE	CF	os	S-SECTIO	N						
C	Species	No.	Size F	Range(mm) Life Phase	Use M	ethod/Ref		L					(Loo	king D	wnst	ream)	Y						R	
3	SST	100		31-49	F	R	EF					9	PLA	NIMETR	IC VI	EW					3				
(8)	SST	30	6	9-14	6 J	R	EF																		
当	CHAR	1		50	F	R	EF																		
-3	BT	2	1	02-13	2 J	R	EF																		
K	DV	3	9	0-113	3 J	R	EF																		
1110	DV	1		152	A	S	EF																		
	le			2.2		T.			1																
2	Suspect	har fr	y wa	s a D	v.																				
3								- Ti																	
331											COMM	IENTS													
	Channe	Stab	ility	3	Debris X	N	lanager	ment C	Concerns	Œ	Ob	struction	s	Ripa	rian 2	one	E	Valle	Wall	Pro	ocesses	E]	Etc.	
	Hiked in	to site	from	old	block; trail ri	bbone	with p	ink fla	gging tap	e.															
ii)	The 152	mm lo	ng D	V wa	s identified as	a spen	t male.	1																	
	Site mair	ly cob	ble-r	iffle	with some rut	and f	ats alon	g the r	nargin.																

Edited by

Date Y M D

CP

97/11/26

Two pools in site associated with LOD.

(local) Tenas Creek

Stream Name

(gaz) Tenas Creek

Access ATV/FT Method

Wat	ershed C	ode	460-42	27-096-	049								_				ReachNo.	1	Lngth(km)	_	9.	1	
Loc	tion	Mid s	ection of T	enas C.	st ou	tiet of s	mali be	ever po	ond.			Map#	093	L065			SiteNo.	T4	LthSurv(m	_	3	3	
												U.T.M.					FishCard	Y N	C	Field	X	Hist	t
Date	Y.M.D		9 7 0	9 1	9	Time	130	0	Agency	C87	Crew	RD/GM		Photos	B3/1	1, 12	2 AirPhotos				-		
			PARAME	TER		V/	LUE		METH			-	SPI	ECIFIC	DA	ΓÄ				OBS	TRUC	TIONS	5
COLUMN TO SERVICE SE	Ave. Cha	ın. Wi	dth (m)				11.9			10.9,	12.7, 11.	1, 13.0								TO!	Ht(m)	Туре	Loc'n
							9.3			9.0, 9	.8, 9.4, 9	.1 +alm	n² al-	cove an	ea.								
		Mid section of Tenas C. at outlet of small beaver pond.																					
		Mid section of Tenas C. at outlet of small beaver pond.															44.67						
		Mid section of Tenas C. at outlet of small beaver pond.														KS					\vdash		
		Mid section of Tenas C. at outlet of small beaver pond. Map # 093L065 SaeNo. T4														able T		-		\vdash			
	% Pool	Mid section of Tenas C. at outlet of small beaver pond.																Н					
	Side Chai	Mid section of Tenas C. at outlet of small beaver pond.														_				Щ			
	D-1-1-	Mid section of Tenas C. at outlet of small beaver pond.														EN CO				N/A			
	Debris	Mid section of Tenas C. at outlet of small beaver pond. Wap # 0931.065 SaeNo. T4 L.														0-2	5 5-1			I/A			
	COVE	M.D 9 7 0 9 1 9 Time 1300 Agency C87 Crew RD/GM Photos B3/11, 12 AirPhotos														Dry	L M	<u>) н</u>	Flo	od			
	Comp.	Dp.Poo	l L.O.D.	Bould	ler	ln∨eg	Over	Veg	Cutbank			boulder(>256	Bmm)			10	Flood Signs	Ht(m)	0.6 Bra	ided	Y		
	sum 100%	6	10	80				5	5		Bedrock						Bars (%)	10	pH	7.2	O ₂ (pp	om)	
	Crown Clo	sure %	6				Aspec	t t		海线	D90(cm)	25	Com	paction	LM	0	WaterTemp	(C) 7.5	Turb(cm) cl	Cond(2	25C)	100
						-	DISC	HARGE			/50	13						REA	CH SYM	BOL			
	Para	meter		Value		Meth	nod			Spec	ific Data	3							(Frsh)				
雅	Wetted V	Vidth (m)					Estima	ited 20 c	.f.s. di	scharge.												
	Mean De	Area% 0														\neg							.
		M.D 9 7 0 9 1 9 Time 1300 Agency C87 Crew RD/GM Photos PARAMETER VALUE METH SPECIFIC																					
		M.D 9 7 0 9 1 9 Time 1300 Agency C87 Crew RD/GM Photos B3/11, 12 AirPin														(Width:Valley/Chan	vel Slope)	,			BedMat	enat	
a Cinera		10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 11.1, 13.0 10.9, 12.7, 12.1, 12.7, 12.1, 12.7, 12.1, 12.7, 12.1, 12.7, 12.1, 12.7, 12.1, 12.7, 12.1, 12.7, 12.1, 12.7, 12.1, 12.7																					
		Wet_Width (m)																					
		Max.Pool Depth (cm) 30 28, 32															_						
C	Species	Description Park															_			R			
	SST	D 9 7 0 9 1 9 Time 1300 Agency C87 Crew RD/GM Photos B3/11, 12 As/Photos PARAMETER VALUE METH SPECIFIC DATA														_							
	SST	D 9 7 0 9 1 9 Time 1300 Agency C87 Crew RD/GM Physics B3/11, 12 ArPhotos PARAMETER VALUE METH SPECIFIC DATA																					
	CHAR	Mild section of Tenas C. at outlet of small beaver pond. Map # 0931.065 Stato. T4																					
7	DV	PARAMETER																					
		\Box		\dashv				\neg	•														
	The char	frv we	ere a mix o	of DV an	d BT.			\top	•														
		1						\top	•														\neg
				+									_										_
4.6		\vdash				\vdash		-	•														\dashv
		\vdash		+		\vdash		+	•														\dashv
						II		—			COMM	ENTS											
	0	04-1:	14.	D-r :	_								_	D:			□ Ve"	W Mell D-		_		Eta	
]					****			-				- Longeria	y vvali Pr	cesses			Etc.	
	Hiked in	from /	ATV road	on old c	utblo	ck. AT	V could	not be	used du	e to th	e abund	ance of tre	es/sl	rubs o	n the	blo	ck.						
	Mainly b	oulder	-riffle hat	itat wit	som	e run a	nd 2 sm	all edge	e pools.														
艦	Alcove at	base o	of seepage	outlet f	om ti	he beav	er pond	was al	so samp	led.													
	Excellent	fry ha	bitat sect	on in th	e side	channe	ıl.																
2500																							
77.																							
1									_		- · · · · - · ·												
													-,						Edr	ted by:	СР		

Stre	am Nam	ne	(ga	z) Te	enas Cr	eek						(local)	Tenas Cr	eek					Acces	55	FT	Meth	bod
Wat	ershed (Code		460-4	227-096	5-049											ReachNo.	2	Lngth(km)	14	1.2	
Loca	ation	Upp	er Te	enas C	.; hike	d down	from	block.	Just u/s	from 19	97		Map#	093L054			SiteNo.	T3	LihSur	rv(m)	4	4.1	
		peri	phyto	on site									U.T.M.				FishCard	(D)	4	C Fie	Hd 🗶	His	st.
Date	Y.M.C)	9	7 (9	1 7	Time	11	00	Agency	C87	Crew	RD/GM/	CP Photos	B3/5,	6	AirPhotos	-					
G		_	PA	RAME	TER		V	ALUE		METH				SPECIFIC	CDATA	1				ОВ	STRUC	HON	S
****	Ave. Ch	nan. W	/ldth	(m)				10.8			12.3,	12.2, 10	.5, 9.8, 9.1							i.C	Ht(m)	Туре	Loc'n
-	Ave. W	_	_	-				5.7			6.2,	5.5, 5.9,	5.8, 5.1							100	6		
Shaw.	Ave.Ma	_	_	_	cm)	=		30			30, 2	8,31								100			
Miles San	Ave.Ma		_	-				33			33, 3									- 65	1		
This Park	Gradier			-				3			C	BE	D MATER	IAL	%	C	BAN	KS		25	1		
1015	% Pool	T		Riffle	90	Run	10	Other	TT		22.00	Fines	ciay,sitt,san	d (<2mm)		5	Height(m)	2.5 %Uns	table	303	100		
(ib)	Side Chi	an.%			01	0-10	10-	40	>40		200	Gravels	small (2-16	imm)		10	Texture	F G	L R	Fine	No.		
20	The Device	Area	4		0	0-53	_	15	>15		MILE		large (16-6	4mm)		10	Confinemen	t	EN	CO FC	000	UC	N/A
KARS.	Debris	Stat	_			-		nr			-		sm. cobble	(64-128mm)	1 2	0	Valley:Char	nel Ratio	0-2	(-5) 5	-10 1	0+ 1	N/A
Meter	COV	ER: To	otal	6				70	_			Larges	kre. cobble	(128-256mm)	1 3	5	Stag	9	Dry	L (H (N	Flo	bod
のサ	Comp.	Dp.Pc		L.O.D.	Box	ulder	inVeg	_	rVeg	Cutbank	anes	-	boulder(>2		-	0	Flood Signs		-	Braided	TY		(M)
	sum 100	- 1	701	5	9		mvog	1	5	Cuidania	100	Bedrock	1		-	19	Bars (%)	20	pH	7.7	02(0	_	
Chest.	Crown C	_	94	T	5		C	Aspe	_		SHOULD BE SHOULD	D90(cm)	40 C	Compaction	1. 46	5	WaterTemp		100		10,500	_	90
100	CIOWITO	iosure	70	_		_	1,675	-	HARG	-	Henen	/50	24	Touritain	1	4			-	MBOL	12.00		1
200	Das	amete		-	Val		Met		T	_	Sne	cific Dat				+			7777,77	ish)			
Post No.	Wetted	-0.11-0.1	_	_	Vai	ue	IVIC	1100	Unner	Tenas (_	-	1							
Chief.	Mean D		(,		-	-		-	Оррен	Тепиз	, at u	louerate	nows.	_		1	-	_					7
960	Mean V	1,000	-	=1	-	-			-	_					_	-							
1500 1600	Dischar	_	_	3/	-	_		_		_		-				-	Acth Valley/Chan	nal Sional				BedMa	
1000	Dischar	ge (m.	315)													14	NOUI. Valley/Chan	ret, arope)				Decwa	atterial.

		FISH SUMMA	ARY			STREAM/VALLEY CROSS-SECTION
Species	No.	Size Range(mm)	Life Phase	Use Me	thod/Ref	L (Looking Downstream) R
SST	Г 9	28-36	F	R	EF	PLANIMETRIC VIEW
SST	r 2	98-183	J	R	EF	
CHA	R 11	41-53	F	R	EF	
DV	1 19	67-122	J	R	EF	
DV	1	171	A	S	EF	
The 17	71 mm l	ong DV was ide	ntified as	a ripe r	nale.	-
All bu	t 3 char	fry were ident	ified as B	Г.		
	24 115		11 -			
1						T
						COMMENTS
Chan	nnel Stal	pility D	ebris	M	anagemen	t Concerns Obstructions Riparian Zone Valley Wall Processes Etc.
In san	ne gener	al area as 1984	site but a	a new	location.	
Heavy	y rain ca	used flow/turbi	dity to inc	rease d	uring samp	pling.
	nainly ri	ffle with a smal	section (5-10%) of run. P	Pools were to deep/turbid to sample.
Site m						
Site m						
Site m				-		
Site m						
Site m						
Site m						
Site m						
Site m						Edited by CP

Stre	am Nam	(g	az) T	enas (Creek						(local)	Tenas Cr	eek						Acces	ss	F	N	Method
Wat	ershed (Code	460-	4227-0	96-049											ReachNo.		3	Lngth(km)		2.6	
-00	ation	Upper	Tenas (C.; -7	0 m u/s i	n the V	est for	k.				Map#	093L054			SteNo.	1	6	LthSur	v(m)		24	10
				-								U.T.M.				FishCard	O) N		C	Field	X	Hist.
at	Y.M.D		9 7	0 9	1 8	Time	11	00	Agency	C87	Crew	RD/CP/G	M Photos	B3/7	, 8	AirPhotos							
Ci		P	ARAM	ETER		V	ALUE		METH		7		SPECIFI	C DAT	Α					0	BST	RUCT	IONS
器	Ave. Ch	an. Wid	th (m)				8.4			12,3,	7.3, 7.7,	6.3								300	C	tt(m) T	ype Loc
	Ave. We	t. Width	h (m)				4.4			3.0, 3	.4, 5.8,	5.5								1626	76	< 1	
雞	Ave.Ma	x.Riffle	Depth	(cm)			14			15, 1	8, 9									100	5		1/
論	Ave.Ma	x.Pool D	Depth (cm)			46		1	31,5	6, 50									200			
階	Gradien	it %				100	3			C	BE	D MATER	IAL	9/	0	BA	NKS			910	1		
磷	% Pool	15	Rime	8	0 Run	5	Other	TT			Fines	clay,silt,san	d (<2mm)		5	Height(m)	0.5	%Unst	able	0	3		
1	Side Cha	n.%		0	0-10	10-	40	>40		100	Gravels	small (2-16	mm)		5	Texture	F	G)L	R	185			Tr.
		Area%		0	0-5	5-	15	>15		510		large (16-64	(mm)		20	Confinem	ent		EN	co i	FC (6C) U	JC N/A
	Debris	Stable	%	27 -			70			(200		sm. cobble	(64-128mm)		40	Valley:Ch	annel Ra	tio	0-2	2-5	5 10	104	+ N/A
¥	COVE	R: Tota	1%				90			國國	Larges	ige, cobble	(128-256mm)		20	Sta	ge		Dry	L	M) н	Flood
B	Comp.	Dp.Pool	L.O.D	В	oulder	InVeg	Ove	rVeg	Cutbank	200	-	boulder(>25	6mm)		10	Flood Sig	ns Ht(m)		0.3	Braided	-	Y	(A)
28	sum 100	%	10		60			30		1000	Bedrock				1	Bars (%)	1	20	pH	7.5	5 (O ₂ (ppr	n)
Ž.	Crown C	losure %			15	C	Aspe	ect		100	D90(cm)	28 C	Compaction	LO	H	WaterTen	np(C)	4.5	Turb	cm)	80	Cond(25	(c) 9
6.49							DISC	HARG	E	_	/50	7						REA	CH S	мво	L		
12	Para	ameter		V	alue	Met	hod			Spec	cific Dat	а			\neg				(#	ish)			
100	Wetted	Width (m	n)	1				Tena	s C. at me	derat	e to low	flows.											
¥.	Mean D	epth (m))		-											_							
Mean Velocity (m/s)														7									
1	Discharge (m3/s)										-					Mdth Valley/Chu	nnal Sinn					B	edMaterial

		0	FISH SUMM	ARY			STREAM/VALLEY CROSS-SECTION
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L (Looking Downstream) R
H	RB	7	33-36	F	R	EF	PLANIMETRIC VIEW
	RB	5	89-98	J	R	EF	
08	CHAR	5	36-49	F	R	EF	
10	DV	15	70-143	J	R	EF	
-9							E i
38		10					
À.	Char fry	were	identified as D	V except	the la	argest	
	fry which	was	a BT.	1000			
	1.00	144		1,			
原				-			
NO F							COMMENTS
	Channe	Stab	oility 🔲 D	ebris 🗶		Managemen	t Concerns Obstructions Riparian Zone Valley Wall Processes Etc.
(in)	Complex	site c	onsisting of rif	fle, 2 pool	s, sn	all debris alo	ng the margins, and a small trickle side channel suitable for fry.
0.0	Bed mate	erial i	s primarily cot	ble; very	limi	ted potential	spawning in lower 100 m.
ON B							
13							
13	2						
囱							
1							
いい場合							
							Edited by: CP

tream Nam	ne (g	az) Te	nas Creek					(local)	Tenas C	reek					Access	5 1	T	Method
Vatershed (Code	460-42	27-096-049										ReschNo.	1	Lngth(kr	m)	2.	5
ocation	Upper	Tenas Ci	reek, ~100 m	w/s in th	e East f	fork			Map#	093L054			SiteNo.	T5	LIhSurv	(m)	3:	3
	1								U.T.M.				FishCard	(D)	N C	Fiel	dX	Hist.
ate Y.M.D		9 7 0	9 1 8	Time	1130	D Age	ency	C87 Crew	RD/GM/	CP Photos	B3/9, 1	0	AirPhotos				7	
C		ARAME		V	ALUE	ME	TH			SPECIFIC	DATA					OBS	TRUC	TONS
	nan. Wid	_			12.5		_	17.8, 12.1, 12	4, 10.8, 9,	5				-		C.	Ht(m)	Type Loc
200	et. Width				4.1		=	5.5, 3.9, 4.1, 3								Feb.	1.0	X 0
1000	x.Riffle		em)	-	24			27, 25, 19								100 No.	Locat	ed at the
-	x.Pool D				41			52, 29								(Crix	mout	n of the
Gradier					4-5			-	MATER	IAL	%	C	BANI	(S	_	- (E)	East	ork.
% Pool	20	Riffie	75 Run	5	Other			Fines	ciay,sit,sar		1 5	-	-	1.5 %	stable	186		
Side Chi	_	T		10-4	_	40		Graveis	small (2-16		15	128		FG	-	經驗		
The Control of the Co	Area%	++	0 0-5	-		15 🗌		Ge st	large (16-6		-	E	Confinement		-	O FC	60	UC N/A
Debris	Stable	4	0.05	3-1	20	10_	-	E STATE OF THE STA		(84-128mm)	1 20	E51	Valley:Chann	al Patio	_	_		+ N/A
269	ER: Tota				70		_	Larges		(128-256mm)	40	952	Stage		Dry	L	_	Flood
Comp.	Dp.Pool	L.O.D.	Boulder	InVeg	OverV	/00 00	bank	F150	boulder(>2		20	-	Flood Signs	Ht(m)	1	Braided	Y	(N)
sum 100		20	65	mvey	Sverv	Cui	Julik.	Bedrock	J-000001(72	- Line	1 20	35	Bars (%)	30	pH	7.4	O ₂ (pp	_
	losure %	1 20	0.5	C	Aspec		-	D90(cm)	40 0	Compaction	LO	92	WaterTemp(_	_	_	Cond(2	_
Cidwii C	iosule 75	_		60.50		HARGE	_	/50	16	Compación	1-6	Shi	water remp(ACH SY		Condi	30/ 12
Pan	ameter	_	Value	Met		TARGE	_	Specific Data	_			1		N.E.	(Fis			
100	Width (m		value	Met	-	F-6					-	1						
	epth (m)	_	-	-		Estimated	3-0	c.f.s. discharg		-	_	1	-		- 1		-	-
-	elocity (r	_		-			-					1						
	ge (m3/s	_		-			_					١	dth: Valley/Channe	Garage.	- 1			BedMaterial
	F	ISH SUM	MARY	_			_		S	TREAM/VA				N	=	_	-	_
C Species	No. Si	ze Range(r	_	-	ethod/Ref	L				(L00)	king Downs	stream	n)					R
CHAR	5	31-51	F	R	EF	100			P	LANIMETRI	C VIEW	1						_
DV	2	77-144	J	R	EF													
BT	1	197	J	R	EF	_												100
	1					-												
The 3 la	rgest fry	were ide	ntified as BT			-												_
9	+			11		-												-
					-	-	_					_						
100	1	_																
0				П		-												-
						=												-
						E												-
						ŧ		COMM										7
	el Stabilit		Debris _			ment Cond	erns		IENTS structions	X Ripa	rian Zon	ne 2	(Valle	y Wall i	Processe	s [Etc.
Large g	ravel slui	np prese	nt along rive	r left sid	de of site	e.		Ob	structions	X Ripa	rian Zon	ne 🏖	V alle	y Wall i	Processe	s		Etc.
Large g	ravel slui	np prese	nt along rive	r left sid	de of site	e.			structions	X Ripa	rian Zon	ne 2	V alle	y Wall I	Processe	s [Etc.
Large g	ravel slui boulder-	np prese riffle wit	nt along rive	r left sic LOD ha	de of site	e.		Ob	structions	X Ripa	rian Zon	ne 2	Valle	y Wall i	Processe	s		Etc.
Large g Mainly Dynami	ravel slui boulder-i ic creek w	np prese riffle wit	nt along rive h some pool/ ntial to move	r left sic LOD ha debris.	de of site	e. Creek quite	stee	Ob	structions habitat.	X Ripa	rian Zon	ne 2	√ Valle	y Wall i	Processe	s [Etc.

Edited by

Date Y M D

CP

97/11/26

(local) Tenas Creek Tributary TN31

Access

V2

Method

97/11/26

Date Y M D

Stream Name

(gaz) Tenas Creek Tributary TN31

Wat	ershed C	ode		460-	1227-	096 -	-049													R	eachNo.	2		Lngth((km)		1.8		
Loca	tion	Site	locat	ed in	upp	er re	ach of	Tri	buta	ry TN3	31 alor	g cutblo	ck.		Map#	093	L055			s	ăeNo.	T7		LthSu	rv(m)		100)	
															U.T.M.					Fi	ishCard	Υ	Ø)	Ç.	Field	X	Hist	. 🗍
Date	Y.M.D		9	7	1 0	1	4	Tim	10	1200)	Agency	C87	Crew	RD/DA		Photos	A3 /1	13, 1	4 Ai	irPhotos	L							\neg
0			PA	RAM	ETE	₹			VAI	LUE		METH				SP	ECIFIC	DA.	ГА							DBST	RUCT	IONS	
	Ave. Ch	an. W	/Idth	(m)						0.6			0.6, 0	.8, 0.4											100	5	Ht(m) T	ype l	Loc'n
	Ave. We	t Wie	dth ((m)						0.6			0.6, 0	.8, 0.4														П	\neg
瓣	Ave.Max	.Riffl	e De	epth	(cm)					12																		П	\neg
Carrier .	Ave.Max	.Poo	l De	pth (cm)					35																			
200	Gradien	t %						L		1.5			C.	BEI	MATERI	AL		9	6	C	BAN	KS							
-	% Pool	1:	5	Riffie	-	_	Run	8	10	Other			4	Fines	clay,silt,sand	(<2	mm)	Ш	80	H	leight(m)	0.3 %			0	嬔	\rightarrow	_	
464-465	Side Cha	n.%		Ц	0[X 0	-10[] 1	0-40	□ ×	40			Gravels	small (2-16r	mm)			10	鑿工	exture	F)G	L	R					
		Areas	4	Ш	0[0-5	1 !	5 -15	□ >¹	15[]		總額		large (16-84	mm)			10	籱c	onfinemen	ıt		EN	СО	FC	0C (IC)	N/A
	Debris	Stat	ole%							99					sm. cobbie (84-12	!8mm)			₩ v	alley:Chan	nel Ratio		0-2	2-5	5-1	0 10	F) N	/A
纖	COVE	R: To								40			1000	Larges	ige. cobble (128-2	(56mm)				Stage	9		Dry	L	3) H	Floo	_
	Comp.	Dp.Po	1 1				der	InVe	g	OverV	eg	Cutbank	聯級		boulder(>25	8mm)				F	lood Signs	Ht(m)		0.1	Braide	d]	Υ	•	
Sept. Company	sum 100	2	0	20				L		10	0	50	持续	Bedrock						B	ars (%)			pН	7.	4	O ₂ (ppr	n)	
PROTECTION OF	Crown Clo	osure	%					C		Aspect	t .		瓣	D90(cm)	3 C	Соп	npaction	Õ	н	×	VaterTemp	(C) 3	3.0	Turb((cm)	cl	Cond(25	ic)	50
										DISCH	ARG											R	EAC	CH SY		L			\neg
	Para	mete	r		\	/alu	e	N	letho	od			Spec	cific Data	1									(F	Fish)				
	Wetted V	Vidth	(m)								Estima	ted 1.5 c	.f.s. d	ischarge															
	Mean De	epth (m)																										ļ
and-thick	Mean Ve	locity	(m/	s)				L																					1
1	Discharg	e (m	3/s)																	(Width:\	Valley/Charr	nel,Slope)					8	edMate	irial .
																													_
-			FIS	H SL	мм	ARV	,	-			_				ST	DEA	MA/AI	I EV	CB	088	-SECTIO	ON	_	_					
C.	Species	No.	1	Range		_	Phase	l lea	Meth	M/Peti	\dashv	L			3,	NL,	(Looki				-35011	ON						R	ı
			1	·······································	(Jane	1		-30	1		\dashv	-			PI	ANII	METRIC	: VII	=w					~~~				11	
						\vdash		\vdash	+-		+							- • • •										-	\dashv
		1				 - 		-	 		+																	-	\dashv
340			NO	CAT	CH.	\vdash		\vdash	\vdash		+	•																-	\dashv
*			1			Н		\vdash	\vdash		+	•																-	\dashv
a E						 			†		+	•																-	\dashv
12.0						1		Ι	1		\top	•																-	\dashv
			_			-		\vdash			\top																		\dashv
						\vdash		Н			+	•																-	\dashv
								-			+	•																-	-
								_	٠					сомм	ENTS								_						ᅱ
1000	Channel	Stab	ility	X		ebri	s 🗀		Mai	nagem	ent Co	ncems	$\overline{}$		tructions	_	Ripari	an Z	one	X	Valle	y Wall	Pro	cesse	es	_	E	tc.	\dashv
3.4	Small, st		<u> </u>	radio	nt, n	еап	dering	cre	_				ks.													1400-			ᅱ
Sec. 2.	No spawr													d/silt.															ヿ
	Crack is	huffer	od o		h eid	e fre	m na		thlac	·ke																		-	ヿ

											511	CEAN	SUK	EY FOR	IVI	_		_			_	_	_	-	_	-
Str	am Name	е	(ga	z) B	ulkl	ley P	liver						(local)	Bulkley l	River						Acces	55	BO	AT M	ethod	
Wa	tershed C	od	e	460															ReachNo.	6	Lngth(km)				•
Loc	ation	В	ulkle	River	m	argir	n site, -	- 100 m	d/s	from H	abert Cree	k		Map #	093L0	065			SiteNo.	B1	LthSur			20		
		n	outh.											U.T.M.					FishCard	0	N	C	Field	X	Hist.]
Dat	e Y.M.D		9	7	1	0 0	0 2	Time	1	1100	Agency	C87	Crew	RD/CP	/DA Pr	hotos	B4/15,	16	AirPhotos							
C			PA	RAME	TE	R	-	V	ALU	E	METH				SPEC	CIFIC	DATA						DBST	RUCTI	ONS	
123	Ave. Ch	hed Code 460 Bulkley River ma mouth. Y.M.D 9 7 1 0 PARAMETE e. Chan. Width (m) e. Wet. Width (m) e. Max.Run Depth (cm) e. Max.Pool Depth (cm) adient % fool Rime ie Chan.% 0 Stable% COVER: Total% mp. Dp.Pool LO.D. in 100%							10	ю	1	80, 1	20, 100,	100 - CW	s calcul	ated f	from air	pho	oto.				C	Ht(m) Ty	pe Loc	n
	Ave. We	mouth. Y.M.D 9 7 1 0 PARAMETER Ye. Chan. Width (m) Ye. Wet. Width (m) Ye.Max.Run Depth (cm) Ye.Max.Pool Depth (cm)							5.	3		2.4,	4.6, 6.5,	6.7, 7.2, 4.1	(Enclo	sed si	te only.)									
報	Ave.Max	PARAMETER ve. Chan. Width (m) ve. Wet. Width (m) ve.Max.Run Depth (cm) ve.Max.Pool Depth (cm) radient % Pool Rume de Chan.% 0 X stable% COVER: Total%						-4	4		45, 5	2,36														
88	Ave.Max	k.P	ool D	epth (cm)			n	a		-		_									感			
	stershed Code cation Bulkley River is mouth. te Y.M.D 9 7 1 PARAMET Ave. Chan. Width (m) Ave. Wet. Width (m) Ave.Max.Run Depth (cr. Ave.Max.Pool Depth (cr. Gradient % Side Chan.% Debris Stable% COVER: Total% Comp. Dp.Pool LO.D. sum 100% Crown Closure % Parameter Wetted Width (m) Mean Depth (m) Mean Velocity (m/s)				165	- 1			C	BE	D MATER	IAL		%	C.	BAN	IKS						Ī			
100	Ave.Max.Pool Depth Gradient % % Pool Rim Side Chan.%		Riffie	T	T	Run	100	Oth	or		100	Fines	clay,sit,san	nd (<2mm	1)	5	座	Height(m)	3.0 %	instable	0	in a				
008	% Pool Rim			II	0	X	0-10	10-4	10	>40		能出	Graveis	small (2-16	imm)		15	邀	Texture	FIG	L R		- 374			Ī
23	-	A	rea%		0	X	0-5	5-1	15	>15	1	80.38		large (16-6	4mm)		4.60	鹽	Confinemen	nt	EN	co.	FC)	oc u	C N/A	ī
	Debris	1	Stable	%					n	я		STATE OF		sm. cobble	(64-128m	ım)	30	影	Valley:Char	nel Ratio	0-2	(-5)	5-10	0 10+	N/A	Ī
The state of	COVE	R:	Tota	1%					4	0		4 10	Larges	ige, cobble	(128-256)	mm)	40	205	Stage	9	Dry	0	М	н	Flood	_
560	Comp.	D	p.Pool	LO.D.	T	Bou	ulder	InVeg	To	verVeg	Cutbank	60		boulder(>25	56mm)		10	識	Flood Signs	Ht(m)	2.0	Braide	d	Y	(V)	ī
	10000	6			1	1	100					國際	Bedrock					幽	Bars (%)	5	pH	7.	4	O ₂ (ppm	1)	
	Crown Clo	osu	re %		_	0		Curcon	As	pect		100	D90(cm)	30 C	Compa	ction	LOOH	施	WaterTemp	(C) 8.	0 Turb(cm)	cl	Cond(25)	c) 11	0
13	Crown Closure %						DIS	SCHAR	GE		/50	12						RI	EACH	SYME	OL			_		
800	Wetted Width (m)			ue	Met	hod			Spe	cific Da	ta							(F	ish)							
100															1											
(6)					1										1											
j(C)	Mean Ve	eloc	city (m	1/s)						11								1								
	Discharge (m3/s)																me	to:Valley/Chan	nel Sinne)				В	edMaterial		

			FISH SUMM	ARY			STREAM/VALLEY CROSS-SECTION	
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L (Looking Downstream)	R
	SST	36	33-59	F	R	EF	PLANIMETRIC VIEW	
P	SST	3	71-74	J	R	EF		
	СН	46	44-70	F	R	EF		
鳩	LNC	1	37	F	R	EF		
Ē					. 7			
93								
욕								
S.								
							COMMENTS	
	Channe	Stat	oility D	ebris 🗌		Managemen	Concerns Obstructions Riparian Zone Valley Wall Proce	sses Etc.
18	Similar I	ocatio	on to 1984; di	rections de	scrib	ed 1984 site	be 100 m d/s from Hubert Creek mouth, but rock outcrop (site description) is	
	~1 km d/	s.						
Ħ	Slow, fla	t, run	habitat with o	obble bed	mate	erial.		
200								
_								
		_						
門を以								
医足丛髓								
6 日以禮職								Exited by CP

										STR		SURV	EY FORM	A											
Stre	am Name		(gaz) Bu	lkley	River							Bulkley R							Acces	ss	ВО	AT N	letho	d
	ershed Co		4	160													ReachN	o.	6	i_ngth(km)				\neg
_	tion	_	klev l	River	mare	gin site, 1	00 m d	s from	rock or	itcrop			Map#	093L06	55		SiteNo.	\neg	B2	LinSur	V(m)		23		П
				R rip									U.T.M.				FishCar		Y (N)	C	Field	X	Hist	
Date	Y.M.D		9	7	T T		Time	130	0	Agency	C87	Crew	RD/CP/	DA Pho	otas	B4 /1	7 AlrPhot	s							
Co			PAR	AME	TER		V	LUE		METH				SPECI	FIC D	ATA						OBST	RUCT	IONS	
	Ave. Cha	n. V	Vldth	(m)				100			80, 12	20, 100, 1	100 - CW's	calcula	ted fr	om air	photo.					C	Ht(m) 1	ype L	.oc'n
	Ave. Wet	. WI	dth (m)				3,0			2.6, 3	.4, 4.2, 4	.4, 2.2, 1.0	(Enclos	ed site	only.))								
	Ave.Max	Rur	Dep	th (cı	m)			60			60, 54	, 66													
	Ave.Max	Poc	ol De	pth (c	m)			na			-														
	Gradient	%						1			数	BEC	MATER	AL		%	C B	ANK	S			錢			
	% Poci		1	Riffle		Run	100	Other				Fines	clay,silt,sand	j (<2mm)		5	Height(m) 3.	.6 %Ur	nstab le	0				
糯	Side Char	.%			0 🗶	0-10	10-4	⊙ >	40			Gravels	smail (2-16)	mm)		15	Texture	C	FIG	LR					
M.		Area	*	\top	02	0-5	5 -1	5 >	15[]				large (16-84	imm)			Confine	ment		EN	СО	FC	oc ı	IC N	/A
湖	Debris	Sta	able%	,				na					sm. cobble (64-128mn	1)	25	Valley:0	Channel	Ratio	0-2	(-5	5-10	0 10-	⊦ N/	Α
	COVE	R: T	otal%	6				65				Larges	ige. cobble (128-258m	m)	45	≨ s	tage		Dry	<u> </u>	M	н	Floo	ď
1	Comp.	Dp.f	Pool	L.O.D.	В	oulder	InVeg	Over	Veg	Cutbank			boulder(>25	6mm)		10	Flood S	ions Ht	(m)	2.0	Braid	ed	Y	_(D
	sum 100%					100						Bedrock					Bars (%	<u> </u>	5	рН	7	.4	O ₂ (pp	m)	
	Crown Clo	sure	%			0	Ç.	Aspec	t .			D90(cm)	28 🕏	Compac	tion L	MH	WaterT	emp(C)	8.0	Turb	(cm)	cl	Cond(2	ic)	50
纖								DISCI	HARGE			/50	15						RE	ACH :		BOL			
	Parai	nete	er		V	alue	Met	nod			Spec	ific Data	3]			(6	ish)				
	Wetted V	∕idth	(m)																						
	Mean De	pth ((m)						<u></u>																
SE.	Mean Ve	ocit	y (m/:	s)	╙												1								
	Discharg	e (m	3/s)				L		L								(Width:Valley/	Channel, S	Slope)					ed Mete	nai
		_	FISI	H SUN	AMA	RY			\top				ST	REAM/	VALL	EY CF	ROSS-SEC	MOITS		_					
G.	Species	No.	_		_	Life Phase	Use M	rthod/Ref	П	L			•			Downs			-					R	
	SST	4	+	40-47		F	R	EF	4	_			PL	ANIME	TRIC	VIEW				-					
1	СН	3	-	57-58	一	F	R	EF	\top	•										_				-	
24		Г	_		1					•														-	
		Г	Г							•														-	
EŽ.		Г								•														-	_
										_														_	
					\Box																				
- 0.5 - 0.5																									
. 7												COMM	ENTS												
	Channel	Sta	bility		De	ebris 🗀	M	anager	nent C	oncerns		Obs	structions	R	iparia	n Zone	• _ · V	alley	Wall P	roces	ses			Etc.	
	Same loca	tion	as 19	984. F	ish h	abitat no	t as go	od as th	at foun	d at site	B1.														
	Fast and	deep	alon	g oute	r edg	ge of mar	gin site	and me	oderate	flows w	ithin n	nargin s	ite.												

Edited by:

Date Y M D

CP

97/11/

Bed material consists of cobble.

										STR	EAN	SUR	EY FOR	M											
Str	eam Name	((gaz)	Bu	ılkley	River						(local)	Bulkley	Rive	г			_		Acce	ss	BC	TAC	Meth	bod
Wa	tershed Co	ode	4	60										-				ReachNo.	6	Lngth	(km)				
Loc	ation	Bulk	ley F	liver	mar	gin site.			- 3				Map#	09	3L065			SteNo.	B3	LihSu	rv(m)		2	1.5	
													U.T.M.	I				FishCard	0	N	C	Fiel	ld 🗶	His	st.
Dat	e Y.M.D		9	7 1	0	0 2	Time	140	0	Agency	C87	Crew	RD/CP	/DA	Photos	B4/18	, 19	AirPhotos							
如			PAR	AME	TER		V	ALUE	- 54	METH				SF	PECIFIC	DATA						OBS	TRUC	TION	s
日	Ave. Cha	n. W	idth	(m)				100		2.3	80, 1	20, 100,	100 - CW	's cal	culated t	from ai	r ph	oto.				C	Ht(m)	Туре	Loc'n
数	Ave. Wet	. Wid	th (r	n)				3,5			2.7,	4.3, 4.5,	3.6, 3.4, 2.	2 (En	iclosed si	ite only	.)					The second			
鑑	Ave.Max.	Run	Dep	th (c	m)			55			45, 5	7, 64										總			
	Ave.Max.	Pool	Dep	th (c	cm)		1	na			-											が高			
酒	Gradient	%				30		1			C	BE	D MATER	RIAL	Cot.	%	C	BAI	NKS			部			
3	% Pool		R	iffio		Run	100	Other	T ₁		District Control	Fines	clay,sift,sa	nd (<2	2mm)	5	25.0	Height(m)	2.5 %		0			11	
躔	Side Chan	1.%			0		□ 10-	10 >	40		THE REAL PROPERTY.	Gravels	small (2-1	Smm)		5	156 69	Texture	F G)LR		Par.		1	
機能		Area%			02	0-5	5-	15 >	15		25%		large (16-4	Mmm))	10	趣	Confineme	nt	EN	co	FO	ОС	UC	N/A
200	Debris	Stab	le%					na			部級		sm. cobble	(64-1	28mm)	30	機	Valley:Cha	nnel Ratio	0-2	6-5	5-1	10 10	0+ 1	N/A
ST.	COVE	R: To	tal%					70				Larges	ige, cobble	(128-	256mm)	40	麗	Stag	0	Dry	0) M	Н	Flo	od
塞	Comp.	Dp.Po	ol L	O.D.	В	loulder	InVeg	Over	Veg	Cutbank			boulder(>2	56mm	1)	10	機	Flood Sign	s Ht(m)	2.0	Braid	ied	Y		3
爾	sum 100%	20				80					機能	Bedrock			-		搬	Bars (%)	5	pH	7	7.4	O2 (p	pm)	
190	Crown Clo	sure %	6			0	C.	Aspec	t		建图	D90(cm)	27 C	Con	mpaction	Ę.	88	WaterTem	o(C) 8.	5 Turb	(cm)	cl	Cond((25C)	50
las.								DISCI	HARG	E		/50	12						R	EACH		BOL			
	Paran	neter			V	alue	Met	hod			Spec	cific Dat	ta							(Fish)				
	Wetted W	/idth (m)																						7
No. of	Mean De	-																							
100	Mean Vel	ocity	(m/s)													1								
配用	Discharge	e (m3	/s)														CVA	th: Valley/Char	nel Slope)					BedMa	itenal
		F	FISH	SU	AMN	RY			T				S	TRE	AM/VAL	LEY C	ROS	S-SECTI	ON	-	-	_		-	
C	Species	No. S	Size R	ange(r	mm)	Life Phase	Use M	ethod/Ref		L					(Looki	ng Down	stream	n)		-				R	
166	SST	10	- 3	7-54		F	R	EF					P	AN	IMETRIC	VIEW	,			-					

			FISH SUMM	ARY				STREAM/VALLEY CROSS-SECTION	-	
С	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L	(Looking Downstream)	-	R
溪	SST	10	37-54	F	R	EF		PLANIMETRIC VIEW	0	
20	SST	1	70	J	R	EF				
	СН	14	45-66	F	R	EF	E			Ξ
19		+					-			_
100										
		-								
186 (E)		+					-			-
							_			_
SE.								COMMENTS		
総	Channe	Stal	bility _ D	ebris _		Managemer	t Concerns	Obstructions Riparian Zone Valley Wall Pr	rocesses	Etc.
1.00	Approxi	matel	y same location	n as 1984.						
趋	Cobble b	ed m	aterial in a slo	w run sect	tion.					
THE STATE OF										
120	-									
震										
100										
2										
OF RE										
A									Edted by	CP
3									Date Y M D	97/11/

												. 00111	LITOR			_					_			
Stre	am Name		(gaz	:) Bu	lkley	River						(local)	Bulkley I	liver		_				Access	BC	AT	Metho	d
Nati	ershed Co	ode		460													ReachNo.	1 0	6	Logth(km				1
Loca	rtion	Bull	dev	River	marg	in site, 50) m d	/s from	Site B3.				Map #	093L06	5		SiteNo.	В	4	LthSurv(r	n)	2	ı ·	
													U.T.M.				FishCard	(7	7	N G	Fiel	d X	Hist	
204	Y.M.D		9	7 1	0	0 2	Time	Τ,	500	Agency	C87	Crew	RD/CP/	DA Pho	ns R	/20,			_	Įa:	Sal	-		
	1.111.10	.,				<u> </u>				_	C87	Olow	, RD/CI			_	ZZ prani notos				Ope	TRUCT	TONE	_
C		_		SAME.	IER			/ALUI		METH	⊢			SPECI										
	Ave. Cha	n. W	idth	(m)				10	· · · · · · · · · · · · · · · · · · ·		80, 1	120, 100,	100 - CW'	s calculat	ed fron	n air	photo.					Ht(m)	Туре	Loc'n
	Ave. Wet	. Wid	dth (m)				3.0		<u>l</u>	3.0,	4.3, 4.6,	1.3, 3.4, 1.9	(Enclose	d site o	nly.)					***			
	Ave.Max.	Riffi	e De	epth (d	em)			29			25, 3	33									98		1	
	Ave.Max.	Run	Der	oth (cr	n)			41			40,	38, 46												
stock?	Gradient			<u>`</u>				<1				BE	D MATER	IAL	-	%	C BA	NKS			511		\neg	
2274425		<u> </u>		Riffle	5	la	95	Oth		 		Fines	clay,sitt,san		+	5	Height(m)	_	964 In	stable	0			
語の	% Pool	ш	\dashv	rume		Run				-	tree orb	22	+		+-	_	imani.	F	_	L R	383023 6 0		\dashv	
30	Side Char	.%	_	\bot	o 🗶		_	40	>40	ļ		Gravels	small (2-16	mm)		5	Texture	-	٢	_			- 1	
		Area	%		O X	0-5	5 -	-15	>15_				iarge (16-6	4mm)			Confinem	ent		EN C	\sim		uc !	
	Debris	Sta	ble%	•				100		1			sm. cobble	(64-128mm)	30	Valley:Ch	annel Ra	atio	0-2	-5 5-1	10 10	+ N	/A
7.4	COVE	R: To	otal	%				75				Larges	lge, cobble	(128-256mr	Π)	45	Sta	ge		Dry 1	L) M	н	Floo	od
	Comp.	Dp.P	$\overline{}$	L.O.D.	Bo	oulder	InVeg	10	erVeg	Cutbank	Marie		boulder(>2	6mm)		15	Flood Sig	ns Ht(m))	2.0 B	aided	Y	6	5
Section 2	sum 100%	H	-	2.0.0.	-	100		+		-		Bedrock	1			H	Bars (%)	_	5	рН	7.4	O ₂ (pp	m)	_
							Carren	1000 A		+	diam		30 C		1.4	<u></u>	PERMIT		T	+		+		50
	Crown Clo	sure	%)	S	Sept.		<u> </u>	関係	D90(cm)	30	Compact	on L	ЭН	WaterTen	np(C)	8.5			Cond(2	(50)	30
								DIS	CHARG	E		/50	17						RE	ACH S'				
	Parar	nete	г		Va	llue	Me	thod	1		Spe	ecific Dat	a							(PIE	9			
	Wetted V	∕idth	(m)																					
SL) +	Mean De	pth (m)														-			T				
	Mean Ve			/s)	\vdash				+											- 1				
Liver S	Discharge			-	┰		\vdash		 		-						(Width: Valley/Ch	61		1			BedMat	
25	Discriary	3 (1114	3/3/		٠		L										(VIIIO): Valley/Cit	8/1 KI, 3/0	,,,					
_			EIG	H SU	454 A 1	DV							6.	TREAMA	/ALLE	V CE	OSS-SECT	TION						
136			_										3		Looking C			IIO.					R	
·C.	Species	No.	Size	Range(r	nm) [Method/		L							,			_			K	
- 1	SST	23	_	32-53	_	F	R	E	F	_			P	LANIME	TRIC V	IEW				===				
70	SST	6		71-82		J	R	E	F	_														
	СН	26		39-69		F	R	E	F															
										_														
			\vdash							-														
		1	-		\dashv				-+	-														
	<u> </u>	-	-				-		-	-														_
-		ļ	<u> </u>		-1		\vdash																	
			<u> </u>		_		Ц		_	_														
										_														
							Π																	
1.0		•										COMM	ENTS											
07 000	Channel	Stal	nility	::	De	bris :		Mana	ement (oncerns			structions	R	parian	Zone	Va	iley W	ali P	rocessi	s		Etc.	
PORT.			_																					
32.14	Approxim				ation	as 1784.																		
	Slow, run																							
	Cobble b	ed m	ateri	al.													 .							
1	Good CH	and	SST	parr	rearii	ng habita	t. M	oderat	habitat	for larg	e par	r.												
SE ST	Good fry																							
	3000 117					5-11																		
相談									·····															-
Note																								

Edited by: CP

Date Y M D

											STR	EAN	SU	RV	EY FOR	M													
Str	am Name		(ga	z) Fo	ur C	reek							(loc	al)	Four Cre	ek								Acc	æ55	1	/2	Metho	bd
Wa	tershed C	ode		460-4	227-0	96-256														F	ReachNo.	2		Lngt	h(km)		2	.0	
Loc	ation	Fo	ur C	reek, ~	30-40	m d/s fi	om T	elk	wa Coal	Mine	Road.				Map#	093	3L065			5	SkeNo.	F	1	Lths	iurv(m)		15	5.0	
													- 8		U.T.M.					F	ishCard	Y	7	N	Gill	Fiel	d X	His	
Dat	Y.M.D		9	7 0	9	2 9	Time		1130	-	Agency	C87	Cn	ew	CP/D	A	Photos	A2/3-	; B4	5-7 A	LirPhotos								
C			PA	RAME	TER			VA	LUE		METH					SP	ECIFIC	DAT	Α							OBS	TRUC	TIONS	5
9	Ave. Cha	an. V	Nidt	h (m)					4.5			3.0,	3,9, 6	.9, 5	.9, 4.2, 3.0							~				C	Ht(m)	Туре	Loc'n
29	Ave. We	t. W	idth	(m)					1.2			0.5,	1.7, 1	.5												1			
13	Ave.Max	.Rif	fle D	epth ((cm)				14			15, 1	4, 12													表数			
	Ave.Max	.Po	ol De	epth (c	cm)	- 74			25		- n	32, 2	20, 23																1.5
5%	Gradlent	1 %							8	-21	1	'C			MATER	IAL		%		C	BAI	NKS			· ·	连续			
250	% Pool		15	Riffle	8	5 Run			Other			20.518	Fine	4	clay,sit,san	d (<2	mm)		5	100	Height(m)	1.5	%Un	nstable	0	183			
7 位	Side Char	n.%			00	0-10	10	40	□ >4	0 🗆		265	Grav	reis	small (2-16	_			5	280.00	Texture	$\overline{}$	$\overline{}$			ESTO	-		
2013		Are	a%		o		6 5	-15	□ >1	5		Test test	200	-	large (16-64	4mm)			10	器	Confineme	nt	_	EN	CO	FC	ОС	UC I	WA.
H.S.	Debris	-	able?	6	1	-			10					-	sm. cobble	_	28mm)	-	20	100	/alley:Cha		tio	6-	_)+ N	_
	COVE	R: T	otal	%	_			_	65			STATE OF THE PARTY OF	Larg		ige, cobble (35	1	Stag	_		Dr	_	_			
怪	Comp.	-	Pool	LO.D.	В	oulder	InVeg		OverVe	90	Cutbank	1 min			boulder(>25	_		-	25	聚,	lood Sign			0.4	_	_	Y	_	0
隱	sum 100%	6	5	5		65			10	_	15	Str.	Bedi	rock	179710.	1,000		1		200	Bars (%)	5	0	ph	-	nr	O2 (p	_	_
	Crown Clo	-	%	T		40	C	907,	Aspect			MES	D90	_	35 C	Con	npaction	L(M)	н	2000	VaterTem	(C)	5.0	+	b(cm)	cl	Cond		180
Light St	-				_		district.	98"	DISCH	_		-			1000				_				_	-	SYN	_	_		
	Parar	mete	er		Tv	alue	M	etho			_	Spe	cific	Data	U.	_		_	┪						(Frah)				
AND	Wetted V		_	7			-	-				-					_		┪										
150	Mean De								1	Estims	ted 1 c.	f.s. di	scha	rge.					┪		-		_		T				
100	Mean Ve	locit	y (m	/s)															╛										
157	Discharge	e (m	3/s)																	(Width	Valley/Char	vnet.Slope	1					BedMati	lane
					_			-	_			_	_						_					_					
_					_					_										_									
_			FIS	H SU	AMN	RY	_	_		4					ST	REA					-SECT	ION							
C	Species	No.	Size	Range(r	_	Life Phase	Use	Met	hod/Ref		L						(Look	ing Dov	vnstr	eam)								R	
	SST	4		45-52	-	F	R		EF	-					PL	ANI	METRI	C VIE	W					-					
	DV	2	. 3	166-20	1	A	S/M		EF	_																			
351										+																			
	201 mm I	_	_		_					1																			
(5)	166 mm I	DV w	vas a	matur	e ma	le.				1																			
417		-	-		_			_		-																			
		-	-					_	_	-		_											_						
SER.		-	-					_		1																			
1 - 2	-	-	-					_		1																			
35%																													

COMMENTS

Obstructions X Riparian Zone

Valley Wall Processes

Etc.

97/11/

Management Concerns

Sample site was 30-40 m below the road - below the barrier. Several fry were visually observed just below the barrier.

1.5 m high drop over debris (remnants of old bridge) is present just d/s from road culvert: fish barrier.

Channel Stability

Good cobble-boulder fry cover.

Small pockets of potential DV spawning.

Debris X

Culvert dimensions: 1.9 m diameter by 17.3 m long with ~5% gradient.

													J / 1810E															
		_									STR	EAN	SURV	EY	FORM	<u> </u>												
_	am Name		(gaz	_		reek							(local)	For	ır Cree	k						_		Acce	ss			ethod
Wat	ershed Co	ode		460-42	227-0	096-256								_		_				_	ReachNo.	+	2	Lngth	km)		2.0	
Loc	ation	Fou	r Cr	eek, ~	25 m	w/s from	Tell	cwa	Coal !	line R	load.			Ma	ap#	093	3L065				SiteNo.	+	F2	LthSu	2200000		19.5	
							_	_						U.	T.M.						FishCard	Ľ		D_		Field	18	Hist 🗌
Date	Y.M.D		9	7 0	9	2 9	Time	•	113		Agency	C87	Crew	L	CP/DA	_	Photos		па		AirPhotos				_			
Q			PAF	MAS	TER	l		VA	LUE		METH					SP	ECIFIC	DA.	ſΑ							OBS	TRUCTIO	ONS
	Ave. Cha	n. V	Vidth	(m)					4.1			3.7,	5.2, 3.7, 3	3.6, 4	.3											ic.	Ht(m) Ty	pe Loc'n
	Ave. Wet	. WI	dth ((m)					2.7			2.3,	2.3, 2.9, 3	3.6, 2	.5	_											1.5	x
	Ave.Max.	Riff	le De	epth (cm)		L		25			23, 2	7, 26													鑑	located	d/s of
题	Ave.Max.	Poo	i De	pth (c	m)		_		33			42, 2	20, 29														road cui	vert.
豐	Gradient	%							9		1	C	BE	D M/	ATERI	AL		9	Ó	C	BAI	NKS						\perp
4	% Pool	5	0	Riffie	5	0 Run	L		Other		<u> </u>	634	Fines	clay	silt,send	(<2	(mm)		5	鑿	Height(m)		%Un		5			
類	Side Chan	.%			0.	0-10] 10	0-40	□ >	40_			Gravels	sma	ll (2-16n	nm)			5		Texture	F	(3)	L R		擔		
BY.		Area	1%		0	0-5] 5	-15	□ >	15💢				large	(18-84	mm)			5		Confineme	ent			(60)		oc uc	
	Debris	Sta	ıble%	5					70				RECEIVE	sm.	cobble (64-12	28mm)		10		Valley:Cha	innel R	tatio	(-2)	2-5	5-1	0 10+	N/A
3.29	COVE	₹: T	otai?	6					70				Larges	ige.	cobble (128-2	256mm)		30		Stag	30		Dry	C	M) H F	lood
217	Comp.	Dp.F	Pool	L.O.D.	В	louider	inVe	<u> </u>	Over	/eg	Cutbank	n juris Facebur		boul	der(>256	Bmm))		45	数	Flood Sign	ıs Ht(n	1)	0.6	Braid	ed	Υ	(1)
	sum 100%	1	0	10		70				5	5		Bedrock						\neg		Bars (%)	Т	5	pН	7	.4	O ₂ (ppm)
	Crown Clos	sure	%			60	ð.		Aspec	t			D90(cm)	5:	5 C	Con	mpaction	L@)+		WaterTem	p(C)	5.0	Turb	(cm)	cl	Cond(25C) 180
									DISC	IARG	E		/50	20	0				П				RE/	ACH	SYM	BOL		
	Paran	nete	r		V	alue	М	letho	bd			Spe	cific Data	a					\neg					(1	Fish)			
	Wetted W	lidth	(m)																									
	Mean De	oth (m)							Estim	ated 1-2	c.f.s.	discharg	c.														_
	Mean Vel	ocity	/ (m/	s)							_																	
7.5	Discharge	(m	3/s)																\neg	(Widt	h:Valley/Char	nnel,Sic	pe)				Sec	Material
_																_				_								
g0.00		_	1	H SUN						_					ST	RE/					S-SECT	ION						
	Species	No.	Size	Range(r	mm)	Life Phase	Use	Met	nod/Ref	4	L						(Looki	-		eam,	,							R
			-					L		+	-				PL	ANI	METRIC	C VII	EW									
			-				_	<u> </u>		+	-																	
遗		_			_			<u> </u>		+	-																	
			NO	CATO	н.		\vdash	\vdash		-	-																	
		_	-		-		<u> </u>	-		+	-																	
			-		\dashv		-	-		-	-																	
		_					\vdash	-		+																		
		_	_		\dashv					+	-																	
		_	<u> </u>		_			<u> </u>		+	-																	
			L_					<u> </u>		ㅗ																		
Project STATE													COMM															
STATE OF	Channel	Stat	sility		D	abrie 🟋		Ma	nanen	ant C	oncarne	_	Obs	truc	tions	7	Pinari	an 7	000	-	Vall	AL VA	Iall D		000		E+	_

C,	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	ı	L (Looking Downstream)		R
								PLANIMETRIC VIEW		
							Г			
							Г			
X.			NO CATCH.				Г			
							Г			-
I					Г		Г			
					Г					
							Г			
教育							Г			
7be								COMMENTS		•
773H1781 85							_	ncerns Obstructions X Riparian Zone Valley Wall Process		
	Channel	Stat	bility 🗀 D	ebris 🗶		Managemen	t Co	oncerns Obstructions X Riparian Zone Valley Wall Process	ses :_	Etc.
5075257	-				belov			e the site was spot shocked; no fish were caught or observed.	ses :_	ETC.
	No fish we	re c		2. ~15 m		w and ~15 m a	bov	e the site was spot shocked; no fish were caught or observed.	ses :_	Etc.
	No fish we The ~1.5 r	re c	aught in site Fa gh drop presen	2. ~15 m t t d/s from	the	w and ~15 m a road culvert i	bov s a l	e the site was spot shocked; no fish were caught or observed.	ses :_	Etc.
新疆影響	No fish we The ~1.5 r Boulder-p	re c n his	aught in site Fa gh drop presen	2. ~15 m t d/s from me log ste	the ppin	w and ~15 m a road culvert in g; although s	bov s a l	e the site was spot shocked; no fish were caught or observed. parrier to fish.	ses :_	<u>E</u> Etc.
新疆影響	No fish we The ~1.5 r Boulder-p	re c n his	aught in site F. gh drop presen habitat with so	2. ~15 m t d/s from me log ste	the ppin	w and ~15 m a road culvert in g; although s	bov s a l	e the site was spot shocked; no fish were caught or observed. parrier to fish.	ses :	Etc.
	No fish we The ~1.5 r Boulder-p	re c n his	aught in site F. gh drop presen habitat with so	2. ~15 m t d/s from me log ste	the ppin	w and ~15 m a road culvert in g; although s	bov s a l	e the site was spot shocked; no fish were caught or observed. parrier to fish.	ses :_	etc.
	No fish we The ~1.5 r Boulder-p	re c n his	aught in site F. gh drop presen habitat with so	2. ~15 m t d/s from me log ste	the ppin	w and ~15 m a road culvert in g; although s	bov s a l	e the site was spot shocked; no fish were caught or observed. parrier to fish.	ses :_	Etc.
	No fish we The ~1.5 r Boulder-p	re c n his	aught in site F. gh drop presen habitat with so	2. ~15 m t d/s from me log ste	the ppin	w and ~15 m a road culvert in g; although s	bov s a l	e the site was spot shocked; no fish were caught or observed. parrier to fish.	ses :	Etc.
	No fish we The ~1.5 r Boulder-p	re c n his	aught in site F. gh drop presen habitat with so	2. ~15 m t d/s from me log ste	the ppin	w and ~15 m a road culvert in g; although s	bov s a l	e the site was spot shocked; no fish were caught or observed. parrier to fish.	ses :_	Etc.
	No fish we The ~1.5 r Boulder-p	re c n his	aught in site F. gh drop presen habitat with so	2. ~15 m t d/s from me log ste	the ppin	w and ~15 m a road culvert in g; although s	bov s a l	e the site was spot shocked; no fish were caught or observed. parrier to fish. , appears to be good for parr rearing.	Edited by:	CP Etc.

						ST	REAM	SURV	EY FORM	M						_				
Stream Name	(g	az) Fo	ur Creek					(local)	Four Cree	ek						Acce	SS	F	r A	Method
Vatershed C	ode	460-4	227-096-256											ReachNo.	2	Logith	(km)		2.0)
ocation	Site ca	rd just	ws from Trib	utary 1	, ~600 m	u/s from Tel	kwa		Map #	0931	.065			SiteNo.	F3	LihSu	rv(m)		200	0 .
	Coal N	line Ro	ad.						U.T.M.					FishCard	Y	(N)	S	Field	X	Hist.
ate Y.M.D		9 7 1	0 1 4	Time	1600	Agency	C87	Crew	RD/D/	A F	hotos	A3/15,	16	AirPhotos						
Gi	PA	ARAME	TER	V	ALUE	METH	1			SPE	CIFIC	DATA					C	DBST	RUCT	IONS
Ave. Cha	n. Wid	th (m)		174	2.3		1.9, 2	.7, 2.4									- 1	C	it(m) T	ype Lo
Ave. Wet	Width	1 (m)		-	nr													Mar S	Steep o	d/s.
Ave.Max	Riffle I	Depth (cm)		15		V.										1	Like		
Ave.Max	Pool D	epth (c	cm)		45		NOT	E: BED	MATERL	AL W	AS NO	OT REC	ORI	DED DUE	TO W	ATER'	TURB	IDIT	Y.	
Gradient	%			J.	4-5		#C	BEI	D MATERI	AL		%	C	BAN	IKS					
% Pool	30	Riffle	60 Run	10	Other	III.	機器	Fines	clay,silt,sand	d (<2mi	m)	4 0	際	Height(m)	1.0 %	Jnstable	25	200		1
Side Char	.%		0 2 0-10	10-	40 >4	0_	美	Gravels	small (2-16r	mm)		7	2	Texture	(FOG	L R				11/1
	Area%		0 0-55	5 -	15 >1	5	金		iarge (16-64	mm)			圖	Confinemen	nt	EN	co	FC (oc u	C N
Debris	Stable	%			50		機能		sm. cobble (84-128	mm)		圖	Valley:Char	nel Ratio	6-2	2-5	5-10	104	N/A
COVE	R: Tota	1%			60		學區	Larges	ige. cobble (128-256	Smm)		E	Stag	e	Dry	L	(M)	н	Flood
Comp.	Dp.Pool	L.O.D.	Boulder	InVeg	OverVe	g Cutbani	. Indi		boulder(>256	6mm)			8	Flood Signs	Ht(m)	0.3	Braide	-	Υ	61
sum 100%	10	20	70				All bours	Bedrock					至	Bars (%)	nr	рН	nı	$\overline{}$	O ₂ (ppr	
Crown Clo	sure %			C in	Aspect	-1/4	製造	D90(cm)	nr C	Comp	action	LMO	麗	WaterTemp	(C) n	r Turb	(cm)	_	Cond(25	-
741				-	DISCH	ARGE	To the last		inter.	1			1508			EACH	-	_	-	
Parar	neter	_	Value	Met	hod		Spec	ific Data	a				1		.,	- 15 CAN	Fish)	-		
- Wetted V		1		1,110			Орсс	Anc Dau	-		_	_	1							
Mean De		'/				atimated 6.	7 . 5 . 4	ischara		_		_	1	-	-	_	T	_	_	_
Mean Ve		n/e)				stimated 6-	C.I.S. U	ischarge		-		_	1							
Discharge		_			-			_		_	-	-	1				1			
Discharge	(1113/5			_	_	-		_	-	_			(Widt	h:Valley/Chan	nel,Slope)		_	_	В	e:Materia
	FI	SH SU	MMARY			T			ST	REAM	M/VAL	LEY CF	ROS	S-SECTI	ON	_	_			
C Species	No. Siz	e Range(r	mm) Life Phase	Use M	ethod/Ref	1						ng Downs				-	9			R
									PL	ANIM	ETRIC	VIEW				-				- "
100									1		- 200					_				1
																				-
7-3	NO	OT SAN	IPLED.																	-
6																				-
12						1														-
0.0		-	-		_	-														_
FE2	-			\vdash					_	_	-				_	_	_	-	_	
10.		_		-	_	-														_
100				-	-	-														_
														-						
Siet.								COMM					_					_		
Channel	Stabilit	y X	Debris _	N	lanageme	ent Concern	S	Obs	structions	\equiv	Ripari	an Zone	9	Valle	ey Wall	Proces	ses		F	Etc.
A lot of in	stabilit	y along	banks.																	
Gradient	of 4-5%	at 400	m u/s from ro	ad; gr	avel-cobb	ole and some	potenti	al SST s	spawning is	pres	ent.									
Tributary	1 enter	s Four	C. at 525 m.			7 100														
Gradient	increas	es to 11	% at 900 m at	d then	decrease	s to 4% at 10	000 m;	bed mat	terial is gra	vel ar	nd con	tinues u	/s wi	th the sai	ne grad	ient.				
V90													-		B		_	_		_

CP

97/11/

Edited by Date Y M D

											STR	EAM	SURV	EY FOR	VI												
Stre	am Name		(gaz) F	our (гее	k						(local)	Four Cre	ek							Acce	ss	V	2	Metho	od
Wat	ershed Co	xde	- 4	160-4	1227-	096	-256												ReachN	0.	3	Lngth	(km)		1.	8	
Loca	etion	Fou	r Cre	æk, s	at sec	ond	road	crossi	ng.					Map#	0931	.055			SiteNo.		F4	LthSu	irv(m)		2	5	
					_								,	U.T.M.	<u> </u>				FishCar	1 (Y)	N	C A	Field	X	His	L
Date	Y.M.D		9	7	1 0	0	1	Time	1	600	Agency	C87	Crew	RD/D	A F	Photos	B4/	12, 13	AirPhoto	s							
			PAR	AMI	TEF	<u> </u>		_	/ALU	E	METH				SPE	CIFIC	DAI	`A							RUC	TION	s
	Ave. Cha	n. W	/idth	(m)					2.	4		3.1, 2	2.0, 2.1, 2	2										C	Ht(m)	Туре	Loch
STREET, ST.	Ave. Wet	-							2.	2		-	2.0, 2.0, 2	2.0													
	Ave.Max.			-	<u> </u>				9			8, 10,	, 10														Ш
	Ave.Max.	Poo	l De	oth (cm)				1:	5		14, 1															
Service of	Gradient				_		_	L	1-	2		C	BE	MATER	IAL		%	9	В	ANKS	_		_				
	% Pool	1	0 1	ume		75	Run	5	Oth			熱土	Fines	clay,silt,san	1 (<2m	m)		40	Height(I		%Un		L				
post may	Side Chan	.%	_	4	0 2	_	0-10		40	>40	' 		Gravels	small (2-16	mm)		\Box	10	Texture	(F	(G)	L R	~				Щ
		Area		丄	0		0-5	5.	-15	>15				large (18-6	tmm)		Ц	15	Confine	ment		EN	<u>(co</u>	-	-	UC I	_
攤	Debris	4	ble%					_	9	0		A aa		sm. cobble	64-128	mm)		30		hannel f	Ratio	0-2		5-1	0 10		_
	COVE	₹: T	otai%	<u> </u>					5	0			Larges	lge. cobb le	128-25	6mm)	_	25	S	age		Dry	<u> (</u> L	<u>) M</u>	Н	Floo	_
		Dp.P	\rightarrow	.O.D.	4-	3oui		in∨eg	<u> °</u>	verVeg	Cutbank		<u> </u>	boulder(>25	8mm)		4	15	Flood S	gns Ht(r		0.3	Braid	_	Y	_	DI.
	sum 100%		0	20		6				10			Bedrock	1 1000					Bars (%	<u> </u>	5	pН	•		O ₂ (pr		
	Crown Clos	sure	%	1				S					D90(cm)	28 C	Comp	action	L(M	H A	WaterT	mp(C)	5.5		, ,	_	Cond(2	(5C)	150
					_			· · · · · ·		CHAR	GE		/50	10				4			RE		SYM	BOL			- 1
	Paran		_		+	/alu	18	Me	thod			Spec	cific Data	a				4				,	,				
	Wetted W		<u> </u>		+-			├		 								4	_				_				.
of overdoors	Mean Dep				╁			-		Estir	mated 2 c.f	.s. dis	charge.					4									
	Mean Vel		<u> </u>	5)	╫			 		+								┨.					1				1
	Discharge	(m.	3/5)					L										γ.	Adth:Valley/C	hannel,Si	ope)					BedMet	tenal
	- 1.		FISH	ı su	MM/	\RY	′	_						S1	REAL	M/VAL	LEY	CRO	SS-SEC	TION							
C,	Species	No.	Size F	tange	(mm)	Life	Phase	Use	Aethod/	Ref	L					(Looki	ng Do	wnstrea	m)			-				R	
275	DV			7 11				1		12				DI.	A NUBI	ETO		38/				_	,				

	· · · · · · · · · · · · · · · · · · ·		FISH SUMMA	NRY .	_		Г	STREAM/VALLEY CROSS-SECTION		
d	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	İ	L (Looking Downstream)		R
	DV	6	5 7-115	J	R	EF		PLANIMETRIC VIEW		
が存	NOTE: T	he fi	sh data is the o	ombined	data	for		•		
	sites abov	e an	d below the ros	d; two of	the	six				
	fish were	aug	ht in the enclo	sed site ab	ove	the				
	road.									
					_					
74%					_		L			
							L			
								COMMENTS		
	Channel	Stat	oility 🗌 D	ebris 🗶		Managemen	t Co	oncerns 🗶 Obstructions 🗶 Riparian Zone 🗔 Valley Wall Process	ses 🗌	Etc.
	Spot shoc	ked 1	10 m section be	low the ro	ad.	Sampled a 15	m	enclosed site above the road.		
	Heavy del	ris :	cross the chan	nel preve	nted	a larger site i	ron	being sampled.		
	Low grad	ent,	cobble-bedded	stream w	ith l	imited potent	al I	OV spawning.		
20 mg	Block was	logg	ged beside R. le	ft bank;	whe	n the block wa	s bı	rned, the small buffer zone was burned also, causing trees to fall across the		
()	creek and	cha	nging the LOD	composit	ion.					
	Culverts a	t the	e road are imp	assable: 1	m x	19 m and 0.7	mx	19 m (Photo B4/14).		

								· · · · · · · · · · · · · · · · · · ·		

				-,					Edited by:	CP
									Date Y M O	97/11/

DFO / MOE

Stream Name	1/0	er\ Fe	our Creek	_					EY FORI			_			Access	F	T Me	ethod
Natershed Co	1,0	-	227-096-256				_	(IOCal)	Four Cit	CA	_	7	ReachNo.	4	Lngth(km)	_	1.1	Miles
	1			***			_		Map#	093L055	-	_	SteNo.	F5	Lingth(km)	_	30	_
Location	Upper	Four C	reek, just d/s	of tork.		_	_		U.T.M.	USSLUSS	_	-	FishCard	(Y)	N G	-		Hist.
Date Y.M.D	-	0 7 1	0 0 8	Time	1600	Agency	C87	Crew	-	DA Photos	A3/1,	\rightarrow	AirPhotos	U	N Mar	T POIG	4	list.
		ARAME		100		METH	Co/	CIOW	CF/RD/	SPECIFIC		4 1	AITFIDIUS			Toper	RUCTIO	SING
C)			IER	V/	ALUE	MEIN	212	7 10 1	7.20	SPECIFIC	DATA	_		_		THE PERSON A	HI(m) Typ	_
Ave. Cha				\vdash	1.9	+	-	2.7, 1.9, 1				_				1925	PA(m) 134	/e LOC.
Ave. Wet				-	6	-	2.0, 2	2.4, 1.6, 1	.5, 2.0			_				E S		+
Ave.Max.	_			+	25	1	-					_				原送	-	+
Ave.Max.		eptin (c	m)	-			Tay And	ne.	NATER		n/	~	DAN	we.		が高	+	+
Gradient	_	1	I co la	-	4		C		D MATER		%	C	BAN			100		+
% Pool	20	Riffle	60 Run	20	Other 10	+	1000 Day	Fines	clay,sitt,san		10	2830		3.0 %0	_	- PERENTAL		+
Side Chan		++-	0 🗶 0-10		40 >40	+-	100 P	Gravels	small (2-16		30	1	Texture	(F (G		陸製		1
Make Dahele	Area%	11	0 0-5	5-1	15 >15	+-	62.046		large (16-6-		1.0	2.763x15.	Confinement		EN CO	_	oc uc	_
NACE .	Stable			-	95	+-	5.50			(64-128mm)	40	10000	Valley:Chan		-		0 10+	_
COVER		1	1 33000	-	60	1	Dec.	Larges		(128-256mm)	20	20000	Stage		-	L) M	H F	-
CESE	Dp.Pool	_	Boulder	InVeg	OverVeg	Cutbank	33885		boulder(>25	6mm)		Sent as	Flood Signs	_	0,2 Bri		Υ	0
sum 100%	_	10	75	100		5	3600000	Bedrock	I Io			1000	Bars (%)	10	pH		O ₂ (ppm)	
Crown Clos	sure %		15	C	a rapaci		體	D90(cm)	18	Compaction	r@H	201	WaterTemp(0 Turb(cm		Cond(25C)) 13
388 388			1	-	DISCHARG	Ε		/50	7					RF	EACH SY	MBOL		
Paran			Value	Meth	hod	-	Spec	cific Data	3			1			(Fisci)			
Wetted W		-		-			-					1						
Mean Der				-	Estin	nated 2 c.	f.s. dise	charge.			-							
Mean Vel				-								1			1			
Discharge	: (m3/s)										(Width	th:Valley/Charm	el,Slope)			Bad	dMatenal
	FI	SH SUN	MARY						ST	REAM/VAL	LEY CR	eos:	S-SECTION	ON	-			
C Species	No. Siz	e Range(r	mm) Life Phase	Use M	ethod/Ref	L				(Lookii	ng Downst	ream)	1					R
CHAR	4 39	-43	F	R E	F				PL	ANIMETRIC	VIEW							14
DV	6 91	-122	J	R E	F	-												1
-100 A	100					5												
All char f	ry were	visually	y identified as	DV.														
	13/1		-1	14		2												
3						200												
3	T I			H														-
THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NA																		
71						7												
																		-
- 1 - 1 - 1	H	-		\Box														
						_		СОММ	ENTS					-				

Edited by

Date Y M D

97/11/

Small, stable creek in confined gully.

Some boulder/LOD habitat and pockets of potential spawning are present.

Moderate to low gradient in this section of creek (steeper u/s).

Stream Name (gaz) Four Creek (local) Four Creek Access FT Watershed Code 460-4227-096-256 ReachNo. 5 Lngith(km)																	ין ד	Metho	ođ						
Wat	ershed Co	ode		460-42	227-096-256												ReachNo.	5	П	Lngth(km)		0.3	3	
Loc	ation	Up	per F	our C	reek							Map #	093L055			\neg	SkeNo.	F6	╗	LthSu	rv(m)		40	<u>.</u>	\Box
												U.T.M.				┪	FishCard	Y	7	7	C	Field	X	Hist	
Date	Y.M.D		9	7 1	0 1 4	Tim		nr		Agency	C87 Crew	RD/D	Photos	Т	04	_	AirPhotos		_	_		4	-		_
X.			PA	RAME		-		LUE		METH	0.00	10,5	SPECIFIC	L DA					-			OBS	TRUCT	1000	\vdash
となる	Ave. Cha	- V	_		-	╫┈	<u> </u>	2.2		MILIN	2.9, 1.7, 2.1		37 EQIFIC								_	SMC7590, 278	_	_	$\overline{}$
				· · ·		╌				-												42 MAR	Ht(m)	ype	Locn
	Ave. Wet					┼		2.2		-	2.9, 1.7, 2.1												\vdash		\vdash
	Ave.Max.	_				╄		8											_			3	\sqcup	_	\square
	Ave.Max.	Poc	l De	pth (c	:m)	┖		25																	
鍐	Gradlent	%				1_		8-11			CE BE	D MATER	AL	9	%	C	BAN	KS				狼			
譜	% Pool	3	10	Riffle	60 Run	1	0	Other			Fines	clay,silt,san	i (<2mm)		5		Height(m)	0.8 %	Uns	tabie	0				
410	Side Char	.%			0 🗶 0-10[1	0-40	<u> </u>	10		Gravela	small (2-18	mm)	1	10		Texture	(F)G)	. R			П	\neg	\Box
		COVER: Total% 60 Larges ige. cobble (128-258mm) 60 Stage omp. Dp.Pool L.O.D. Boulder InVeg OverVeg Cutbank boulder(>258mm) 5 Flood Signs Ht(m)																_	co		oc ı	JC N	N/A		
	Debris	Area% 0															_	6-2	$\overline{}$		0 10-				
	COVE	Stable															\dashv	_	_				_		
を発		Stable															-		1			_	_		
	i '	bris Stable% 75 sm. cobble (84-128mm) 20 Valley:Channel Ratio COVER: Total% 60 Larges ige. cobble (128-258mm) 60 Stage mp. Dp.Pool L.O.D. Boulder InVeg OverVeg Cutbank boulder(>258mm) 5 Flood Signs Ht(m) m 100% 10 15 70 5 Bedrock Bars (%) 0 own Closure % nr Aspect D90(cm) 18 Compaction LOTH WaterTemp(C) 1.5															-		┿			_	7		
和声		Stable															4	<u> </u>	•	_	-	-			
回機	Crown Clo	COVER: Total% 60 Larges ige. cobble (128-256mm) 60 Stage mp. Dp.Pool L.O.D. Boulder InVeg OverVeg Cutbank boulder(>256mm) 5 Flood Signs Ht(m) m 100% 10 15 70 5 Bedrock Bars (%) 0 own Closure % nr Calculate Aspect D90(cm) 18 Compaction LMH WaterTemp(C) 1.5															.5	Turb	(cm)	35	Cond(2	5C)	nr		
		Stable																	BOL						
対	Parar	Area% 0															(F	Fish)							
讔	Wetted W	Stable Stable Stage St																				ı			
	Mean De	Stable% 75																							
NA:	Mean Vel	Stable Stable Stable Stage S																				- 1			
		Dp. Pool L.O.D. Boulder InVeg OverVeg Cutbank																,			a-illan				
		,,,,				1										,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		ш,окре/		٠					
	Comp. Dp.Pool L.O.D. Boulder InVeg OverVeg Cutbank boulder(>256mm) 5 Flood Signs Ht(m) 0.4 Braided Y N																								
	Comp. Dp.Pool L.O.D. Boulder InVeg OverVeg Cutbank boulder(>256mm) 5 Flood Signs Ht(m) 0.4 Braided Y Sum 100% 10 15 70 5 Bedrock Bars (%) 0 pH nr O2 (ppm) Crown Closure % nr Support DISCHARGE /50 12 REACH SYMBOL (Fash) Parameter Value Method Specific Data Wetted Width (m) Mean Depth (m) Estimated 3 c.f.s. discharge. Mean Velocity (m/s) Discharge (m3/s) STREAM/VALLEY CROSS-SECTION																								
		pp. Dp.Pool LO.D. Boulder InVeg OverVeg Cutbank boulder(>256mm) 5 Flood Signs Ht(m) 0 pound for the following for the fo																_				\neg			
c	Species	OVER: Total% 60																			R				
E.P. OPCOD	Species	No.	1			Use	Meti	hod/Ref	-	L			(Look	ung D	ownst			ON		<u></u>				R	
	Species	No.	1			Use	Meti	hod/Ref	-	L			(Look	ung D	ownst			DN						R	
	Species	No.	1			Use	Meti	hod/Ref		L			(Look	ung D	ownst			ON						R	
	Species	No.	Size	Range(n	nm) Life Phase	Use	Meti	hod/Ref		L			(Look	ung D	ownst			DN						R	
	Species	No.	Size	Range(n		Use	Meti	hod/Ref		L -			(Look	ung D	ownst			ON						R	
	Species	No.	Size	Range(n	nm) Life Phase	Use	Meti	hod/Ref		L - -			(Look	ung D	ownst			ON						R	
	Species	No.	Size	Range(n	nm) Life Phase	Use	Meti	hod/Ref		t			(Look	ung D	ownst			ON						R	
	Species	No.	Size	Range(n	nm) Life Phase	Use	Meti	hod/Ref		t - -			(Look	ung D	ownst			ON						R	
	Species	No.	Size	Range(n	nm) Life Phase	Use	Meti	hod/Ref		t			(Look	ung D	ownst			ON						R	
	Species	No.	Size	Range(n	nm) Life Phase	Use	Meti	hod/Ref		L			(Look	ung D	ownst			ON						R	
		No.	Size	Range(n	nm) Life Phase	Use	Meti	hod/Ref					(Look	ung D	ownst			ON						R	
		No.	Size	Range(n	nm) Life Phase	Use	Meti	hod/Ref		L	COM		(Look	ung D	ownst			ON						R	
	Chand		NOT	Range(n	IPLED.				eent CC	-		PL	(Look	C VI	ewnst	meam)			Pro		ses			R	
	Chand	Stat	NOT Dility	Range(π	IPLED. Debris		Ma	ınageme		oncerns	Ot	PL MENTS structions	(Look	C VI	ew services	meam)		ON ey Wall	Pr	oces	ses		-	-	
通知程序的显示程序的影响的	Channel Hiked low	Stater se	NOT	Γ SAM	IPLED. Debris uth fork (up)	per F	Ma	ınageme		oncerns	Ot	PL MENTS structions	(Look	C VI	ew services	meam)			Pr	oces	ses			-	
通知程序的显示程序的影响的	Channel Hiked low Moderate	State ser se	NOT	F SAM	Debrisuth fork (up)	per F	Ma	ınagem C. main		oncerns	Ot	PL MENTS structions	(Look	C VI	ew services	meam)			Pr	oces	ses			-	
通知程序的显示程序的影响的	Channel Hiked low Moderate Good pote	Stater so	NOT	T SAM	Debrisuth fork (uppreek from for at in lower 30	per F	Ma	nagem C. main		oncerns	Ot	PL MENTS structions	(Look	C VI	ew services	meam)			Pr	oces	ses			-	
	Channel Hiked low Moderate Good pote 8% gradie	State er so, lowentia	NOT	F SAM	Debris uth fork (up) reck from for at in lower 36 s of potential	per Frk.	Ma	nageme C. main		oncerns	Ot	PL MENTS structions	(Look	C VI	ew services	meam)			Pr	oces	ses			-	
	Channel Hiked low Moderate Good pote 8% gradie Gradient	Stater se, lowentia	NOT	F SAM	Debris uth fork (up) reek from for at in lower 36 s of potential	per Fr.) m o	Ma	nageme C. main cam.	nstem)	oncerns	Ot	MENTS estructions extent of fish	(Look	ian 2	Zone) [Pr	oces	ses			-	
	Channel Hiked low Moderate Good pote 8% gradie Gradient	Stater se, lowentia	NOT	F SAM	Debris uth fork (up) reck from for at in lower 36 s of potential	per Fr.) m o	Ma	nageme C. main cam.	nstem)	oncerns	Ot	MENTS estructions extent of fish	(Look	ian 2	Zone) [Pro	oces	ses			-	
医多种性性 医多种性 医多种性 医多种性 医多种性 医多种性 医多种性 医多种性	Channel Hiked low Moderate Good pote 8% gradient Channel b	State ser see, lowerntia	NOT	T SAM	Debris uth fork (up) reek from for at in lower 36 s of potential	per Frk.) m o DV s bble i	Ma our of str spaw	nageme C. main ceam. vning. tat.	nstem)	oncerns to deter	Ot mine upper of	MENTS structions extent of fish	Riparh.	ian 2	EW) [itat.	Valle	ry Wall			ses			-	
医多种性性 医多种性 医多种性 医多种性 医多种性 医多种性 医多种性 医多种性	Channel Hiked low Moderate Good pote 8% gradient Channel b Further u	Stater so, lowentia	NOT	T SAM	Debris uth fork (up) reek from for at in lower 30 s of potential riffle-pool colonfined w/s are	DV soble houg	Ma our of str spaw habit	nageme C. main ream. vning. tat. 0 m is en	nstem)	oncerns to deter	Ot mine upper of the property	MENTS structions extent of fish 19% gradi	Riparh.	ian 2	Zone habi	itat.	Valle section of	ry Wall			ses			-	
	Channel Hiked low Moderate Good pote 8% gradient Channel b Further u	Stater so, lowentia	NOT	T SAM	Debris Uth Phase Debris Uth fork (up) reek from for at in lower 30 of potential riffle-pool colonfined u/s at ks again. Alt	DV soble houg	Ma our of str spaw habit	nageme C. main ream. vning. tat. 0 m is en	nstem)	oncerns to deter	Ot mine upper of the property	MENTS structions extent of fish 19% gradi	Riparh.	ian 2	Zone habi	itat.	Valle section of	ry Wall			ses			-	
医多种性性 医多种性 医多种性 医多种性 医多种性 医多种性 医多种性 医多种性	Channel Hiked low Moderate Good pote 8% gradient Channel b Further u	Stater so, lowentia	NOT	T SAM	Debris Uth Phase Debris Uth fork (up) reek from for at in lower 30 of potential riffle-pool colonfined u/s at ks again. Alt	DV soble houg	Ma our of str spaw habit	nageme C. main ream. vning. tat. 0 m is en	nstem)	oncerns to deter	Ot mine upper of the property	MENTS structions extent of fish 19% gradi	Riparh.	ian 2	Zone habi	itat.	Valle section of	ry Wall			Ses	d by:	CP	-	

Stream Nam	(g	az)	Fo	ur Creek							(local)	Four Cr	eek								Acce	ss	1	/2	Meth	od
Watershed (Code	460	-42	27-096-256														ReachNo.	L.	6	Lngth	(km)		2	.1	
Location	Upper	Four	C	reek; sample	d belov	v ros	d cul	vert.				Map#	0	93L055				SiteNo.	1	7	LthSu	rv(m)		7	75	
												U.T.M.	T					FishCard	Y	((A	C	Fiel	X b	His	st.
Date Y.M.D		9 7	1	0 0 8	Time		1700		Agency	C87	Crew	RD/CP	/D	A Photos	A	3/5,	6	AirPhotos								
C	P	ARAI	ME	TER	V	ALU	E		METH					SPECIFIC	DA	TA							OBS	TRUC	TION	S
Ave. Ch	an. Wid	th (n	1)			0	,9			0.9,	0.7, 0.8,	1.1		_ ^									C	Ht(m)	Туре	Loc'n
Ave. W	t. Widt	(m)			1	0	9			0.9,	0.7, 0.8,	1.1											統	Steep	p.	
Ave.Ma	x.Riffle	Dept	h (cm)			3																鱖		1.2	100
Ave.Ma	x.Pool	epth	(c	:m)		1	1		TE.	12, 1	0, 13											0	Min.			
Gradier	nt %					1	7			C	BE	D MATER	RIA	L	1	%	C	BAN	KS							T
% Pool	15	Riff	lo	75 Run	10	Oth	er				Fines	clay,silt,sa	nd ((<2mm)		5	離	Height(m)	1.2	%U	stable	0	法			
Side Ch	an.%		n d	0 0-10	10-	40_	>4	0_			Gravela	small (2-1	6mn	n)	1	20		Texture	E	G	L R		聯		-	
	Area%			0 0-5	0 5-	15_	>1	5				large (16-4	64m	m)	1		鼷	Confinement			EN	(00)	FC	ОС	UC	N/A
Debris	Stable	%				9	5					sm. cobble	(64	-128mm)		25		Valley:Chan	nel R	atio	0-2	2-5	5-1	0 10	0+ 1	N/A
cov	ER: Tota	1%				5	0			議会	Larges	ige, cobble	(12	8-256mm)		40	輸	Stage			Dry	() M	Н	Flo	od
Comp.	Dp.Pool	L.O.	D.	Boulder	InVeg	1	overVe	9	Cutbank	電波		boulder(>2	56m	nm)		10	縣	Flood Signs	Ht(m)	0.2	Braid	ed	Y		(P)
sum 100	% 30	1	5	30			5		20	40	Bedrock				Ò		識	Bars (%)		<5	pН	7	.6	O ₂ (p	pm)	
Crown C	losure %			nr	C	As	pect			22.0	D90(cm)	30	题 c	Compaction	0	н	100	WaterTemp	(C)	1.5	Turt	(cm)	cI	Cond(25C)	110
表示						DI	SCH	ARG	E		/50	11	_							RE	ACH	SYM	BOL			
Para	ameter			Value	Me	thod				Spe	cific Dat	а									1	Fish)				
Wetted	Width (n	1)		1																						
Mean D	epth (m)						7	rick	e flow d	ischar	ge.							-								•
Mean V	elocity (n/s)																								
Dischar	ge (m3/s)															(Wid	th:Valley/Chann	el,Slo	pe)					BedMa	ierei

			FISH SUMMA	ARY						STRE	AM/VALI	EY CROS	SS-SEC	TION	-			
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L			PLAN	(Lookin	g Downstream	n)		_			R
5 M	Spot sho	cked	below road for	75 m leng	th of		_			1 241	Little				-			-
N.			sh were caught															
(99)		T				,												
加工																		
000				1	-													1
13				4.0														1
吧							-											35
EE																		1/=
														-				
聯								C	OMMEN	ITS								
髓	Channe	I Stal	bility 🔲 D	ebris 🔲		Managemer	nt Concern	s _	Obstru	uctions X	Riparia	an Zone	V	alley Wall	Proces	ses	E	tc.
200	Creek to	o sma	all and steep; r	no potenti:	al fish	use.												
想	7																	
遵																		
42																		
3																		
18																		
1	Š.																	
200																		
100																_		
121					_											Edited by	CP	-
100									****							Date Y M D	9	7/11/

Stream Na	me	(ga	z) Fo	ur Creek Tri	butary 1					(local)	Four Cree	ek '	Tributar	y 1						Acces	15	FT	Me	elhod
Vatershed	d Co	de	460-42	227-096-256													ReachNo.	2	53	Lngth(k	um)		1.3	
ocation		Four C	reek Tr	ributary 1, at	spur ror	d crossi	ing.				Map #	09	93L065				SiteNo.	F	8	LthSur	v(m)		45	
					-					7	U.T.M.					34	FishCard	Y	6	0	C F	ield 2		Hist.
Date Y.M.	.D	9	7 1	0 2 2	Time	1400	Ager	ncy	C87	Crew	RD/D/	A	Photos	A	4/7,	8	AirPhotos	1						
C.		PA	RAME	TER	VA	LUE	ME	_				S	PECIFIC	DA	TA						0	BSTR	исті	SNC
SERVICE .	Char	n. Widt				3.2			4.1, 2	2.9, 3.1, 2	2.8										100	C H	(m) Ty	pe Loc
1000	_	Width				3.2				2.9, 3.1, 2											N.			
1000	_	Riffle D		cm)		7			1												10	2	V)	
Ave.N	lax.	Pool D	epth (c	:m)		25		-										1-			100	C.		
Gradie	ent	%		7.7		2		-7	C	BE	D MATERI	IAL			%	C	BAN	KS			600	100		
% Pool		20	Riffle	10 Run	70	Other				Fines	clay,silt,sand	d (<	(2mm)	1	00	195	Height(m)	0.3	%Uni	stable	0	NEW YEAR		
Side C	han	.%		0 3 0-10	10-40	0 >4	40		海	Graveis	small (2-18r	mm))			-	Texture		G)		100			
A		Area%		0 0-5	5-1	5 >1	15		200		large (16-64	4mm	n)			逐	Confinemen	it		EN	CO (F	c) o	c uc	N/A
Debris		Stable	%			95			18.00		sm. cobble (_				100	Valley:Chan	_	itio	-	-	_	10+	
co	VEF	R: Total	_			30			28an	Larges	ige, cobble (-				-	Stage			Dry	0	М	H F	Flood
Comp.		Dp.Pool	L.O.D.	Boulder	InVeg	OverVe	eg Cutt	bank			boulder(>25	-				200	Flood Signs		13	-	Braided		Y	(N)
sum 10		30	20		10	20		20	1000	Bedrock				_		8	Bars (%)	_	0	рН	7.3	_	(ppm	_
Crown		_	1		C.	Aspect			用等	D90(cm)		Cr	ompaction	0	ин	-	WaterTemp	(C)	2.5	Turb(_	_	nd(250	_
360				-		DISCH	_	_	-	-	The same of the sa			_		-			_	_	SYMB	_		
Pa	aram	neter		Value	Meth				Spe	cific Data	а					1					ish)			
Wette	d W	fidth (m))													1								
200	-	oth (m)	-			1	Estimated	2 c.	f.s. di	scharge.						1								-
Mean	Vel	ocity (m	1/5)				Water turl				isibility.					1								
200	_	(m3/s)			250											(Me	dth.Valley/Chan	wil, Slope	a)				Be	dMaterial
	_	EIS	en em	MMARY			1	_		-	97	PPE	- AMA/A	IE	v CI	205	SS-SECTION	ON	_	-		_	_	_
C Species			Range(n		luca Ma	nad Parl	- 1				0.	KL			owns			JIN		-				R
Species	-	No. Size	Kange	nm) Life Pilase	USE MU	hod/Kei	-				PI	AN	NIMETRI							-				14
30		-			++		-				1		IIIIE III.							-				P
Ž.	-	-			+		-																	-
	-	NC	CATO	ч	+		-																	-
经验的 10 4 mm			Car	1																				1.7
是我					1		-																	-
276					1		-																	_
22				- h-	1				_			_						_						
6040				_			17																	-
			-		+		-																	A.
-	_		_				-	_		COMM	IENTS	_		_	_	_		_	_	_			_	_
Chan	nel	Stability		Debris 🗆	M	anagem	nent Conce	erns	151	2 (11)	structions	10	Ripar	rian	Zon	e 3	Valle	ev W	all P	rocess	ses		E	tc.
200				k with heavy	2.5			_			JII 40.2			-		-		,						
P.D.w.		_		resent in this		Mary	me cana		-															
Chick	_			/winter.								_												
				15%), cobble,	-1 cfe	and I n	n wide: sr	ene	et no f	fish use		_												

Edited by: CP

Date Y M D

Stre	am Name	(ga	z) F	our Cr	eek Tri	butary 2					(local)	Four Cre	ek Tributs	ry 2						Acces	5	F	T	Meth	od
Wat	ershed Co	ode	460-	1227-09	6-256											1	ReachNo.	1		Lngth(k	um)		2	.3	
Loca	ation	Four C	reek T	ributa	ry 2, th	e lower	120 m.					Map#	093L055				SiteNo.	F9		LthSun	(m)		1	20	
												U.T.M.					FishCard	Y	(0	C	Field	X	His	st.
Date	Y.M.D	9	7	1 0	1 4	Time	1000		Agency	C87	Crew	RD/D	A Photos		na		AirPhotos	T							
i Ci		PA	RAM	ETER		V	LUE		METH				SPECIFI	C DA	TA							OBS	TRUC	TION	s
-	Ave. Cha	n. Widt	h (m)				1.9		F	1.9, 2	.1, 1.7										П		Ht(m)	Type	Loc'n
	Ave. Wet	Width	(m)				1.9			1.9,	.1, 1.7														1
	Ave.Max.	Riffle D	epth	(cm)			12																		30
	Ave.Max.	Pool D	epth (cm)			30															Re			
100	Gradient	%				1	11-14	-		AC.	BE	D MATER	IAL	10	%	C	BAN	KS				76			111
1000	% Pool	20	Riffie	60	Run	20	Other			埃密	Fines	clay,sit,san	d (<2mm)		5	鑿	Height(m)	0.8	%Uns	table	0	開設	1	Jan 1	
1	Side Chan	.%	П	0 🗶	0-10	10-4	0 >	40		43.	Oravels	small (2-16	mm)		10	聯	Texture	F	G)L	. R					
97	7-1	Area%		0	0-5	5-1	5 >	15		SETTE		large (16-6	4mm)	1		编	Confinement			EN (00	FC	ос	UC	N/A
TOTAL STREET	Debris	Stable	%				90					sm. cobble	(64-128mm)		20		Valley:Chan	el Rat	io	0-2	2-5	5-1	0 10	0+ 1	N/A
1	COVE	R: Total	%				60			HE TO	Larges	ige. cobble	(128-256mm)		50	灎	Stage	-		Dry	L	M) H	Flo	od
144	Comp.	Dp.Pool	L.O.D	Вс	ulder	InVeg	OverV	'eg	Cutbank	一		boulder(>25	i6mm)		15	髓	Flood Signs	Ht(m)		nr	Braide	ed	Y		(M)
	sum 100%	20	5	13	70				5	1	Bedrock					樹	Bars (%)	<5	,	pН	D	r	O2 (p	pm)	
-	Crown Clo	sure %	T		5	C	Aspec	t		100	D90(cm)	27 CH	Compaction	140	Эн	艇	WaterTemp(c)	1.5	Turb(cm)	cl	Cond(25C)	nr
此							DISCH	IARG	E		/50	10		_					REA	CHS	YM	BOL			_
100 M	Parar	neter		Va	lue	Meth	nod			Spe	cific Dat	А								(F	sh)				
1	Wetted W	ridth (m)		e e											1									
蕭	Mean De	oth (m)						Estim	ated 2-3	c.f.s.	lischarg	e.				1	-					-			5.1
	Mean Vel	ocity (m	/s)													1									
J. Car	Discharge	(m3/s)														red	th: Valley/Chann	el.Slope)					BedMa	aterial

			FISH SUMMA	ARY				STREAM/VALLEY CROSS-SECTION		
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L	(Looking Downstream)	_	R
鹽								PLANIMETRIC VIEW	=	
100										
Will.										
703			NOT SAMPL	ED.						
5		1								
10.70										-
U.S										-
T.S.	li and									
28			VIII I							-
Give										_
103		-						COMMENTS		
6	Channel	Stal	bility D	ebris		Managemen	t Concerns	Obstructions Riparian Zone Valley Wall Pro	ocesses	Etc.
500	-	_			ent		obble-boulder b		-	
N.F.			inually steeper		_					
112		_			_			crossing; no fish were caught.)		
200	Dia or p			es un (est	pic	(11.11)	Delen me rona e	and the same same same same same same same sam		
200										
100 di										
		_			_					
VIS										
100		-			_					
200000										
E-47									Edited by: CI	•

												214	EAN	SUKV	EY FOR	ni.											. ,	
Stre	am Name		(gaz	z) l	Fou	r Cre	ek Tri	buta	ry 2					(iocal)	Four Cre	ek	Tributar	y 2						Acces	s	V2	Meth	bo
Wat	ershed Co	ode		460	422	7-09	6-256														ReachNo.	1		Lngth(i	um)		2.3	
Loc	ation	Fou	ır Cr	eek	Tri	buta	ry 2, d/	s fro	m ro	ad culv	ert.				Map#	0	93L055				SiteNo.	FI	10	LihSur	v(m)		70	
															U.T.M.	L					FishCard	Y		J		Field	His	st. 🗌
Date	Y.M.D		9	7	1	0	0 8	Tim	•	1630		Agency	C87	Crew	RD/CP/	DΑ	Photos	A	3/3,	4	AirPhotos							
			PAI	RAN	ΙEΤ	ER			VA	LUE		METH				s	PECIFIC	DA'	TA						C	BSTR	UCTION	s
of speciments	Ave. Cha	n. V	Vidti	ı (m)			Г		1.1			0.9,	1.1, 1.4, 0	.7, 0.9, 1.3	3									Band	C H	(m) Type	Loc'n
	Ave. Wet	. WI	dth	(m)						1.1			0.9,	1.1, 1.4, 0	.7, 0.9, 1.3	,									***	S	teep.	
	Ave.Max.	Riff	le D	epth	1 (C	m)				3											,				1000			
1	Ave.Max.	Poc	ol De	pth	(cn	n)				15															23			
	Gradient	%								18			io.	BEI	MATER	IAI	L	9	6	C)	BAN	IKS			- 1			
	% Pool		5	RIM	·T	95	Run		П	Other	\top			Fines	clay,silt,san	d (<2mm)		5		Height(m)	1.5	%Uns	stable	0	***		
	Side Char	1.%				0 🗶	0-10[] 1	0-40	□ ×	10			Gravels	small (2-16	mm	1)		5	龖	Texture	(FC	(2	L R	35505			
		Ares	1%	П		0	0-5	()	5 -15	□ >1	15[]				large (16-6	4m/	m)		30		Confineme	nt		EN	(S)	FC O	c uc	N/A
	Debris	Sta	ble%	4				Т		90					sm. cobble	(64-	-128mm)		30		Valley:Cha	nnel Ra	atio	0-2	E-5	5-10	10+	N/A
***	COVE	R: T	otal	%				Т		30				Larges	ige, cobble	(12	8-256mm)		20		Stag	е		Dry	0	M	H Flo	od
Ť.	Comp.	Dp.F	Pool	L.0.1	5 .	Во	ulder	InVe	100	OverV	eg	Cutbank	anna.		boulder(>25	58m	ım)		10		Flood Signs	s Ht(m)	,	0,2	Braide	1	Υ	\odot
	sum 100%	7	20	20	,		60	Т						Bedrock							Bars (%)		0	рΗ	7.	7 0	₂ (ppm)	
	Crown Clo	sure	%			n	r			Aspect	1			D90(cm)	25	c	ompaction	L (V	Эн	100	WaterTemp	p(C)	1.5	Turb(cm)	cl C	ond(25C)	130
										DISCH	ARG									Г			RE/		SYME	OL		$\neg \neg$
纖	Parar	nete	er			Va	ue	N	feth	od			Spe	cific Data	1]				(F	ish)			1
	Wetted V	Vidth	(m)]								.
数	Mean De	pth ((m)								Trickl	e flow di	scha	rge.														- 1
4	Mean Ve	locit	y (m	/s)	_			_																	l			
地	Discharge	e (m	3/s)		_			<u> </u>												(746	tth:Valley/Chan	vnei,Slop	•)				BedM:	tenet
			EIG	шe		MAR	~				_				67	грі	EAMA/A	I E	/ CB	200	S-SECTI	ON	_					
	Species	No.	_	_	_		fe Phase	Lina	1		\dashv	L			3	171		cing D				ON		-			F	. [
	opecies	NO.	Size	Rang	e(mi	m) L	io Pileso	1058	MOL	iou/Ket	\dashv	_			DI	ΔΙ	NIMETRI	c v	ΕW								,	·
	Spot shoc	L-d	70 -	lon		<u> </u>	d	<u> </u>			+	-			,,		14/1012 170	.	_,,					-				\dashv
	road. No			_	_			1	T		- -	-					•											\dashv
	. 044. 110	1.3.1	T		5	_ UUSI	. 700,	+	+		+	-																\dashv
		\vdash	\vdash			+		十	+		+	-																\dashv
		Н				+		+			\top	-																\dashv
		\vdash				\top			 		+	-																\dashv
		T	_	_		\top	-	\top	1		十									_								\neg
			1	_		\top		\top	1		十	•																\dashv
t et		1	 			\top		1	1	-	\top	•																
			_		_			_	_					COMM	ENTS	-				_								\neg
批	Channel	Sta	bility]	Det	oris		Ма	nagem	ent C	oncerns			tructions	-	Ripai	rian 2	Zone	, -	Valle	ey Wa	ali P	roces	ses		Etc.	
				ıd st	eep:			ial fis		<u> </u>												-						\neg
																												$\neg \neg$
-						_	_	_					_			_												

CP

97/11/

Edited by:

Date Y M D

Stream Name Graz Tallow River Groot Tallow River Reports Tallow River Reports Tallow River Reports Tallow River Reports Tallow River Reports Tallow River Reports Tallow River Reports Tallow River Reports Tallow River Reports Tallow River Reports Tallow River Tallow Riv																	_				-			
Coestion Lover Tellows River side channel; near Bulking River Map 8 893,065 Stable; SCI Liberroll 76 Map 19 3 9 7 9 9 3 9 The 1500 Aprec C7 Crew RDDA Postor B401,9 Aprecos C7 N SF Feld (K) Nist	Stree	m Name	10	gaz) Te	lkwa River						(local)	Telkwa	Rive	er			_			Access		V2	Meth	00
Confidence Con	Wate	rshed C	ode	460-42	227													ReachNo.	1	Lngth(km)	8	.0	_
Dest	Loca	tion	Lower	Telkwa l	River side cha	anel; r	ear Bu	ikley R	iver			Map #	05	93L065				SkeNo.	SC1	LthSurv(n	n)	7	6	
PARAMETER	Г		conflu	ence.								U.T.M.	\perp					FishCard	\odot	N S	Fie	ld 🗶	His	t 🗌
Ave. Chan. Width (m)	Date	Y.M.D		9 7 0	9 3 0	Time	150	0	Agency	C87	Crew	RD/I)A	Photos	В	4/8,	9	AirPhotos						
Section Sect				ARAME	TER	V.	ALUE		METH			•	s	PECIFIC	DA	TA					OBS	TRUC	TION	s
Ave. Max. Pullip Depth (cm)	PERMITS.	Ave. Cha					~240		-	-calc	ulated fr	om air p	toto).		_						Ht(m)	Туре	Loc'n
Ave_Max_Pool Depth (cm) 15	Maddagger												_		vw¹s	of s	ide (channel s	ampled.		Section.			
Ave_Max_Pool Depth (cm) 38 38 38 38 38 38 38 3	Section 1				m)	_			 			,,		.,		-					-	96		Н
Section Sect	-								_	-							_							Н
Section Note 5 Note	- Projection			ropar (di	,						BEI	MATE	PIAI		0	6	4	BAN	iks				_	Н
Side Chan.	9,2000		" —	num.	f 12			0.5		1.4th Charles	-	_			H	_	28/			netable (10000			\vdash
Debtis Stable	- Salarana			Rime		1	'		FLATS	**************************************			_	_			発売		_		THROUGH C			-
Debris Stable% 10	金数	olde Char	_	++							Graveis				,	U	建				-	_	Щ.	
COVER: Total% 20)abeia			10 <u> </u>	5-1		15							_					+		~		$\overline{}$
Comp. Do Peol O.D. Boulder m/vg Coerving Collabat Doubletor-2-Settings Doubletor-2-										CHROSE		sm. cobble	(84-	·128mm)	-	-				+		_		-
Sum 100% 30 10 20 10 30 30 30 30 30 30 3	Tary.	COVE	R: Tota	1%	,		20				Larges	ige. cobble	(128	3-256mm)	Щ	-		Stag	е	+ -	_			
Crown Closure % 5 DisCHARGE		Comp.	Dp.Pool	_	Boulder	lnVeg	Over	Veg	Cutbank	AND COURSE	ļ	boulder(>2	58mr	m)	Щ	5		Flood Signs	Ht(m)	1.5 Br	zided	Į (Y	_	N
DISCHARGE 50 7 REACH SYMBOL Family Method Specific Data Parameter Value Method Specific Data Parameter Value Method Specific Data Parameter Value Method Specific Data Parameter Value Method Specific Data Parameter Value Method Value Method Value	STE S	um 100%	30	10	20			10	30		Bedrock							Bars (%)	70	pH	7.4	O₂(p	pm)	Ш
Parameter Value Method Specific Data Wetted Width (m) Mean Depth (m) FISH SUMMARY FISH SUMMARY FISH SUMMARY STREAM/VALLEY CROSS-SECTION (Locking Commitman) R SST 40 37-63 F R EF PLANIMETRIC VIEW SST 16 69-160 J R EF CO 101 47-76 F R EF CO 23 77-104 J R EF MW 35 47-63 F R EF CO 23 77-104 J R EF CO 23 77-104 J R EF CO 25 FORMENTS COMMENTS COMMENTS COMMENTS COMMENTS Comment Stability Debris Management Concerns Obstructions Riparian Zone X Valley Wall Processes Etc. Sampled a very small side channel. Many fish present in this site: may be survival problems in the winter?	EX. (Crown Clo	sure %		5	C.	Aspe	:t			D90(cm)	20	C	ompaction	Ò	н		WaterTemp	(C) 9.0	Turb(cn	n) cl	Cond(25C)	80
Wetted With (m) Estimated <1 c.f.s. discharge. Wetted With (m) Estimated <1 c.f.s. discharge.							DISC	HARG	E		/50	7						•	RE					
Mean Velocity (m/s) Estimated <1 c.f.s. discharge. FISH SUMMARY STREAM/VALLEY CROSS-SECTION (Looking Downstream) R		Parar	neter		Value	Met	nod			Spec	ific Data	3					Ì			(Frah))			
Mean Velocity (m/s) Discharge (m3/s) FISH SUMMARY FISH SUMMARY STREAMVALLEY CROSS-SECTION (Looking Downstream) R SST 40 37-63 F R EF DV 1 103 J R EF CO 101 47-76 F R EF MW 35 47-63 F R EF MW 35 47-63 F R EF COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone X Valley Wall Processes Etc. Sampled a very small side channel. Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?	藝	Vetted V	/idth (n	1)													1							
Discharge (m3/s) No. Suze Range(mm) Use Phase Use MethodRef L (Looking Downstream) R		Mean De	pth (m)					Estima	ated <1	.f.s. d	ischarge	<u>.</u>					1							.
FISH SUMMARY Species No. Size Range(mm) Life Phase Use Method/Ref L. (Looking Downstream) R SST 40 37-63 F R EF PLANIMETRIC VIEW SST 16 69-160 J R EF CO 101 47-76 F R EF MW 35 47-63 F R EF MW 35 47-63 F R EF MW 35 47-63 F R EF CO MMENTS Comments Comm		Mean Ve	ocity (r	n/s)													1							i
Color Species No. Size Range(mm) Life Phase Use MethodRef Land Color	Ť.	Discharge	(m3/s)													(Wd	th:Valley/Chan	nel.Slope)	•			BedMa	terial
Color Species No. Size Range(mm) Life Phase Use MethodRef Land Color																								
Color Species No. Size Range(mm) Life Phase Use MethodRef Land Color								_																
SST 16 69–160 J R EF DV 1 103 J R EF CO 101 47-76 F R EF CO 23 77-104 J R EF MW 35 47-63 F R EF COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc. Sampled a very small side channel. Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?	milition.		· · · ·					_				S	TRE						ON	_				
SST 16 69-160 J R EF DV 1 103 J R EF CO 101 47-76 F R EF CO 23 77-104 J R EF MW 35 47-63 F R EF COMMENTS Comments Comments Comments Comments Comments Comments Sampled a very small side channel. Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?	-				_	_		Ц	L								remin	,					R	
DV 1 103 J R EF CO 101 47-76 F R EF CO 23 77-104 J R EF MW 35 47-63 F R EF COMMENTS Comments Comments Comments Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc. Sampled a very small side channel. Section is slow and flat with curbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?	2327":4349		-			-		-				P	LAN	NIMETRI	C VI	EW				\Box				_
CO 101 47-76 F R EF CO 23 77-104 J R EF MW 35 47-63 F R EF COMMENTS COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc. Sampled a very small side channel. Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?	and the same		$\overline{}$		J		EF	-	-															
COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc. Sampled a very small side channel. Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?		DV				-	EF		-															
MW 35 47-63 F R EF COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc. Sampled a very small side channel. Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?	10042	co		47-76	F	-	EF																	_
COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc. Sampled a very small side channel. Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?		co	23	77-104	J	R	EF																	_
COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc. Sampled a very small side channel. Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?		MW	35	47-63	F	R	EF	\bot																
COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc. Sampled a very small side channel. Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter? Edited by CP			\sqcup			\perp						···												
Comments Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc. Sampled a very small side channel. Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?			Ш					\bot	_															
COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc. Sampled a very small side channel. Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?																								
Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc. Sampled a very small side channel. Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?	4.00								-															
Sampled a very small side channel. Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?											COMM	ENTS												
Section is slow and flat with cutbank and alder overstory providing good cover. Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter?		Channel	Stabilit	у	Debris _	M	anager	nent C	oncerns	[.]	Obs	structions		Ripari	an Z	2one	: X	Valle	ey Wall F	rocesse	s [Etc.	
Nice fry habitat along the cobble margins. Many fish present in this site; may be survival problems in the winter? Edited by CP	30	Sampled	very s	mall side	channel.																			
Many fish present in this site; may be survival problems in the winter? Edited by CP		Section is	slow a	ıd flat wi	th cutbank an	d alder	overst	ry pro	viding go	od co	ver.													
Edited by CP		Nice fry h	abitat :	along the	cobble margir	ıs.																		
Edited by CP		Many fish	preser	t in this s	ite; may be s	ırvival	proble	ms in t	he winter	?													•	
Edited by CP	が 対 が は に に に に に に に に に に に に に																							
Edited by CP	3 3												_											
Edited by CP	141																_							
Edited by CP																_								
Edited by CP	200 2 0 C												_			_							_	
AC M	1200																_				ited by	CP		
	434								-														97/11	//

									eto		SURV		BH											
Stre	am Name		(gaz)	Telkw	va River				318		(local)		_						A	ccess	v:	2	Meth	od
	ershed Co			4227							(ReachNo.	1	1,	ngth(km)		8.	0	•
	ation				channel.							Map	# 1	093L065			SteNo.	SC2	-+-	hSurv(m)		51	_	_
LOC	auon	1 CIKW	VM POVE	Side	Channel							U.T.N	_	07312003			FishCard	(Y)	N	C	Field	-	His	• [
Det	Y.M.D	1	9 7	1 0	0 0 1	Time	120	<u> </u>	Agency	C87	Crew	-)/DA	Photo	s R	1/10,		<u> </u>	-	PA-efficial	1 1010		3 113	
	1.00.0		PARAN	_	_		ALUE	 	METH	1007	1 0.00	1		SPECIF	_		11 10:00	Щ.			OBST	RUC	TON'	•
C.	Ava Cha			15151			~230		MEIN		lated 6				IC DA						TOTAL PROPERTY.	Ht(m)		_
	Ave. Cha								-	-	culated f											ra(iii)	ype	LOC
	Ave. Wet			<u> </u>			5.1		-	3,3, 3	5.0, 2.8, 4	.1, /.4,	о.J,	5.2, 5.0							South State of State			├
	Ave.Max.						10		-	├											PERMIT			-
	Ave.Max.	_	Depui (cm)			35			fine the	T			••	1 .	,	Essi Dan	1140	_		Athena	\rightarrow		-
	Gradient			_		·	1			Ci		D MATI			+	%	C BAN		_		436	-		
	% Pool	10	Riffi	_	30 Run	60	Other		_		Fines			(<2mm)	+	15	-	3.0 %	_	_	2 19 E			-
	Side Char	_	\perp	_	X 0-10	10-4	_=_	-40 □		1000	Gravels	small (2	2-16m	ותו)		20	5000	(F () G	~		與鍵		_	
4		Агев%		0	X 0-5	5 -	15:	>15		70.00		large (1	8-84	നന)	-	20	62.		-+-	N CO		_	_	N/A
	Debris	Stab	le%				na			148		sm. cob	ble (8	34-126mm)		10	Valley:Cha	nel Ratio		0-2 2-5	5-10	0 0	+)	I/A
	COVE	R: Tot	al%				30				Larges	ige. cobi	bie (1	28-256mm	» <u> </u>	25	Stag	в		Dry (L	<u> M</u>	н	Flo	_
	Comp.	Dp.Poc	I L.O.	э.	Boulder	Aigae	Over	Veg	Cutbank			boulder(>256	mm)	Щ.	10	Flood Sign:	Ht(m)	4	1.5 Brain	ied	Y	(\odot
	sum 100%	10			50	40					Bedrock						Bars (%)	70	┙	pH '	7.4	O ₂ (pp	m)	
	Crown Clo	sure %	, " - "				Aspe	ct			D90(cm)	30	C	Compactio	n D	АН	WaterTem	(C) 8	T 0.	urb(cm)	cl	Cond(2	5C)	130
響							DISC	HARGI	E		/50	7						R	EAG	CH SYM	BOL			
	Parar	neter		Τ,	Value	Met	hod			Spec	cific Data	a								(Fish)				
	Wetted V	Vidth (m)	\top													1							
H	Mean De	pth (m	1)	\top				Estim	ated 2 c.	f.s. di	scharge.						1 –						-	
4	Mean Vel	locity ((m/s)	丅																				
1	Discharge	e (m3/	s)	Т													(Width:Valley/Char	nel,Slope)					BedMs	teruel
3.44			FISH S					\dashv					STI		OOKING D		ROSS-SECTI	ON					_	
C	Species	•	Size Rang			-	ethod/Ref	Щ	L						_		area any						R	
	SST	198	30-		F	R	EF	_					PL	ANIMET	RIC V	IEW				_				
53	SST	2	72-		J	R	EF	_	_															
	BT	1	15		J	R	EF		-															
	co	26	51-		F	R	EF	-	-															_
	со	11	77-1		J	R	EF	+	-															
	MW.	31	35-	_	F	R	EF		-															
	LNC	6	27-	32	F	R	EF																	
		\sqcup				\vdash		_																
						\sqcup		\bot	-															_
					1			L																
H											COMM	ENTS							_					
	Channel	Stabil	ity 🕽	(Debris 🗀	N	lanage	ment C	oncems		Obs	structio	กร	Rip	parian	Zone	e ⊡ Vall	ey Wall	Pro	cesses	_=		Etc.	
	Sampled	a slow,	, wide fl	at sec	tion with c	obble ı	margin	along o	ne side o	f the	site.													
	Good fry	cover	despite	the sa	ındy bed m	aterial	due to	the ext	ensive an	nount	of brow	n algae	gro	wing wit	hin the	cha	nnel.							
4																								
77.4																								

CP

97/11/

Edited by:

Date Y M D

DEO / MOE

MS6 and MS7.	Intermed C	0	(gaz)	Te	lkwa River						(local)	Telkwa R	iver			_			Acces	SS	F	I	Method
Miss And Miss Mis	atersned C	ode	4	0-42	27												ReachNo.	1	Lngth()	km)		8.0	
Table Tabl	ocation	Telk	wa Riv	er si	de channel;	located	between i	margin site	23			Map#	093L065				SiteNo.	SC3	LthSun	v(m)		25	
PARAMETER		MS6	and M	IS7.								U.T.M.		_			FishCard	0	N	C 記	Field	X	Hist.
Ave. Chan. Width (m)	ate Y.M.D		9	7 1	0 0 3	Time	1300	Agen	y	C87	Crew	RD/DB/	CP Photos		B5/6,	7	AirPhotos						
Ave. Wet. Width (m)	C		PARA	ME	TER	V	ALUE	MET	Ή				SPECIFI	C DA	ATA						OBST	RUCT	IONS
Ave.Max.Pool Depth (cm) 12	Ave. Ch	an. W	idth (r	n)			168			200,	164, 140	168 - CW	's calculate	d fr	m a	ir ph	noto.	e.			C	Ht(m) T	ype Lo
Ave.Max.Poc Depth (cm) ms	Ave. We	t. Wic	th (m				10.6			8.0,	7.7, 8.9, 1	1.3, 12.9, 1	4.5								經	+ 10	
Gradient %	Ave.Max	c.Riffl	Dept	h (c	m)		12														報		
Side Chan.% O	Ave.Max	c.Pool	Dept	(cn	n)		na		¥,												See L		91
Stide Chan.% 0	Gradien	t %					1			C	BEI	MATERI	AL		%	C	BANK	KS		- 2		_	
Debris Stable%	% Pool		R	Me			Other	20 FLAT	8		Fines	clay,sit,sand	(<2mm)			鑑		_		0			
Debris Stable%	Side Cha	n.%			0 3 0-10	10-4	0_ >40	0		320	Graveis	small (2-16r	mm)		10		Texture	FIG	L R				
COVER: Total% 65	禁	Area5			0 0-5	5-1	5 >1	5_		100		large (16-64	mm)			鏇	Confinement		EN	co	FC (0C) L	C NA
Comp. Discharge Discharg	Debris	Stat	le%				na					sm. cobble (64-128mm)		15		Valley:Chann	el Ratio	0-2	2-5	5 1	10-	N/A
Sum 100% 100	COVE	R: To	tal%				65				Larges	ige. cobble (128-256mm)		45	選	Stage		Dry	C) M	Н	Flood
Crown Closure % Aspect Descent Descent LOH WaterTemp(C) 4.5 Turb (cm) cl condizació DISCHARGE /50 20 REACH SYMBOL REACH SYMBOL	Comp.	Dp.Pd	ol L.	D.D.	Boulder	InVeg	OverVe	Cutba	nk	調		boulder(>25	5mm)		30	颠	Flood Signs	Ht(m)	2.0	Braide	d	Y	W
DISCHARGE /50 20 REACH SYMBOL Parameter Value Method Specific Data Wetted Width (m) Mean Depth (m) Estimated 10 c.f.s. discharge. Mean Velocity (m/s) Discharge (m3/s) FISH SUMMARY FISH SUMMARY STREAM/VALLEY CROSS-SECTION (Looking Downstream) R SST 172 31-48 F R EF DV 1 82 J R EF DV 1 82 J R EF DV 1 82 J R EF MW 4 59-61 F R EF MW 4 59-61 F R EF The char fry was visually identified as a BT. COMMENTS Comments Comments Comments Comments Comments Comments Comments Comments Comments Comments Comments Riparian Zone Valley Wall Processes Etc.	sum 100%	6			100					108	Bedrock			_		靡	Bars (%)	0	pH	7.	3	O ₂ (pp	n)
Parameter Value Method Specific Data Wetted Width (m) Mean Depth (m) Mean Velocity (m/s) Discharge (m3/s) FISH SUMMARY STREAM/VALLEY CROSS-SECTION (Looking Downstream) R SST 172 31-48 F R EF CHAR 1 57 F R EF DV 1 82 J R EF BT 2 71-107 J R EF BT 2 71-107 J R EF MW 4 59-61 F R EF The char fry was visually identified as a BT. The char fry was visually identified as a BT. COMMENTS Comments Comments Comments Comments Comments Comments Comments Riparian Zone Valley Wall Processes Etc.	Crown Ck	osure 9	6			C	Aspect			器	D90(cm)	33	Compaction	4	N)H	變	WaterTemp(c) 4.:	5 Turb(cm)	cl	Cond(25	ic)
Wetted Width (m) Mean Depth (m) Mean Depth (m) Discharge (m3/s) FISH SUMMARY STREAM/VALLEY CROSS-SECTION (Looking Downstream) SST 172 31-48 F R EF SST 20 63-122 J R EF CHAR 1 57 F R EF DV 1 82 J R EF DV 1 82 J R EF BT 2 71-107 J R EF MW 4 59-61 F R EF The char fry was visually identified as a BT. The char fry was visually identified as a BT. The char fry was visually identified as a BT. COMMENTS Comments							DISCHA	ARGE			/50	20						RE			BOL		
Mean Velocity (m/s) Discharge (m3/s) FISH SUMMARY FISH SUMMARY Species No. Size Range(mm) Life Phase Use Method/Ref L SST 172 31-48 F R EF CHAR 1 57 F R EF DV 1 82 J R EF DV 1 82 J R EF MW 4 59-61 F R EF MW 4 59-61 F R EF The char fry was visually identified as a BT. The char fry was visually identified as a BT. COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc.	Para	meter			Value	Met	nod			Spe	cific Data	9				1			(F	mh)			
Mean Velocity (m/s) Discharge (m3/s) FISH SUMMARY FISH SUMMARY Species No. Size Range(mm) Life Phase Use Method/Ref L (Looking Downstream) SST 172 31-48 F R EF SST 20 63-122 J R EF CHAR 1 57 F R EF DV 1 82 J R EF DV 1 82 J R EF MW 4 59-61 F R EF The char fry was visually identified as a BT. The char fry was visually identified as a BT. COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc.	Wetted V	Nidth I	m)													1	-			_			_
FISH SUMMARY FISH SUMMARY Species No. Size Range(mm) Life Phase Use Method/Ref L SST 172 31-48 F R EF CHAR 1 57 F R EF DV 1 82 J R EF BT 2 71-107 J R EF MW 4 59-61 F R EF The char fry was visually identified as a BT. The char fry was visually identified as a BT. COMMENTS Comments Com		_	_			-	E	stimated 1	0 c.	f.s. d	ischarge			_		1							
Species No. Size Range(mm) Life Phase Use Method/Ref L		_	-			_	-		_							1			- 3				
Species No. Size Range(mm) Life Phase Use Method/Ref L	Discharg	e (m3	/5)							_						(Wd	th Valley/Channe	I,Slope)			_		edMateria
Species No. Size Range(mm) Life Phase Use Method/Ref L		- 1																					
Species No. Size Range(mm) Life Phase Use Method/Ref L			FISH	SUN	MARY	_		1	_	_		ST	REAM/VA	LLE	Y CE	ROS	S-SECTIO	N	-	_	_	_	_
SST 172 31-48 F R EF PLANIMETRIC VIEW		No.				Use Me	thod/Ref	1 .										.,	-				R
SST 20 63-122 J R EF	Species	172						1				PL	ANIMETR	IC V	IEW				-				
DV 1 82 J R EF BT 2 71-107 J R EF MW 4 59-61 F R EF The char fry was visually identified as a BT. The char fry was visually identified as a BT. COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc.	-			_				_				3/3							_				-
DV 1 82 J R EF BT 2 71-107 J R EF MW 4 59-61 F R EF The char fry was visually identified as a BT. The char fry was visually identified as a BT. COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc.	SST	+	63	-122	J	R	EF																-
MW 4 59-61 F R EF The char fry was visually identified as a BT. COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc.	SST	20		_	_	-		-					-										
The char fry was visually identified as a BT. COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc.	SST SST CHAR	20		57	F	R	EF	ŧ															-
COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc.	SST SST CHAR DV	20 1 1		57 82	F J	R R	EF EF	Ė															-
COMMENTS Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc.	SST SST CHAR DV BT	20 1 1 2	71	57 82 -107	F J J	R R	EF EF	=															-
Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc.	SST SST CHAR DV BT	20 1 1 2	71	57 82 -107	F J J	R R	EF EF	Ė															
Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc.	SST SST CHAR DV BT MW	20 1 1 2 4	71	57 82 -107 9-61	F J J F	R R R	EF EF																-
Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc.	SST SST CHAR DV BT MW	20 1 1 2 4	71	57 82 -107 9-61	F J J F	R R R	EF EF																
	SST SST CHAR DV BT MW	20 1 1 2 4	71	57 82 -107 9-61	F J J F	R R R	EF EF																
Hiked in from private property; sampled a side channel on river right.	SST SST CHAR DV BT MW	20 1 1 2 4	71	57 82 -107 9-61	F J J F	R R R	EF EF				СОММ	ENTS											
	SST SST CHAR DV BT MW	20 1 1 2 4	71 5	57 82 -107 9-61	F J J F	R R R R	EF EF EF	ent Conce	rns				Ripa	rian	Zone	e	Valle	y Wall I	Process	ses			

Edited by

Date Y M D

CP

									QTP		MOE / MOE	: EY FOR	M												
Stream Nan	10	(ga	ız) Te	lkwa	a River				0110			Telkwa I		:r						Ad	ccess	v	72	Meth	od
Watershed			460-42								·						Reach	No.	1	Լո	gth(km)		8.	0	\neg
Location	_	_	1		channel d		and b					Map#	loc	3L065			SiteNo	-	SC4	-	hSurv(m)		3:		
Location	114	elkw	Kiver	siae	channel, s	t prop	osea Di	rage cr	0831ng.			U.T.M.	165	31,003			FishCa		$\frac{30}{9}$	N	nsurv(m)	Field		His	• 🗆
Date Y.M.		1 9	7 1	0	2 1	Time	113	n	Agency	C87	Crew	RD/D		Photos	A4/	1. 2	AirPho	-	·	··	filhani	1 101	- 🕰	- 1113	
		1	RAME				ALUE		METH	00.	0.0	143.5	_	PECIFIC		_						OBS	TRUC	TION	$\overline{}$
Ave. CI	-				`		120		MILIT	- (72	celeule	ted from a			<u> </u>	<u> </u>						AND MARKET OF	Ht(m)	_	$\overline{}$
Ave. W		_					5.7					.7, 5.8, 4.			ite only								(,	. , , , .	20011
Ave.Ma			<u> </u>	cm)			16			17, 15		.,, 0.0, 4	(2)	neioseu s	ite om;	•,				_			$\vdash \vdash \vdash$		\vdash
Ave.Ma							75			75	5, 10												\vdash		\vdash
Gradie				,			1.5				BEI	MATER	IAL		%	C.		BANI	KS			XC IS	\vdash		Н
% Pool	Ť	20	Riffle	1 3	35 Run	30	Other	15	FLATS	Service on AC	Fines	clay,silt,sar			Ĩ.	1.000	Height		3.5 %1	Insta	ble 0	30,4463			\vdash
Side Ch	an.%			0 2		10-4		40		THE PARTY	Gravels	small (2-16			10		Textur		FG		R		$\vdash \vdash$		
	т-	20%	+	οŪ	0-5		-	-15				large (16-6					Confin		\sim	-	N CO	140,200,00	ос	UC	N/A
Debris		table	%			Ĺ	90					sm. cobble			3	0	-		nel Ratio	-	2-5		0 10	_	I/A
cov	ER:	Tota	1%				60				Larges	ige. cobble			1 4	0		Stage		1	Ory (L	M	Н	Floo	od
Comp.	Dr	.Pool	LO.D.	E	Boulder	lnVeg	Over	Veg	Cutbank			boulder(>2	_			5	Flood	_		-	1.5 Brain	ied	Y	- (0
sum 100	%	15	25	Т	60						Bedrock						Bars (30	٦,	рН	7.4	O ₂ (pp		
Crown C		е %			0	C	Aspe	ct			D90(cm)	36 C	Co	ompaction	LME	5	Water	Temp(c) 4.	5 Tı	urb(cm)	cl	Cond(2		Br
		_				AUGS NEIDAM		HARGE	<u></u>	Sections.	/50	12	exit.			956.5				EAC	H SYN	BOL			\dashv
Par	ame	ter		Τv	/alue	Met	hod	Ī		Spec	ific Data					1					(Fish)				
## Wetted	Wid	th (m)	┢	-											7									
Mean D	epth	(m)		Τ				Estima	ted 10	c.f.s. d	ischarge	<u>.</u>				7	-								.
Mean V	eloc	ity (n	n/s)	Т												1									
Dischar	ge (ı	m3/s))	Г												(We	th:Valley	/Channe	si,Slope)		·			BedMat	tensi
									,																
					. 57			_							. =			0710			_				
	1	_	SH SU	-				-				5	IKE	AM/VAL	ing Down			CIIC	N		_			_	
C Species	No	$\overline{}$				—	thod/Ref	Н	L								.,							R	1
SST SST	2	-	34-58 66-153	_	F	R	EF	+	•			P	LAN	IIMETRI	C VIEW	٧									
331 BT	+		88-219	_	J	R	EF EF	-	•																
DV	+		117-12	-	J	R	EF	\dashv	•																-
co	+;		62-72	_	F-	R	EF	+	•																
co	1	\rightarrow	78		J	R	EF	\dashv	•																
	+	\top						\top	•																
	\top	1																							$\neg \neg$
E	T	1						\top																	
83	T							\top																	
					•				-		СОММ	ENTS													
Chann	el St	ability	,	D	ebris 🗶	M	anage	nent Co	oncerns		Obs	structions		Ripar	ian Zoi	ne 🗌	\	/alle	y Wall	Proc	cesses	_=		Etc.	
Best site	this	seas	on for g	ood	fish habit	at and	comple	xity.																	
Excelle	t sm	all si	de chan	nel	complex o	f habit	at type	s (riffle,	pool, ru	n, flat	s).														
Cobble	bed i	mater	rial with	ı son	ne debris	along I	L left n	nargin.																	
Exceller	t pa	rr/ju	v. char	habi	itat for 75	% of th	is site.																		

Edited by: CP Date Y M D

97/11/

Good fry habitat along the slower flat areas.

Stream	m Name	(ga	az)	Tel	kwa River						(local)	Telkwa R	liver						Acce	55	1	2	Meth	boi
Water	shed Co	ode	460	-42	27												ReachNo.	1	Lngth(km)		8	.0	
Locat	ion	Lower	Telk	wa	River margin	n site; a	t end o	f Cotto	nwood S	St.		Map #	093	L065			SkeNo.	MS1	LthSur	rv(m)		22	2.8	•
		in Telk	wa.									U.T.M.					FishCard	0	N	C	Fiel	X	His	st.
Date	Y.M.D	- 1	7	1	0 0 9	Time	100	0	Agency	C87	Crew	RD/CP/	DA	Photos	A	3/7	AirPhotos							
C		PA	RAN	ΛE.	TER	V	LUE		METH				SP	ECIFIC	DAT	4					OBS	TRUC	TION	s
_	ve. Cha	n. Wid	th (m	1)		100	201		1	172,	208, 240	, 184 - CW	's ca	lculated	from	air j	photo.			- = /	C	Ht(m)	Туре	Loc
A L	ve. Wet	Width	(m)				3.5			2.0, 3	3.8, 4.2,	4.3, 3.8, 3.1	(Enc	closed s	ite on	y.)								
A	ve.Max.	Riffle	Dept	h (c	cm)		38														歸			
A	ve.Max.	Pool D	epth	(c	m)		na														1			
G	radient	%				7	1			C	BE	D MATER	IAL		%	C	BAN	IKS		< 1			1	
× ×	Pool		Rim		60 Run	40	Other	П		松縣	Fines	clay,sitt,san	d (<2r	mm)	5	- 1	Height(m)	2.0 %	Jostable	0	100			Г
-	ide Chan	.%			0 0-10	10-4	0 >	40	1	福慧	Gravels	small (2-16	mm)			2003	Texture	FG)LR					Г
36		Area%	Н	_	0 0-5	5-1	5 3	15				large (16-6-	4mm)			10	Confinemen	_	_	co	FC	oc)	uc	N/A
D	ebris	Stable	%				na			200		sm. cobble	(64-12	8mm)		15	Valley:Char	nel Ratio	0-2	2-5	5(1	0) 10)+ 1	N/A
33	COVER	R: Tota	1%	_			70				Larges	ige, cobble	(128-2	56mm)		30	Stag	8	Dry	() M	Н	Flo	od
C	omp.	Dp.Pool	LO.	D.	Boulder	inVeg	Over	Veg	Cutbank	15		boulder(>25	6mm)			10	Flood Signs	Ht(m)	2.0	Braid	ed	Y		(N)
100	um 100%				100					and a	Bedrock					1	Bars (%)	0	pH	7	.4	O2 (p	pm)	
-	rown Clo		1		0	C.	Aspe	et		和高色	D90(cm)	35 C	Corr	paction	10	1 8	WaterTemp	(C) 1.	9 Turb	(cm)	cl	Cond(25C)	6
- 73		_				7	DISC	HARG	E		/50	18				7		R	EACH	SYM	BOL			
100	Paran	neter			Value	Meth	nod			Spe	cific Dat	a				7			(1	Fish)				
V	Vetted W	/idth (m)		3.											1								
N	Mean De	pth (m)		- 7	7.00											7								
-	Mean Vel		n/s)																					
-	ischarge		_													7	Wdth Valley/Chan	nel Slope)					BedMa	aterial

			FISH SUMM	ARY				STREAM/VALLEY CROSS-SECTION	_	
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L	(Looking Downstream)		R
	SST	30	32-47	F	R	EF		PLANIMETRIC VIEW	宣	
	SST	6	64-108	J	R	EF	130			
E	BT	1	152	J	R	EF				E
		+			-		-			-
10	1	E								
19										
i.		1								_
3		+					_			- 1
04						100				
1	1			-	_	22.00.00	72727	COMMENTS		
-12	Channe	_		ebris 🗌	_		nt Concerns	Obstructions Riparian Zone Valley Wall	Processes	Etc.
	Site cons	sists n	nainly of bould	er and col	bble	with high flor	ws on the edge	e of the site and some slow flats within ~1.5 m of the margin.		
					_					
100										
ES		_								
15		_		_	_					
(F)	-	_			_					
伊子	-	_			_					
100		-								
AVE.		-			_		-		Lucia	CP
ME B	-	-			_		_		Edited by:	1000000
143									Date Y M D	9//11/

											QTD		O / MOE	EY FOR	u								
C4-	No		/	· T-	12	Diam					316	CAN	_	Telkwa R					_	Access	V2	Met	bod
	am Name		(gaz	() 1e 460-42		River							(local)	1 cikwa k	iver			ReachNo.	1		V2	8.0	1000
_	ershed Co		_				<i>4</i> 0 -		6 6	: h. N.				14an #	093L	068		SiteNo.	MS2	Lngth(km)		20.2	-
LOC	ation	1 en	CWB .	Kiver	mary	gin site, -	-0U E	п ш/я	Irom S	ite Mi)1.			Map# U.T.M.	0531	003		FishCard	(Y)	N C	Field		ist.
Date	Y.M.D	_	9	7 1	o	0 9	Tim		1200		Agency	C87	Crew	RD/DA	CP In	hotos	A3/		<u> </u>	File	Field	<u> </u>	ist _
	1.M.D		_	RAME			1130		LUE		METH	C8/	Ciew	KUIUA		CIFIC		Auriloios	L		OPET	RUCTIO	Ne
	Ave. Cha				IER		╁╌	<u> </u>	201		MEIN	172	208 240	184 - CW				is abota				t(m) Typ	
	Ave. Wet.	_		``			╀		4.8			-		i.0, 4.3, 2.9								I(III) I 1 yp	e Loca
	Ave.Max.			· · ·	cm)		+		20			3.3, .	3.3, 0.7, 0	, 4, 2	(EIICH)3eu 311	e only.	<u>, </u>			ALL REP		+
	Ave.Max.			<u> </u>	<u>_</u>		\vdash		58			_									STATE OF	+	+
250	Gradient				,		╁		1				BEI	MATER	IΔI		%	C BAI	ıks		100 mg		+
	% Pool	Ü		Riffie	2	0 Run	۲,	80	Other	\top			Fines	clay,sit,san		,	1 5	Height(m)	2.0 %U	nstable 0	10.440	+	+-1
		Chan.% 0 X 0-10 10-40 >40 Gravels small Area% 0 X 0-5 5 -15 >15 Ising															15	Texture	(F G		The state of	- -	+
発験	Jies ondi	Area% 0.X 0-5 5-15 >15 large (16-04mm)																Confineme		EN CO	FC (C	C UC	N/A
	Debris	_	_	 6	100	0-0:	Ť	J - 10		<u></u>						nm)	20	52222000 41234000		0-2 2-5		_	N/A
	COVER	₹: T	otal	%			Т		60			100	Larges	ige. cobble	(128-256	imm)	40	Stag	e	Dry (L) M	H FI	ood
2	Comp.	Dp.P	ool	L.O.D.	В	loulder	In∨	eg	OverVe	99	Cutbank			boulder(>25	(6mm)		20	Flood Sign	s Ht(m)	2.0 Braic	ied	Υ	()
	sum 100%					100	Τ						Bedrock					Bars (%)	0	р́Н	7.4) ₂ (ppm)	
, Arec	Crown Clos	sure	%	\neg		0	Ç.		Aspect				D90(cm)	28 C	Compe	action	гФн	WaterTem	p(C) 1.	9 Turb(cm)	cl C	ond(25C)	70
200									DISCH	ARGE			/50	14					RE	ACH SYM	BOL		
	Paran	nete	r_		V	alue		Meth	od			Spe	cific Data	3]		(Fish)			
	Wetted W	lidth	(m)				L											<u> </u>					_
	Mean De	oth (m)																				
	Mean Vel	ocity	(m/	(s)			$oldsymbol{\perp}$			_										ļ			
	Discharge	(m	3/s)															(Width: Valley/Char	mel,Slope)			Bedi	Matenal
			FIS	H SU!	AMA	RY	-			Т				S	REAN	#AVALI	FY C	ROSS-SECT	ON				
C	Species	No.		Range(r	-	Life Phase	Use	Met	hod/Ref	\dashv	L						g Downs			_			R
6	SST	28	_	33-51	,	F	R	+	EF	1	-			PL	ANIM	ETRIC	VIEW			_			
	SST	2	-	67-86	\dashv	J	R	+	EF	1	•									_			\neg
建筑建筑	СН	1		58		F	R	+-	EF	+	•				•								
							Τ	Т		1	•												
		П					Т				•												
							Ι	Ι															
										\perp													
										\perp													
e.																							
775													сомм	ENTS									
	Channel	Stat	oility		D	ebris 🗍		Ma	nagem	ent C	oncerns		Obs	structions	\Box	Riparia	n Zon	e Vall	ey Wall	Processes		Etc	2.
	Cobble m	argi	n site	with	prim	arily ru	n ha	bitat	and a b	it of r	iffle.												
125																							- 1

Edited by: CP

Stre	am Name	•	(gaz) T	elkw	a R	iver							(local)	Telkwa	Rive	r					Acce	ss	١	/2	Metho	bd
Wat	ershed Co	ode		460-4	1227	Ξ														ReachNo.	1	Lngth	km)		8.	.0	
Loc	ation	Tell	cwa l	River	mar	gin	site, t	s fron	a Sit	e MS	2.				Map #	09	3L065		T Ç	SiteNo.	MS3	LihSu	(m)		15	.6	
															U.T.M.					FishCard	0	N	Ç.	Field	X b	His	t 🔲
Date	Y.M.D		9	7	1 0	0	9	Time	1	1400	1	Agency	C87	Crew	RD/CF	/DA	Photos	A3/9,	10	AirPhotos							12
G			PAF	MAS	ETER	?		V	ALI	JE		METH				SF	ECIFIC	DATA						OBS	TRUC	TIONS	3
	Ave. Cha	ın. W	lidth	(m)	1.0				2	01			172,	208, 240	, 184 - CV	V's c	alculated	from a	ir pl	ioto.				C	Ht(m)	Туре	Loc'n
2	Ave. Wet	t. Wi	dth (m)						7.1			4.1, 7	.3, 9.4,	10.3, 9.5, 5	.7, 3	.1 (Enclo	sed site	only	<i>(.</i>)				新糖		7	
	Ave.Max	Riff	e De	pth	(cm))				25				7										ALL.	40		
	Ave.Max	.Poo	I De	pth (cm)			1	+3	na -		Mrs. 23												100	-		
100	Gradient	%						0.7		1	-		C	BE	D MATER	RIAL		%	C	BAN	KS			他	100		
	% Pool			Riffle	T	60	Run	40	Ot	her			認為	Fines	clay,silt,sa	nd (<	2mm)	5	1	Height(m)	2.0 %∪	nstable	0	1			
10 mg	Side Char	1.%			00	X	0-10	10-	40	>4	0		2000	Graveis	small (2-1	6mm)		10	122	Texture	(FOG)	L R		NV.			
		Area	%		o[2	X	0-5] 5-	15	>1	5 🗆		824		large (16-	34mm))		金	Confinemen		EN	co	FC	(oc)	uc I	N/A
	Debris	Sta	ble%						1	na			la B		sm. cobble	(64-1	28mm)	15		Valley:Char	nel Ratio	0-2	2-5	5(1	0) 10	+ N	/A
200	COVE	R: To	otal?	6						70				Larges	ige. cobble	(128-	256mm)	30	區	Stage		Dry	(M	Н	Floo	od
100	Comp.	Dp.P	001	L.O.D.	T	Bou	lder	InVeg	T	OverVe	0	Culbank	哈牌		boulder(>2	56mm	0	40	151	Flood Signs	Ht(m)	2.0	Braid	ed	Y	- 6	5
	sum 100%					10	00		1				沙 克	Bedrock					8	Bars (%)	0	рН	7	.6	O ₂ (pp	m)	_
(P)	Crown Clo	sure	%	T	_	0		C	A	spect			521	D90(cm)	36 C	Co	mpaction	LMH		WaterTemp	(c) 2.0	Turb	cm)	cl	Cond(2	(5C)	60
1 3									D	SCH	ARG	E		/50	19						RE	ACH :	SYM	BOL			
N.F	Parar	meter	,		1	/alu	ie .	Met	thod				Spec	ific Dat	a				1			(F	(sh)				
15	Wetted W	Vidth	(m)					1											1								
EN.	Mean De	pth (m)		1														1								
No.	Mean Vel	locity	(m/	s)															1								
-	Discharge	e (m	3/s)			_													1	th Valley/Chan	al Stone		•			BedMat	anial .

			FISH SUMM	ARY				STREAM/VALLEY CROSS-SECTION		
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L	(Looking Downstream)		R
B	SST	36	32-58	F	R	EF		PLANIMETRIC VIEW	=	
W	SST	9	64-103	J	R	EF				
9	CHAR	1	53	F	R	EF				170
					1					
	The char	fry w	vas visually ide	ntified as	a DV	<i>'</i> .				
					-					
4										
S							_			
15										
15										
1			-					COMMENTS		
	Channel	_		ebris	_	Managemen	t Concerns	Obstructions Riparian Zone Valley Wall Pr	ocesses	Etc.
			ort, wide, cobbl							
		•	habitat for ou		_					
-00	Good fry	and :	small juv. hab	itat along	marg	in section of	site.			
		_								
		_								
dE.										
PJ.					_					
		_								
102		_								
13.	-	_								CP
Si									Date Y M D	97/11/

		-					SIR	EAN	_	EY FOR				_		-	I.	_			_
_	m Name	1.0	_	kwa River	_				(local)	Telkwa F	liver			_			Access	-	_	Meth	bd
Vate	rshed C	ode	460-42	27							_		_	_	ReachNo.	1	Lngth(km)	-	_	.0	
.ocat	ion	Telkw	a River n	nargin site, ji	ust u/s f	rom Site MS.	3.			Map #	093	3L065		_	SiteNo.	MS4	LihSurv(m)	+).7	
							,			U.T.M.		_	_		FishCard	0	N C	Fiel	d X	His	L.L
ate	Y.M.D		9 7 1	0 0 9	Time	1600	Agency	C87	Crew	RD/CP/	/DA	Photos	A3/11	, 12	AirPhotos			_			
C		PA	ARAMET	TER	VA	LUE	METH				SF	ECIFIC	DATA					_	TRUC	_	_
A	ve. Cha	n. Wid	th (m)			201		172,	208, 240	, 184 - CW	's C	alculated	d from a	ir p	hoto.			C	Ht(m)	Type	Loc
避 A	ve. Wet	Width	(m)			5.7		4.7,	6.6, 7.6,	7.4, 6.0, 5.6	, 2.3	(Enclos	sed site	only.)			1			_
A	ve.Max	Riffle	Depth (c	em)		20												1			
A	ve.Max	Run D	epth (cr	n)		32												Ba.			
Sp C	Gradient	%				1		C	BE	D MATER	IAL		%	C.	BAN	NKS		Sien			
编稿 指数 X	Pool		Riffle	10 Run	90	Other			Fines	clay,silt,san	d (<2	2mm)	10	堂	Height(m)	2.0 %U		400			
S	ide Char	1.%		0 🗶 0-10] 10-4	0 >40		100	Gravels	small (2-16	imm)		5		Texture	FIB	LR	E.W			
	1.00	Area%		0 0-52	5-1	5 >15		190		large (16-6	4mm))	10	100	Confinemen	nt	EN CO	FC	(O)	UC	N/A
	Debris	Stable	9%			95		部語		sm, cobble	(64-1	28mm)	30	愚	Valley:Char	nnel Ratio	0-2 2-	5 5	10) 10)+ 1	I/A
	COVE	R: Tota	1%			60			Larges	ige. cobble	(128-	256mm)	35	1	Stag	9	Dry () M	Н	Flo	od
tis II c	comp.	Dp.Pool	L.O.D.	Boulder	InVeg	OverVeg	Cutbank	調腦	5	boulder(>2	56mm)	10		Flood Signs	s Ht(m)	2.0 Bra	ided	Y		0
s	um 100%		5	95					Bedrock					1	Bars (%)	2.0	рН	7.6	O2 (p	pm)	
验	Crown Clo	sure %		0	C	Aspect		1	D90(cm)	27 C	Co	mpaction	LØH	198	WaterTemp	p(C) 1.5	Turb(cm)	cl	Cond(25C)	6
1						DISCHARG	E		/50	11				Т		RE	ACH SYN	ABOL			
300	Para	meter		Value	Meth	nod		Spe	cific Dat	а				1			(Fish)				
适 v	Vetted V	Vidth (n	1)	1										1							
SE N	Mean De	pth (m)													1						
語	Mean Ve	locity (r	m/s)																		
通	Discharg	e (m3/s)											(W	dth: Valley/Chan	nnel,Slope)	-			BedMa	tenal
_		_															_			_	_
1			SH SUN							S	IKE		king Down		SS-SECTI	ION	-				
C	pecies		ze Range(m		-	thod/Ref	L			_							_			R	
SQ12	SST	26	32-49	F	R	EF	-			PI	LAN	IMETRI	CVIEW	•			-				-
	SST	9	68-102		R	EF	-01														-
100 E	CH	3	60-67	F	R	EF	-0														_
STATE OF	BT	1	225	J	R	EF	-														_
P. P	co	1	69	F	R	EF	-														_
D.S.	co,	2	70-85	J	R	EF	-														-
10 m	MW	1	60	F	R	EF		_	_	_	-		_	_			_				_
Krist Control		++	-	-	+		-														-
Service Service		+	_		-		-														-
(CE)							-	_	COM	MENTS				-		-		_		_	_
JENER I	Channel	Cintill		Dahaia 9	14	anagement (Canacian	-			-	Pina	rian Zon	0	Vall	ev Wall I	Processes	-	7	Etc.	
-	Channel	_	-	Debris X	IVI	anagement	Joncems	-	OL	structions	-	Nipai	IBII ZOI		- Vall	by wall i	10003303	-	_	_10.	-
-			bitat wit				_	_			_	_		_				_			_
				most of it de		u.					_			-		_					_
100	ines/cob	bles wi	tnin 2 m	of the margin	n.			-						_				_	_		-
199	-		-		_			-			-			_							_
225		_						-			_	-		_							_
5B	-	_			_			-								-			-		_
(5-5) (5-6)	-				-		_	_			_										_
K-17800																					

CP

97/11/

Edited by:

									STR		SURV	= 'EY FOR	м										
Stre	am Name		(gaz) Te	lkwa	River							Telkwa I	_						Acces	s	FT	Meth	od
Wat	ershed C		460-42							 · -		· ,					ReachNo.	1	Lngth(k	m)		B.0	
Loca	etion	Tell	wa River,	bay s	rea just	off ti	e Germ	n car	er's prop	erty.		Map#	093	L065			SiteNo.	MS5	LthSurv			33	
												U.T.M.					FishCard	0	N	F	eld 🎇	His	t. 🗌
Date	Y.M.D		9 7 1	0	0 3	Time	100	0	Agency	C87	Crew	RD/DA	/CP	Photos	B4/2	2, 23	AirPhotos						
			PARAME	TER		•	VALUE		METH				SPI	ECIFIC	DATA			,		OE	STRU	MOITS	\$
	Ave. Cha	ın. W	lidth (m)				168			200,	164, 140	, 168 - CW	's cal	culated	from	air pl	noto.				Ht(m	Туре	Loch
	Ave. Wel	L WI	ith (m)				6.7			8.5, 8	3.9, 8.2, 8	3.1, 3.1, 7.1	, 2.8	- plus	bay ar	en of	4.6 m x 1	3 m				1	
	Ave.Max	.Riff	e Depth (cm)			10								(Enclo	sed s	ite only.)					<u> </u>	_
	Ave.Max	.Run	Depth (c	m)			45	_	<u> </u>	1										2	300		
海縣	Gradient	%				<u> </u>	1			30 3	_	MATER	IAL		%	Ç				對		<u> </u>	
**	% Pool	Ш	Riffle	10			Other	90	FLATS	300	Fines	ciay,siit,san	d (<2n	nm)	1	0	Height(m)	3.0 %∟		0	_	₩-	<u> </u>
糧	Side Char	1.%	$\perp \perp$	0 🗶			-40 :	40_	<u> </u>		Gravels	smail (2-16	lmm)		30		Texture	(F)G	L R	3	屋	1	
		Area	×	0 🗆	0-5	5	-15[] :	-15				large (16-6	4mm)		<u> </u>		Confinemen	ri	EN (00 F0	_	UC	N/A
	Debris	Sta	ble%				90					sm. cobble	(64-12)	6mm)	4	5	Valley:Char	nel Ratio	0-2	2-5 5	<u> 100 1</u>	0+ N	I/A
199	COVE	R: To	tal%				25				Larges	ige. cobble	(128-2	56mm)		5	Stag		Dry	<u> </u>	м н		
	Comp.	Dp.P	ooi L.O.D.	Bo	oulder	Algae	Over	Veg	Cutbenk			boulder(>2	56mm)		<u> </u>	0	Flood Signs	Ht(m)	1.5	Braided	<u></u> _Y		O.
	sum 100%	1	0		80	10					Bedrock						Bars (%)	nr	pН	7.4	O ₂ (opm)	
	Crown Clo	sure	%	- (0	S.A.	Aspe	≭t	<u> </u>		D90(cm)	32	Com	pection	L ⊘ H		WaterTemp	(C) 4.	0 Turb(c	m) c	Cond	(25C)	60
2							DISC	HARG	E		/50	9				_		RI	EACH S	-	L		
- IF	Parar	nete	•	Va	ilue	Me	ethod			Spe	cific Dat	a				4			(F¤	sh)			
-870£3	Wetted V		` '	_				<u> </u>								4							
e in	Mean De			↓				Trick	de flow di	schar	ge enter	ing top of	bay.			4							
200	Mean Ve	<u> </u>	<u>` </u>	├		<u> </u>										4			1				
	Discharge	e (m	3/s)	ļ												(We	th Valley/Chan	nel,Slope)				BedMa	tensi
	-		FISH SU	MMAI	RY			Т				S	ΓREA	M/VAL	LEY C	ROS	S-SECTI	ON					
C	Species	No.	Size Range(r	mm) L	ife Phase	Use	Method/Ref	П	L						ing Down							R	
	SST	67	31-61	Ť	F	R	EF	-1				PL	ANI	METRI	C VIEV	٧							
-3-3	SST	2	71-108	;	J	R	EF	1	_										_				
241	BT	1	180	$\neg \uparrow$	J	R	EF	T	_				•										
	MW	2	54-68		F	R	EF	T	_														
12									-														
								T															

			FISH SUMMA	RY			STREAM/VALLEY CROSS-SECTION			
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L (Looking Downstream)		Ŕ	
	SST	67	31-61	F	R	EF	PLANIMETRIC VIEW	\Box		
***	SST	2	71-108	J	R	EF			•	
343	BT	1	180	J	R	EF	<u> </u>		-	_
100	MW	2	54-68	F	R	EF			_	_
									_	
									_	
(.)									_	
in h					L	<u> </u>				
di . Tema							•			
							COMMENTS			
	Channe!	Stat	oility D	ebris 🗌		Managem	Concerns Obstructions Riparian Zone Valley Wall	Processes	Etc.	
75 (m)	Sampled :	bay	area off the m	ainstem o	f th	e Telkwa Ri	r.			
						,				
27										
ř Š										
数基										
Peras.										
ar K								Edited by	CP	
								Date Y M D	97/11/	

										STR	EAM	SURV	EY FOR	W											
Stream I	lame	(g	az) Te	lkwa	River				,			(local)	Telkwa F	iver	•						Access		FT	Metho	od
Watersh	ed Co	de	460-4	227															ReachNo.	1	Lngth(km)	8	.0	
Location		Telkw	River	marg	in site, 5	0 m u	/s fr	om Si	te MSS	5.			Map#	093	3LO	65			SiteNo.	MS6	LthSurv(i	n)	16	.5	
													U.T.M.						FishCard	O	N C	Fie	ld 🗶	His	L[
Date Y.	M.D	- 1	9 7 1	0	0 3	Time	Τ	1130)	Agency	C87	Crew	RD/DA	DΒ	Ph	rotos	B5	/2, 3	AirPhotos						
		P/	RAME	TER		\	VAL	.UE		METH				SP	EC	IFIC	DAT	Ά				ОВ	STRUC	TIONS	3
2179 404	. Chai	n. Wid	th (m)					168			200,	164, 140	168 - CW	's ce	alcu	lated	fron	air	photo.			+0	Ht(m)	Туре	Loc'n
Ave.	. Wet.	Widt	ı (m)					6.7			5.5, 7	.2, 7.7, 7	.9, 5.0 (En	clos	ed :	site or	aly.)	_							
Ave	.Max.	Riffle	Depth	cm)				na				•													
Ave	.Max.	Run D	epth (c	m)				39			35, 3	7, 46											4		
Gra	dient	%						1			製C線	BE	MATER	IAL			%		C BA	iks					
% Po	oł		Riffle	П	Run	100) 0	ther				Fines	clay,sit,san	d (<2	2mm)		5	Height(m)	3.0 %∪		0	638		
Side	Chan	.%	\perp	0 🗶	0-10] 10-	-40 [□ >4	40[]			Graveis	small (2-16	mm)			10)	Texture	FUG	L R	100	e de la compa		
製業		Area%		0	0-5[5	-15[>·	15[large (16-6	4mm))				Confineme	nt	EN C	O FC	\odot	uc	N/A
Debi	ris	Stable	%					na					sm. cobble	(84-12	28m	m)		20	Valley:Cha	nnel Ratio	0-2 2	-5 5	10 10)+ N	/A
C	OVE	t: Tota	1%					75				Larges	ige. cobble	(128-2	256r	TUTT)		40	Stag	в	Dry	D N			
Com	p.	Dp.Pool	L.O.D.	Во	oulder	InVeg	\perp	OverV	99	Cutbank		L	boulder(>25	6mm	1).			25	Flood Sign	Ht(m)	1.5 B	raided	Y		\mathfrak{Q}
sum	100%				100		\perp					Bedrock					\perp	_	Bars (%)	nr	pН	7.3	O ₂ (p	om)	
Crow	n Clos	sure %		1	0	9.清	趣 A	spect	١٠	L		D90(cm)	32	Cor	mpa	ction	L ₩	н	WaterTem	(C) 4.	Turb(cr	n) d	Cond(25C)	60
								DISCH	ARGE			/50	17					_		RE	ACH SY		-		
	Paran	neter		Va	lue	Me	etho	d			Spec	cific Data	a					ᅵ			(Fish)			}
Wet	ted W	idth (n	1)	$oldsymbol{ol}}}}}}}}}}}}}}}}}$		<u> </u>												4							. !
77220		oth (m)		₩		<u> </u>		-							_			4							į
SS(2) 25-5100		ocity (r		+		├		\rightarrow										_			ł				
Disc	harge	(m3/s	•)	<u> </u>														_	(Width: Valley/Char	nel,Slope)				BedMat	enel
		FI	SH SU	MMA	RY				T				Si	RE.	AM	∕VAL	LEY	CR	OSS-SECTI	ON					
G Speci	ies	No. Siz	e Range	mm) L	Ife Phase	Use	Metho	od/Ref	7	L						(Looki	ng Dov	wnstr	eam)					R	ļ
S	ST	32	31-48		F	R		EF	\neg				Pl	AN	IME	TRIC) VIE	W			_				
S	ST	4	70-10	9	J	R		EF	\top																
CI	IAR	1	51		F	R		EF																	
対数																									
	char f	ry was	visuall	y iden	tified as	a BT.				-															
iin				\Box		\sqcup			_																
		\vdash				\sqcup			_																
		1		_		\sqcup			\bot																
		\sqcup		_		\sqcup			+																
												COMM					,								
		Stabilit			bris					oncerns		Obs	structions	_	F	Ripari	an Z	one	Vall	ey Wali	Processe	s		Etc.	
6.8.81									ider b	ed mater	ríal.							_							
- Acceptant					m along	the m	argi	in.																	
	d pari	habit	at throu	ghout	site.													_							
														-											
START							_																		

Edited by: **CP**

Date Y M D

												DFC) / MOI	Ē										
											STR	REAM	SURV	EY FOR	M									
Stre	am Name	,	(gaz) Te	licwa	River							(iocal)	Telkwa F	liver					Access	F	T N	detho	5 d
Wat	ershed C	ode	1	460-42	227							•						ReachNo	1	Lngth(km)		8.0)	•
-	ation	_	kwa l	River	marg	n site, l	50 m	w/s	from	Site M	S6.			Map#	093L065			SiteNo.	MS7	LthSurv(m)		22		
F						,								U.T.M.				FishCard	(1)	N S	Field	d	Hist	
Date	Y.M.D		9	7 1	0	0 3	Time	. T	120	0	Agency	C87	Crew	RD/DB/	DA Photos	B.	5/4, 5	AirPhotos			•			
			DAE	AME	1 1		-		LUE		METH	-			SPECIFIC	DAT	TA.				OBS	TRUCT	IONS	
	Ave. Cha	. V			121		+		168		-	200	164 140	168 - CW	's calculate			nhoto.			Talk trees	HI(m) T	- 1	
	Ave. We	_					╁		5.1		 	+			closed site			paoto					<i>//</i>	
操業	Ave.Max				cm)	-	+-		25			i	6, 21	X0, 2.7 (DE	ciosca siac (,.,						\vdash	寸	_
	Ave.Max						╫		DR			120, 3	0, 21									\vdash	-	
), De	pui (c	,		\vdash		1		-	C	PE	D MATER	IAI	94		BA	NKS				-	
213	Gradient	70	1 1.	Riffle	90	Run	-	1	Other	10	FLATS		Fines			├	5	Height(m)	1 1	Instable 0		$\vdash \dashv$	-	
100	% Poci	. •/	1	Kime	0 🗶			_			PLATS	ENNE	1	clay,sitt,san		11		Texture	(FOG					
4	Side Char	1	\rightarrow	+			_)-40		40	\vdash		Grevels	smail (2-16	-	. ''		RNA I					_	
	Dobrie	Area			0	0-5	<u> </u>	-15		15	├			iarge (16-6-		├-		Confinem		0-2 2-		(00) U		N/A
79	Debris		ble%				↓		118		<u> </u>			-	(64-128mm)	\vdash	10	eator -	ennel Ratio					
	COVE	_	_				↓		80		<u> </u>		Larges	-	(128-256mm)	\vdash	45	Sta		Dry (L		,	Floo	
	Comp.	Dp.F	oci i	L.O.D.	+ -	ulder	InVe	-	Over	/eg	Cutbank			boulder(>25	6mm)	Щ	30	Flood Sig		2.0 Brai		Y	_	
樂	sum 100%	_		-	_	100	Asserted	(T) (Z.			Ц		Bedrock	1 /055	*	,]		Bars (%)	nr	4	7.3	O ₂ (ppr		
i,i	Crown Clo	sure	%)			Aspec	t .	ļ		D90(cm)	35	Compaction	L(W	Н	WaterTer	1.			Cond(25	C)	60
1					,				DISCI	HARG	E		/50	18			_		RI	EACH SYN	IBOL			
	Parar	nete	r		Va	lue	М	ethe	od			Spec	cific Dat	a			4			(FISH)				
	Wetted V	Vidth	(m)		<u> </u>		_										_	_						
鬱	Mean De	pth ((m)		↓		↓_													1				
350	Mean Ve	locit	y (m/:	s)	ــــــــــــــــــــــــــــــــــــــ		<u> </u>										_							
	Discharg	e (m	3/s)															Width: Valley/Ch	nnel,Slope)			В	ledMat	arrai
		-	EIGI	1 6111	MMAI			_		$\overline{}$				91	REAM/VA	1 EV	CP	DSS-SECT	TION					
-	Species	No.	T	Range(r		ife Phase	Use	Mari	hod/Ref	\dashv	L			J.		uing Do							R	
100	SST	78	-	31-45	-	F	R		EF	4	-			PI	ANIMETRI	C VII	ew.						•	
78.5	SST	8	-	78-127		J	R	-	EF	+	-					- ***	•			_				
3.10	CHAR	1	\vdash	56	+	F	R	-	EF	\dashv	-													
	MW	1		60	\dashv	F	R	\vdash	EF	+	-													
1000	172 41	Ĥ	-		\dashv		 ``	-		+	-													
Tage	The char	fra s	vae v	anolli	ı iden	tified or	a R1			+	•													
	THE CHAI	T	V # 3 V	suany	T	illica as	T .	Ė		+	•													
- 1 A		╁			\dashv		╁			+														
		╁	-		-+		╁╌	-			-													
418		╁	-		-		╁			+	-													
		<u> </u>	<u> </u>				ــــــــــــــــــــــــــــــــــــــ	<u></u>					COMM	ENTO										_
	Channel	C+-	hilite	-	D.	bris 🗍		14-	nacc	nert C	000000			structions	Dies	rian Z	'oro	<u> </u>	llev Mair	Processes		3 1	Etc.	
			<u></u>	<u></u>			<u> </u>	IVIA	nager	nent C	oncems	<u>' </u>	OD.	su ucuoris	Ripa	rail Z	JIE	va	ney vvali	r rocesses			CIC.	
27.5 10	Sampled		•															-			—			
2214	Excellent																		<u> </u>					
40.0	Good par	r ha	Ditat	throu	ghout	most o	the :	site.																

Edited by: CP Date Y M D

97/11/

Poor fish habitat along the outer edge of net due to high water velocities.

Stre	am Name	(gaz) Te	lkwa River						(local)	Telkwa l	live:	•					Access	V	2	Metho	d
Wat	ershed C	ode	460-42	227												ReachNo.	1	Lngth(km)		8.0	0	
Loca	tion	Telk	wa River	margin site , j	ust d/s	from pr	oposed	bridge			Map#	09	3L065			SiteNo.	MS8	LthSurv(m)		19.	3	
		cross	ing, 30 m	d/s from Site	SC4.						U.T.M.	Τ				FishCard	(N S	Field	X	Hist	. [
Date	Y.M.D		9 7 1	0 2 1	Time	1400		Agency	C87	Crew	RD/I	À	Photos	A4	4/3,	4 AirPhotos						
	•	F	PARAME	TER	V	LUE		METH		·		SF	PECIFIC	DAT	Α				OBST	TRUCT	TONS	
議議	Ave. Cha	n. Wi	dth (m)			120			- CW	calcula	ted from	air p	hoto.						SC.	Ht(m)	Туре	roc,u
	Ave. Wet	. Wid	th (m)			4.7			4.3, 5	5.7, 6.4, 4	.7, 2.5 (S	mpl	e site onl	y.)								
	Ave.Max	Run l	Depth (c	m)		45													ant.			\Box
	Ave.Max	.Pool	Depth (c	:m)		na			<u> </u>											\Box		
经	Gradient	%				1			觀湖	BE	MATER	IAL		%	<u>. </u>	C BAN	KS		3		_	_
	% Poci	\coprod	Riffle	Run	100	Other				Fines	clay,silt.sa	nd (<	2mm)			Height(m)	2.5 %U	stable 0			_	_
	Side Char	1.%		0 🗶 0-10	10-4	0 >	40			Graveis	small (2-1	Bmm)		10	0	Texture	(F (G	L R				
瓣		Area%		0. 0-5	5 -1	5_ >	15				large (16-6	34mm)			Confinemen	nt	EN CO	<u></u>			VA.
놹	Debris	Stab	le%			na					sm. cobble	(84-1	28mm)	\Box	10	Valley:Char	nel Ratio	(- 2) 2-	5 5-1	_	+ N/	Α
2	COVE	R: To	tai%			75				Larges	ige. cobbie	(128-	258mm)	\sqcup	25	Stag	8	Dry I	_ (M)		Floo	_
	Comp.	Dp.Po	of L.O.D.	Boulder	InVeg	Over	/eg	Cutbank			boulder(>2	56mm	1)	Ц	55	Flood Signs	~	1.5 Bra	_	Y	_	\mathcal{C}
線影	sum 100%	<u>L</u>		100						Bedrock				Ц		Bars (%)	30	pH	7.6	O₂ (pp	m)	_
(K)	Crown Clo	sure %	6	0	SHA	Aspec	t		機關	D90(cm)	60	g Co	mpaction	L M	0	WaterTemp				Cond(2	5C)	nr
****						DISCI	IARGE			/50	20				_		RE	ACH SY!	MBOL			
響	Para	neter		Value	Met	nod			Spec	cific Data	<u> </u>				_			(FmP)				
	Wetted V				<u> </u>										_						_	
	Mean De						Telkw	River a	t moc	derate flo	ows.				_							
大雅	Mean Ve		 												_			- 1				ļ
	Discharg	e (m3.	/s)	l	·											(Width: Valley/Chan	nei,Slope)				BedMate	mei
		1	FISH SUI	MMARY			\neg				s	TRE	AM/VAL	LEY	CR	OSS-SECTI	ON					
Ċ.	Species	No. S	Size Range(mm) Life Phase	Use Me	thod/Ref	П	L					(Looki	ing Do	wnstr	ream)					R	
泛越	SST	12	38-52	F	R	EF	7				P	LAN	IMETRIC	C VIE	EW			_				
7.	SST	2	68-98	J	R	EF	1	•														
*	MW	2	60	F	R	EF																
100																						
1.h																						
摄																						_
Will have							\perp															
要		Ш			\sqcup																	
			_															***				
***										COMM												
B. Th	Channel		,	Debris 🔙				oncerns		Obs	structions	<u> </u>	Ripari	an Z	one	Valle	ey Wall F	rocesses	_		Etc.	
112				ite consisting			ın habi	tat.														
	Good par	r rear	ing habit	at despite the	low cat	ch.																

Edited by: CP

Date Y M D

Stream Na	me	(ga	z) Te	lkwa River						(local)	Telkwa I	liver							Acce	55	F	T	Metr	toof
Watershed	Cod	ie	460-4	227												ReachNo.	1	1	Lngth	(km)	1	8	.0	- 3
Location	3	50 m l	elow (Goathorn Cree	k confi	uence;	at prop	osed br	idge		Map#	093L065				SkeNo.	M	S9	Linsu	rv(m)		~1	00	
	c	rossin	g site.								U.T.M.					FishCard	Y	(N	C.	Fiel	X b	His	st.
Date Y.M.	.D	1 9	7 1	1 0 1	Time	nr	- 11	Agency	C87	Crew	RD	Photo	5	A3/19-	25	AirPhotos								-
0		PA	RAME	TER	V	LUE		METH				SPECIF	IC D	ATA						91	OBS	TRUC	TION	IS
Ave. C	han.	Widt	h (m)		e	st. ~60 r	m													1	C	Ht(m)	Туре	Loc'r
Ave. V	Vet. \	Nidth	(m)		100	nr															40			
Ave.M	ax.R	iffle D	epth (cm)		100			1												25			
Ave.M	ax.P	ool D	epth (d	em)		350								-6.7			¥1				離			
Gradie	ent %					1-2			C	BE	D MATER	IAL	T	%	C	BAN	KS				A	2.11		
% Pool	-	15	Riffie	70 Run	10	Other			製品	Fines	clay,sit,san	d (<2mm)	\top	5		Height(m)		%Ur	stable		湾			
Side Cl	han.%	4		0 0-10	10-4	0 >	40		160	Gravels	small (2-16	mm)		15	100	Texture	F(G	LR	5	鹰	174		
PAT.	A	гоа%		0 0-5	5-1	5 >	15				large (16-6	4mm)			2	Confinemen			EN	co	(FC)	oc	UC	N/A
Debris	1	Stable	%			10			23		sm. cobble	(64-128mm)	\top	20	6	Valley:Chan	nel Ra	itio	0-2	2-5	5-1	0 10)+ N	N/A
COV	VER:	Total	%			70			0.50	Lerges	lge, cobble	(128-256mm)		40	NG.	Stage	,		Dry	L	(M) H	Flo	bod
Comp.	D	p.Pool	L.O.D.	Boulder	InVeg	OverV	/eg	Cutbank	100		boulder(>25	66mm)	1	20	100	Flood Signs	Ht(m)		2.5	Braid	ed	Y	-	(M)
sum 10	00%	15	5	80						Bedrock				13	8	Bars (%)	1	0	рН	1	.7	O2 (p	pm)	
Crown	Closu	re %	1		C	Aspec	t		70	D90(cm)	30 C	Compaction	n L	MH.		WaterTemp	(C)	3.0	Turb	(cm)	cl	Cond(25C)	
50%						DISCH	ARGE			/50	14							RE	ACH	SYM	BOL			_
Pa	rame	ter		Value	Meth	od			Spe	cific Dat	а								(Fish)				
Wetter	d Wid	th (m)							-															
Mean	Depti	n (m)					Telkwa	a River	at mo	derate fl	ows. Wate	r slightly												3
Mean	_		/s)			_	_	in colou	_															
Discha	_		_					7777							(We	th: Valley/Chann	el.Sion	•)					BedMa	atemai

Т			FISH SUMMA	RY				STREAM/VALLEY CROSS-SECTION	=	
C	Species	No.	Size Range(mm) NOT SAMPL	Life Phase	Use	Method/Ref	ι _ _	(Looking Downstream) PLANIMETRIC VIEW	=	R
The State of the S										
3								COMMENTS		
多	Channe	Stat	bility D	ebris 🗶		Managemen	t Concerns	Obstructions Riparian Zone 🗶 Valley Wall Pr	rocesses	Etc.
-	Banks: F	R. left	bank consists	of 20 m h	igh l	edrock with a	flat bench on t	top.		
V	1	C rig	ht bank consist	s of a 2.5	3.0	m high cobble	gravel bank.			
38	A small c	obbl	e bar island is p	present in	the	center of the r	river at the cros	sing site. The R. right channel consists of 100% riffle. The R. let	fr	
4	channel	consi	sts of deep poo	l habitat.						
	U/S of cr	ossin	g very confined	single ch	ann	el; d/s of cros	sing channel is	wider and less confined.		
Š	Boulder-	cobb	le bed; substra	te is smal	ler a	t pool outlets	and slow flow se	ections - suitable for salmon spawning, but makes up only a small		
Į,	percenta	ge of	the channel ar	ea.						
ŝį	Potential	sam	pling sections:	R. right	side	channel is too	large for sampl	ling.		
ě	7			Some go	od c	obble margin	is present below	y pool on R. left.		
ń				U/S from	n site	habitat is a s	low run; water	is too deep along the shoreline to sample.	Edited by	CP
-										

Stre	am Name	(ga	ız) Te	lkwa R	iver						(local)	Telkwa	Riv	ver					Access	ν	2	Metho	d
Wat	ershed Co	ode	460-42	27													ReachNo.	1	Lngth(km)		8.)	
Loc	ation	Lower 3	00 m of	Telkw	a River	flood	channel	locate	below			Map #	٦	093L065			SiteNo.	WL1	LihSurv(m)		120	ю.	
		road at	PNG cr	ossing.								U.T.M.	П				FishCard	(2)	N C	Field	X	Hist	
Date	Y.M.D	9	7 1	1 0	4	Time	900)	Agency	C87	Crew	RD/	DA	Photos	A5/	18,	19 AirPhotos						\neg
C		PA	RAME	TER		V	LUE	,	METH					SPECIFI	C DAT	A				OBS	RUC	TONS	;
	Ave. Cha	n. Width	(m)				4.0			2.5, 4	1.8, 4.0, 4	.7								*C	Ht(m)	Туре	Loc'n
	Ave. Wet						2.5				2.3, 3.8, 3									12.50			
	Ave.Max.			m)			3				, ,									1110			
	Ave.Max.		·	<u> </u>		***	38													C.F.			\neg
100	Gradient		· · ·				2			C	BEI	MATE	RIA	AL.	1 %		C BAI	NKS		温静			\dashv
	% Pool	10	Riffie	60	Run	30	Other		<u> </u>		Fines	clay,silt,sa			+	55	Height(m)	1.6 %U	nstable 0	1		\dashv	\dashv
對然霧間 選	Side Chan		1	-	0-10			40		*****	Gravels	small (2-1			+ 10	_	Texture	(F)G	_	The state of		_	\dashv
42		Area%	++	0	0-5			15	\vdash	2		large (18	_		┨ ^		Confineme		EN CO	FC	oc () (St	N/A
	Debris	Stable%		<u> </u>		3-1	75	13				sm. cobbi			╁╌	20	Valley:Cha		0-2 2-5			~	Ä
144									<u> </u>						┰	_	CONTRACTOR OF THE CONTRACTOR O		_			_	_
		R: Total		2			50			1.11	Larges			28-256mm)	+-+	15	Stag			_	H	Floo	_
	Comp.	Dp.Pool	L.O.D.	Bou	$\overline{}$	InVeg	Over	/eg	Cutbank	Committee of		boulder(>	256	mm)	14	\dashv	Flood Sign	T	1.6 Braic	_		-	\mathfrak{O}_{\parallel}
, de	sum 100%	'	15		0	Coltrolition					Bedrock	1	200		+ +	_	Bars (%)	50	 	or .	O₂ (pp	_	\blacksquare
1	Crown Clo	sure %		0		ST.	Aspec			對键	D90(cm)	13		Compaction	r &	Щ	WaterTem	· · .	Turb(cm)		Cond(2	5C)	nr
透纖纖				,				HARGE					_			_		RE	ACH SYM	BOL			
1	Paran			Valu	ie .	Meth	nod			Spec	cific Data	3	_			_			(Fish)				- 1
	Wetted W	<u> </u>		<u> </u>												_							
	Mean De	oth (m)						Estima	ted 1 c.f	ls. dis	charge.					_							
	Mean Vel		s)													_			1				
	Discharge	(m3/s)															(Width:Valley/Char	nel,Slope)				BedMate	enal
				4440									_	E 4 540 /4			000 0505	-					
	Species		SH SUN					\dashv	,			•	יוו		king Do		OSS-SECT	ON				_	ı
Lyss			Range(r	nm) Lite		_	thod/Ref	4	L								,					R	- 1
	SST	1	83		J	R	MT					,	-	NIMETR	IC VIE	.VV							\dashv
72.23	со	107	49-76		F	R	MT	+															\dashv
洪武		\vdash	77-99		J	R	MT	+															\dashv
100 K	C-4 10 +		d al	-161	14 5	<u> </u>		-	•														\dashv
(1) (4) (4) (4)	Set 10 tra	PS 111 1100	u cuani	ies for A	. 4 п. ре	100.		-															\dashv
		\vdash				+		+															
		 				+		-					_									_	\dashv
		 -		\dashv		+																	\dashv
				+		+																	
																							—
10											COMM			== ==									-
¥.,	Channel				is 🗶	М	anager	nent Co	oncerns		Obs	truction	S .	Ripa	rian Z	one	Vall	ey Wall P	rocesses			Etc.	
1	Nice, low												_										\dashv
	Evidence	of high fl	ows - fl	ood wa	ters had	blow	out ol	d beave	r dams	and le	ft debris	above t	ne l	anks.									\blacksquare
4.40	Sand/silt l																						
	Good coh	rearing	and po	tential	coho e	nhance	ment a	rea.															

Edited by: CP

Date Y M D

97/11/

No potential spawning in this section of channel.

DFO / MOE

										STR	EAM	SURV	EY FOR	M											
Stre	am Nam		(ga	z) Hı	ubert	Creek						(local)	Lower H	lubert C	reek						Acces	s	V2	Met	hod
Wate	ershed C	ebo		460-4	370													ReachNo.		1	Lngth(k	m)		3.7	
Loca	tion	-80	m ď/	s from	CNR	culverts							Map#	093L)65			SiteNo.	н	J B 1	LihSun	r(m)		800 m	
												-	U.T.M.					FishCerd	Y	N			Field	X Hi	st.
Date	Y.M.D		9	7 0	8	1 4	Time	93)	Agency	C87	Crew	CP	PI	notos	n.a		AirPhotos							
Q.			PA	RAME	TER		V	ALUE		METH				SPEC	IFIC D	ATA						C	BST	RUCTION	VS.
	Ave. Chi	an. W	/ldt/	(m)				10.5			12.0,	10.9, 8.8	3, 11.6, 9.1	, 10.6								90	G H	t(m) Type	Loc'n
	Ave. We	t. Wi	dth	(m)				7.6			7.7, 8	.3, 6.9, 8	1.7, 6.6, 7.	3								74.6			
192	Ave.Max	.Riff	e D	epth (cm)						n/a											49			
	Ave.Max	.Poo	i De	pth (c	m)			1.0			1.2, 0	.8, 0.9	•••									200	200		
	Gradien	t %						1.5			10	BEI	D MATER	liAL		%	C	BAN	KS			YEST.			
	% Poci	9	5	Riffie	Π	Run	5	Other	П		100	Fines	clay,sitt,sa	nd (<2mm)	95	蠽	Height(m)	0.5	%Unsta	ib le	0	機能		
	Side Cha	n.%			0 🗆	0-10	10-4	0 ;	40			Graveis	small (2-1	Brnzm)		5		Texture	F	G L	R	asy			
13		Area?	4	П	0 🗆	0-5	5 -1	5X :	-15[]		24	1	large (16-6	34mm)			麔	Confinemen	ıt		EN	co	FC C	oc (UC)	N/A
-	Debris	Stat	ole%					100					sm. cobble	(64-126m	ım)			Valley:Chan	nel Ra	tio	0-2	2-5	5-10	(÷)	N/A
孌	COVE	R: To	otal?	%				95			X 140	Larges	lge. cobble	(128-256)	nm)	1		Stage	9		Dry	L	(M)	H F	ood
	Comp.	Dp.Pc	ool	L.O.D.	Вс	oulder	inVeg	Over	Veg	Cutbank			boulder(>2	56mm)		Τ		Flood Signs	Ht(m)		0.2	Braide	<u>. T</u>	Y	0
	sum 100	3	0	15	1	•	40		10	5	ger.	Bedrock				1		Bars (%)		5	рН	7,8	3 C) _z (ppm)	
320	Crown Ck	sure	%		1	0	0	Aspe	ct			D90(cm)	<1 C	Compa	ction (мн		WaterTemp	(C)	15.5	Turb(cm)	cl C	ond(25C)	250
								DISC	HARG			•	<u> </u>				Т			REAC	H SY	мвс	L		
2.4	Para	mete	r		Vē	ilue	Met	nod			Spec	ific Data	a	·			1				(Fi	sh)			
- 15 A	Wetted V	Vidth	(m)														1								
÷75,	Mean De	epth (m)														1								_
atijal k	Mean Ve	locity	/ (m/	s)]				- 1				
£.L	Discharg	e (m	3/s)														(Widt	h:Valley/Chanr	nel, Slope	•)				Bedk	latenai
									•					•											
																	_		=						
		1	T	H SU					\dashv				S	TREAM	/VALL: (Looking			S-SECTION	ON		_				_
C	Species	No.	Size		- +	ife Phase	Use M		Ц.	L			_											,	₹
13	SST	4	-	87-125	•		R	MT	-	-			Ρ.	LANIMI	IRIC	VIEVV					_				
5 (Z) 2 (Z)	co	2	┝	50 75-89	\dashv	F J	R	MT	-	-															
547 547	СН	44	⊢	41-58		F	R	MT	+	-															<u>·</u>
3: %	LSU	2	\vdash	57-89		F/J	R	MT MT	+	-															
	LNC	10	-	42-72		F/J	R	MT	+	•															
19.21	LIVE	10	╁	42-12	\dashv	F/J	-	141 8	+	•															
700	12 +			- 24 b		-d E	Umban		\dashv																
22. 32	12 traps v					ou irom	nuber	· C.	+	-															
7.0 ¥ 6k 1 g (4)\$	mvatn 10	me C	1	CHIVEL	13.		 		+	-															
11 A 12 A		<u> </u>										COMM	ENTS												
Think Post	Channel	Stat	sility	¥	De	bris	NA.	anage	ment C	oncerns			structions	(Y :	Ripariar	700		\/alle		all Dro	cesse			Etc	
5-9-000 5-9-000																		vade acro							·· ·

the channel widths in this section.

catch consisted of: - 3 coho

- 2 steelhead

- 2 chinook

Instream grasses and mosses are abundant and make up the majority of cover. Habitat primarily pool with some ponded areas and sections of glide. Mud/silt bed material with small pockets of fine gravels are present. All BD's d/s of CNR crossing are old and are not a barrier to fish.

There is no site card for HUB2. 12 traps were set for 24 h. period from the CNR culverts to the Hydro line (the HUB 2 section). The

Edited by.

Date Y M D

97/11/26

- 3 longnose sucker

- 114 longnose dace

													311		SOLA	EIFUR	101	_											_	
Stre	am Name	•	(ga:	z)	Hu	bert C	reek								(local)	Lower H	ube	rt Creel	<u>k</u>						Acce	ss	V	2	Meth	od
Wat	ershed C	ode		460	43	70																ReachNo.		i	Lngth	(km)		3.	7	
Loca	ition	Site c	ard	~70	m	d/s fro	m Le	W S 0	n Ro	ed.						Map #	09	3L065				SiteNo.	н	J B 3	LihSu			100)nı	
																U.T.M.	Γ					FishCard	Y	N		C	Field	X	His	t. 🔲
Date	Y.M.D	-	9	7	0	8	1 4	Tin	me	1	030		Agency	C87	Crew	CP		Photos	B1/	18-20		AirPhotos								
C	PARAMETER VALUE METH SPECIFIC DATA																				OBS	TRUC'	TION:	s						
	24													.9, 2.5,	4.5, 3.2, 3.9)										ic.	Ht(m)	Туре	Loc'n	
	Ave. We	L Wid	th (m)				Τ		2.5	,			3.1, 2	.5, 2.0,	3.6, 2.6, 3.3	,													
数	Ave.Max	Riffle	De	pth) (C	m)				nr					•															
	Ave.Max	Pool	De	pth	(cr	n)		Τ		47				55, 5	0, 35												ij.			
7,5	Gradient	%						Т		1				€CZ	BE	D MATER	IAL		7	%	8	BAN	KS							
老弟	% Pool	70		Rim	•	30	Run	T		Othe	11				Fines	clay,siit,sar	d (<	2mm)		85		Height(m)	0.4	%Unsta	ble	0				
継	Side Chai	n.%		П	П	0 🗌	0-10[J	10-4	OX	>4	0		丰富	Graveis	smail (2-16	mm)		Т	5		Texture	E	G L	R					
9		Area%			╗	0 🗀	0-5		5 -1	5	>1	5 X				large (16-6	4mm)	Т	10		Confinemen	t		EN	СО	FÇ	∞ (UC)	N/A
軸	Debris	Stabi	ie%					Т		100	0					sm. cobble	(64-1	28mm)	Т			Valley:Chan	nel Ra	tio	0-2	2-5	5-1	0 1	+) N	N/A
	COVE	R: To	tal%	6				Т			80				Larges	iga. cobble	(128-	-256mm)	Τ	П		Stage	,		Dry	L	M) H	Flo	od
	Comp.	Dp.Poc	Ы	LO.	D.	Bou	ılder	in\	/eg	0,	ærVe	8	Cutbank			boulder(>2	6mn	n)	Т			Flood Signs	Ht(m)		0.3	Braid	ed	Υ		\odot
	sum 100	25		4	0			Τ			35	;		94.7	Bedrock					П		Bars (%)		5	рН	7	.7	O ₂ (pp	m)	
	Crown Clo	sure 9	6			50		G.		Asp	ect			e de la constante de la consta	D90(cm)	<1 C	Co	mpaction	0	н		WaterTemp	(C)	16.5	Turb	(cm)	cl	Cond(2	5C)	240
級職										DIS	CH	ARG	Ē		•				-					REA	CH S	YMB	or			\neg
製製	Para	meter				Vai	ue	Τ	Meth	od				Spec	ific Dat	a									(Fish)				
纖	Wetted V	Vidth ((m)					T			E	Stim	ated 0.5	c.f.s.	discharg	e.														1
	Mean De	pth (n	n)					T			T									\neg										
H)E	Mean Ve	locity	(m/:	s)				T			T									\neg										
	Discharg	e (m3	/s)		٦			T			T										(Widt	h:Valley/Chann	el,Slope)		•			BedMat	terial
					_		-	_								•														

Г			FISH SUMMA	ARY			STREAM/VALLEY CROSS-SECTION		
·C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L (Looking Downstream)		R
, Tarek	со	1	111	J	R	MT	PLANIMETRIC VIEW	~	
	LNC	5	66-87	J	R	MT		-	
A,A	LSU	1	62	J	R	MT			
¥-3	12 traps	were :	set for 24 h, per	riod from	the l	Hydro			
2.1	line to 20	10 m u	s from Lawson	n Road.					
建							_		
200							-		
*							COMMENTS		
	Channe	Stat	oility 📃 D	ebris 📃		Managemen	Concerns X Obstructions X Riparian Zone Valley Wall Process	es 🗀	Etc.
***	Some gra	vels a	are present but	bed mate	rial i	is primarily si	t.		
4.5	Heavy al	der/w	illow overstory	·					
117	5 traps w	ere se	t overnight in	a BD-pone	ied a	rea 200 m u/:	from Lawson Road. (Photo B1/20). Longnose dace were caught.		
4-2	150 m u/s	fron	powerline, la	rge 1.6 m	high	BD is presen	Numerous salmon juveniles were visible d/s of this BD.		
	Restricti	on to	fish but not a b	arrier du	ing	some years w	th very high flows. (A large juvenile coho was trapped ~30 m u/s from		
	Lawson l	Road	crossing.)						
3.8									
1									
Ť									
*#								Edited by:	CP
								Date Y M D	97/11/26

				_										_	_							Τ.		_	_		
Stre	am Nam	9 ((jaz)	Hub	ert C	reek						(local)	Lov	ver H	ube	rt Creel	<u> </u>		_			Acce	SS	<u> </u>	T	Meth	od
Wat	ershed C	ode	460	-437	0										_				_	ReachNo.	1	Lngth	(km)	_		.7	<u>. </u>
Loc	etion	Lower	Huber	rt Cı	reek i	in beave	er dan	swa:	np area i	a wide			Ma	ap#	05	93L065				SiteNo.	HUB4	LthSu	rv(m)			m.	
Г		meado	w.										U.	T.M.	L					FishCard	YN	<u>)</u>	鑑	Fiel	d 🗶	His	t. 🔃
Date	Y.M.D	$\neg T$	9 7	1	0	1 6	Time	Т	nr	Agency	C87	Crew	RD	/DA		Photos	A3/	17, 1	8	AirPhotos							
C.			ARAN	MET	ER			'ALUI	E	METH					S	PECIFIC	C DA	TA						OBS	TRUC	TION	s
	Ave. Ch			_			_	DI			\vdash													1	Ht(m)	Type	Loc'n
1	Ave. We			<u></u>				6-1		 	\vdash				_		_								_	er da	_
世紀は	Ave.Max			100	<u></u>			ni		 	Est.	run dep	th of	3.4 m	_											ent d/	
4546				<u> </u>	<u> </u>					 	Est	шисер		J-1111	<u>. </u>		_		_					74.	p.cs.	T	<u> </u>
16.00	Ave.Max		Jepui	(CIII	<u>''</u>		-	Di						A TED			7 ,		ma.	BAN	IV.C			200	-		
7	Gradien	t %		_		1	-	<u>- <1</u>		├	点の様	_	1	ATER			+		C				١.		 	\vdash	⊢
	% Pool		Rim	_	<u>.</u>	Run	100			├		Fines	+	sit,san	_		╀-1	00	Seit.	Height(m)	1.0 %Unst		0		 	├	-
0.02	Side Cha	n.%	\bot	_		0-10	<u> </u>	40	>40	<u> </u>	100	Graveis	sma	ii (2-16	LUTI))	╄	\vdash	***	Texture	F)G L	_		緒		ᄂ	Ь
		Area%	\perp	C		0-5	5 -	15	>15_	<u> </u>			large	e (16-6-	4mn	n)	┺	_		Confinemen	ıt	EN	ČO		_	_	N/A
3.07	Debris	Stable	%		_		<u> </u>	ns	1		和		sm.	cobble ((84-	128mm)		L	疆	Valley:Char	nel Ratio	0-2	2-	5 5-	10 1	0 +) 1	N/A
300 F	COVE	R: Tota	al%					40)	l	神理	Larges	ige.	cobble ((128	-256mm)				Stag	θ,	Dry		<u>)</u> M	Н	Flo	od
鐵	Comp.	Dp.Pool	L.O.	D.	Bou	ulder	InVeg	0	verVeg	Cutbank	製造		boul	der(>25	6mr	n)				Flood Signs	Ht(m)		Brain	ied	Υ	(\odot
3	sum 100	30	1	\top			50	\top		1		Bedrock						Г	麩	Bars (%)	0	pН	Γ.	7.2	O ₂ (p	pm)	Γ
	Crown Clo	sure %	т-Т		0		CHAR	Asp	ect		-	D90(cm)	T <	1 0	C	ompaction	O	A H		WaterTemp	(C) 4.5	Turb	(cm)	ta	Cond(25C)	130
1			1				the Presing	10.	CHARG		442000				-				38		REA	CH S	YME	OL			
NAME OF THE OWNER.	Dara	meter		Т	Vai		Me	thod	1		Sner	cific Dat	9		-		_	_	1				(Fash)				
∼hx ⊤ ie	Wetted V			+	· ·	ue	IAIC	lijou	1					. .			_	_	1								
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				+			 			ponded s is tanni			113 10	DE VE	1 9 :	STAKURU	-		1	_			T				-
1,7 min	Mean De			-+			-		Water	15 1211111	с ш с	nour.						_	ł								
200	Mean Ve			+			 												1				1				
	Discharg	e (m3/s	5)	-			L .												(Widt	h:Valley/Chan	nel,Slope)					BedMa	tenet
			ISH S	ш	MAD									T2	PF	ΔΜΛ/Δ	II E	V CE	205	S-SECTI	ON	-					_
1.20	Species	T		_	$\overline{}$	e Phase	l l.	lethod/f		L				٥,			king D						-			R	
	Species	No. S	ze Rang	e(ma	n) Lin	e Priese	USE N	ethody	101	_				ы		IMETR	IC 10	EW				_				- 1	
12.47	C + 20 +	ا . ا		-	_		\vdash			-				PL	-A F	IIME I K	1C V	EAA				_	-				
1100	Set 20 tra	aps in m	eadow	for	24 h	ours.				-																	_
19.5		\vdash			-		\vdash			-																	
		\vdash					\vdash		-	-																	
130			NO	CA	TCH		\vdash		-	-																	
est.		\vdash			1		$\vdash \vdash$			-																	
1.5		\sqcup			_		\sqcup																				
2.8		\Box			_					-																	
100							\sqcup																				
11					\perp																						
4(1)												COMM	MENT	rs													
- 13	Channe	Stabili	ty _		Deb	nis 🗀	N	Aanag	ement C	oncerns	X	Ob	struc	tions	X	Ripa	rian .	Zone		Valle	ey Wall Pro	cess	es			Etc.	
- 1	No fish w	ere obs	erved	with	in th	e large	ponde	d cha	nnel.																		
en ir	Suspect t	his sect	ion of	cree	k ma	y have	water	qualit	y proble	ns i.e. lo	w D.O	. levels	and h	ot sur	mm	er temp	eratı	ıres.									
-75	Access in		_										-					_					-				
: :	No poten			_		_																			_		
	Generall																-						_				
- 47		, , ,																									
.r-1,													_		_		_		-								
- 64															-												
34.0									· · · · -											-							
27.00															-								1	_			
100																							Edite	d by	CР		

97/11/26

Date Y M D

		_																		-		_	_			_							
Stre	am Nam	9		(gaz	:)	Hu	bert	Cr	eek T	ributa	y HT1					(local) H	lubert C	reek	Tribut	ary l	HT1						Acce	ss	F	T	Meth	od
Wat	ershed C	od	8		460	-43	70																1	ReachNo.		1		Lngth	(km)		1	.8	
LÖ	tion	L	cat	ted n	nid	-wa	y w	3 OE	seep	age bo	g area.							Map#	093	L065			ŀ	SiteNo.	Н	TUB!	5	LthSu	IV(m)		18	300	
																		U.T.M.						FishCard	,	((N)	3	Fiel	d 🗶	His	t.
Date	Y.M.D		7	9	7	1	1	1	3	Time	130	ю	Age	ncy	C87	Crew	v F	SD.		Photos	A6/1	1, 2	1	AirPhotos									
S.														тн					SPE	CIFIC	DA'	ΓA								OBS	TRUC	TION	s
Derwier.	Ave. Chan. Width (m) 29												\top		22, 2	8, 36														C	Ht(m)	Туре	Loc'n
	Ave. Wet. Width (m) 25												\top		17, 2	5, 32															Cha	nnel is	
攤	Ave.Max.Riffle Depth (cm)												\top									-								5 24	dew	itered	in
	Ave.Max.Riffle Depth (cm) na Ave.Max.Pool Depth (cm) est. ~30 cm														Pool	section	DS W	ere iced	ver	at the	time	of su	ve	y.							secti	ons.	Г
_	Ave.Max.Pool Depth (cm) est. ~30 cm Gradient % <1														C.	В	ED	MATERI	AL		9/	6	er.	BAN	IKS					**		Г	
A15.5%	% Pool		П	1	Rim	•			Run	\top	Other	100) 723	TS		Fines	d	lay,silt,sand	(<2m	nm)	10		105	Height(m)		%U	nsta	ble	0				
	Side Cha	n.%	, -	\neg			0 🗶	1 0	-10 [10-	10 :	×40	1		就說	Gravel	8 SI	mall (2-16n	nm)				2012	Texture	F	G	L	R	-	1			
3.5		An	12%	_	7	-	02	Ļ	0-5	7 5-	15 :	>15	il				la	arge (18-64	mm)		Н	-	2	Confinemen				EN	6	FC	oc	UC	N/A
44	Debris	s	tabl	le%	_		_	_		Ī	na						-	m. cobble (<u> </u>	lmm)	Н		40.	Valley:Char	_	tatio	\neg	0-2	~	5-1			I/A
變	COVE	R:	To	tal%	_			_	_	_	75		+	_		Larges		e. cobble (1	28-25	6mm)	\vdash		in a	Stage			_	Ory		Тм	н	Fio	od
	Comp.		Poo		LO.	n	B	ould	ter	InVeg	Ove	Ven	Cutt	ank			۲	oulder(>256		· · · · · · · · · · · · · · · · · · ·	Н		.54	Flood Signs			\neg	۳	Braid		(Y	_	N
翻譯	sum 100	۲	20	-		-				70	1	5	-			Bedroo			,			25	Sin.	Bars (%)	<u> </u>	0		рH	5.02		O ₂ (p		<u> </u>
Vin. 0		1			Ť					C	Aspe	-	+	_	Mrs. William	D90(cn		рг С		paction	 	-	-	WaterTemp	<u></u>	Ť.	_	Turb	(077)	cl	Cond(-
調	CIOWITCIC	Jau	-	•	_					地种能	DISC		 _		ない。	Dan(CI	11)	DI TRIA	Com	pacion	<u>_</u>	7		vvater i emp	(C)		_		YMB		Cond	230)	nr
開體	Para		•		_	_		alue		Met		T	<u> </u>		<u> </u>	cific Da	-4-					\dashv				KE	AC		TMB Fish)	OL			
變變			-			-		alue	•	ме	noa	G.					ata					4											
C 17707	Wetted V	-				\dashv				\vdash		Stag	nant,	pond	ed sic	ough.						\dashv							T				
dr. 24 m	Mean De	<u> </u>	·	<u> </u>	_	\dashv				-		-										-											
46.5.545	Mean Ve		<u> </u>	·)	\dashv		_		\vdash		-										-											
	Discharg	e (m3	/S)								<u> </u>										0	Matt	Valley/Chan	nel Slo	pe)						BedMat	lenal

			FISH SUMM	ARY			Г	STREAM/VALLEY CROSS-SECTION	-		
G.	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	١	L (Looking Downstream)			R
								PLANIMETRIC VIEW	-		
-12								<u> </u>			
100 M			NOT SAMPL	ED.				•			
	SUGGES	TAF	REA BE TRAP	PED IN T	HE S	SPRING.					
5. N											
半智											
拉集											
100 CB											
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1								•			
Tri)								COMMENTS			
25 to	Channel	Stat	oility 🗶 D	ebris 🗀		Managemen	t C	oncerns Obstructions X Riparian Zone Valley Wall Process	es _	_ Et	tc.
	Shallow,	weed	ed bog with no	visible flo	w. N	Maximum dep	th -	30 cm with some dewatered sections of channel.			
ved.	Instream	brus	h/grass is abun	dant.							
	Easy fish	acce	ss during high (low in the	spr	ing. Channel	is d	ewatered u/s from just below the culvert at the landowner's house.			
The sales	Gradient	is ve	ry low d/s of th	e culvert.							
****	Landown	er sa	id the previous	owner ha	d car	ught fish in th	e sp	oring at this location; there is flow for ~3 weeks as a large stream which forms			
	a lake ab	ove tl	ne culvert. Son	ie years it	stay	s wet enough	to p	revent hay crops.			
	Suspect s	ome	use by CO, SST	, LSU, L	iC.						
1											
20 B									Edited by:	CP	
44.0									Date Y M D	97/1	1/26

											317		N SURV	ET FU	/M														
Stre	am Nam	ю	(gaz	z) Hu	ibert (Creek							(local)	Hubert	Cr	eek					,	_		Acc	955		/2	Meth	iod
Wat	ershed (Code		460-43	70				_,						_						ReachNo.	L	2	Lngth	(km)		1.	6	
Loc	ntion	lmm	edia	tely u/s	from	PNG c	rossin	g of	Hube	rt C	Access v	is		Map #	_	0931	L065	<u> </u>			SiteNo.		HUB6	LINS	iv(m)		3	8	
		field	s at I	lelp's	Farm.									U.T.M							FishCard		Y (1	<u>) </u>		Field	<u>X</u> t	His	t. 🗍
Date	Y.M.D)	9	7 0	8	0 9	Time	\prod	1420		Agency	C87	Crew	DB/CP			Photo	s Al	/14-1	6	AirPhotos								
C			PAF	RAME	TER		\ \	/ALI	ŲE		METH					SPE	CIF	IC D	ATA							OBS	TRUC	TION	s
	Ave. Ch	an. W	/idth	(m)				3	3.4			6,3,	2.8, 2.5,	2.5, 2.6, 3	.8												Ht(m)	Type	Loc'n
	Ave. We	t. Wi	dth (m)				2	2.3			3.0,	2.3, 2.5,	2.5, 1.7, 1	.5														
	Ave.Ma	x.Riffi	e De	pth (c	m)				10			10,	10, 10													戯			
	Ave.Ma	x.Poo	l De	pth (cı	m)			:	27			25, 2	25, 30													2			
	Gradien	t %				·			2			C	BE	D MATE	RLA	\L		T	%	C	BAN	NK:	S						
	% Pool	2	0	Riffie	60	Run	20	Ot	her				Fines	clay,sitt,s	ind	(<2п	чп)	$\neg \vdash$	T		Height(m)	0	.8 %Uns	table	50	推			
775	Side Cha	n.%			0 X	0-10	10-	40_	<u> </u>	0 🗆			Gravels	smail (2-	l6m	m)		Т			Texture	U	G)	. R					
10,		Areas	,		0 🗆	0-5	5-	15_] >1	5				large (16	-84π	nm)			40		Confinemen	nt		EN	co	FC	oc (UC)	N/A
	Debris	Stat	le%		•				50			1	•	sm. cobb	e (64	4-128	lmm)		40		Valley:Char	nnel	Ratio	0-2	2-5	5(1	10) 10	+ 1	V/A
# 9	COVE	R: To	tal%	,					60				Larges	ige. cobbi	e (12	28-25	6mm	,	20		Stag	е		Dry	L	M	ЭН	Fio	od
9	Comp.	Dp.Pc	ioi	L.O.D.	Bo	ulder	InVeg	T	OverVe	9	Cutbank			boulder(>	256r	uiu)		丁	Т	1	Flood Signs	s Ht	(m)	0.4	Braid	ed	Y		\odot
	sum 100	<u>"</u>		5	7	15		Τ	10)	10		Bedrock						Τ		Bars (%)	Π	30	рН	1	.7	O ₂ (pp	m)	
3977	Crown Cl	osure	%	T	9:	5	C	å A	spect			以表	D90(cm)	20		Comp	pactio	n D	мн		WaterTemp)(C)	11.0	Turt	(cm)	cl	Cond(2	(5C)	110
4								D	ISCH.	ARGE			/50	5						Γ			REA	CH S	YMB	OL			
	Para	mete	r		Val	lue	Me	thod	ī			Spe	cific Dat	а						1				,	Fish)				
.:915 14-0	Wetted \	Width	(m)						1	Estima	ted 3-4	c.f.s.	. dischar	ge.]									_
grit.	Mean D	epth (m)																						Г				
15. 15.	Mean V	elocity	(m/:	s)]									
4	Discharg	ge (mi	3/s)																	(VA	dth:Valley/Chan	nne), S	Slope)					BedMa	tensi
																												- "	
_			EIG	H SUN	ARA A D	· ·				_					TD	EA	MAZ	ALLE	V CI	20.5	SS-SECTI	O.							
	Species	No		Range(n		fe Phase	luca la	latha	4004	┨	L			•	,,,,	· E A		ooking I					•	_	-			R	
15)	CT	2		35-179		J	R		EF	┥	_)1 A	Alik	AFT	RIC V	/LEW					,	-			- 1	
2.2		┼∸	H	33-17	_		1		Er	╅				•		******		100						_	-				\dashv
104		+	-		-+					╅╴	•																		
		┼	-							+																			
112		\vdash	 		_		\vdash			╅																			$\overline{}$
		\vdash			\dashv		\vdash			+	•																		
148		\vdash			\dashv					十	•																		
2,2		T		_	\top		\sqcap			+												_							
		T	ऻ		\dashv		\vdash			\top																			_
		1								1	•																		
ins.		4					·						COMM	IENTS															
	Channe	Stat	ility	_	Det	oris		Mana	agem	ent Co	oncerns	X		struction	s ⁻		Rip	arian	Zoru	e 🕽	《 ∨ali	ey '	Wall Pi	ocess	es	_		Etc.	
77.5			<u> </u>	ausing									he creek.		_														
Ž.	Appears																												
Page											ems fro	m lov	wer area	- beaver	•							-					*******		
	Hiked 40	00 m d	/s fr	om site	: som	e spawn	ing pe	tent	tial in	this s	ection. 3	}% sl	lope and	thick bru	sh	cove	er. S	ever	1 0.5	m h	igh drops	ov	er debr	is -					
,,	not fish	barrie	rs.																										
Aug gara	The two	fish c	augh	t at thi	s site	appeare	d to b	ė res	sident	s.																			

Edited by

Date Y M D

CP

(local) Hubert Creek

Stream Name

Watershed Code

(gaz) Hubert Creek

460-4370

Access

Lngth(km)

ATV Method

1.0

Loca	ition	Bet	ween l	'NG c	ros	sing and	i H	ydro lir	ic.					Map#	093L065				SiteNo.	_ <u> </u>	IUBS	_		_			
														U.T.M.					FishCard	<u>' L'</u>	Y (1	1)	C	Field	i X	His	t
Date	Y.M.D		9	7 1	0	2	. 1	Time	1130	, 	Agency	C87	Crew	RD/DA	Photos	A4/5	5, 6		AirPhoto	s							1
Ç		_	DAE	AME	TE		┪	VA	LUE		METH		1,		SPECIFIC	DA	TΑ		1					OBS	TRUC	TION	s
	Ave Ch					<u> </u>	┪					51.4	4 50 6	E 4 9					_					-	Ht(m)		
	Ave. Cha						4		5.4		-		1.6, 5.9, 6											5000			_
- X44-21/4	Ave. We	Ł W	iotth (n)			_		2.9			1.9, 2	2.3, 2.8, 3	.2, 4.3										and by		er po	nas
繼	Ave.Max	.Rif	fle De	pth (c	cm)		_		11		ļ	11, 1	1, 12											1	belov	٧.	Ш
嬔	Ave.Max	.Po	ol Dej	oth (c	m)				30			35, 3	0, 25														
i.	Gradien	t %							3-4			C	BE	MATER	AL	9	6	C	B/	ANKS				SI L		ļ	
	% Pool	П	20	Riffle	Π,	60 Ru		15	Other	5		24	Fines	clay,siit,sand	1 (<2mm)		10		Height(m) 1.0	%Uns	table	0				
	Side Cha			T	0[40 🗆	t		Graveis	small (2-16)		Н	_	-	Texture		G				\vdash		\Box
A PART	0.00 0	т.		┰	+-		_	•	=-	_=	1						20	154		_		EN			⊚	UC	
200	Debris	Are			0	<u> </u>	5 🔀	5 -1		15	-	-		large (16-64		Н	_		Confinen			+	_		◡		N/A
F	Deplis	Sta	ible%				_		90					sm. cobble (84-128mm)	Ш	50		Valley:C	hannel F	Ratio	0-2	>	5) 5-1		۸ +0	-
	COVE	R : 1	「otal%	•					50		<u> </u>		Larges	ige. cobble (128-256mm)		10	響	St	age		Dr	y (1	<u>.) M</u>	Н	Flo	od
	Comp.	Dp.f	Pool	L.O.D.		Boulder		InVeg	Over	/eg	Cutbank			boulder(>25	8mm)				Flood Si	gns Ht(n	n)	0.4	Brai	ided	Y	. (W I
	sum 100	Г	30	10	Т	20			2	:0	20	B.F	Bedrock					200	Bars (%)		40	pН		7.5	O ₂ (p	pm)	
	Crown Clo) Deur	- 04	\neg	<u> </u>		┪	C _T	Aspec	+			D90(cm)	11	Compaction	LØ		7	WaterTe		4.0	Tur	b(cm)	7	Cond(ar
COLUMN Column Co	CIOWII CI	Jour	- /0				-	STEP CASE			<u> </u>				Compacion	- 4	<i>)</i>	485	1*********					_	30110(щ.
V.					т-		-		DISCI	1ARG	<u> </u>		/50	6				ł			KEA	CH S	(Fish)	JUL			1
7	Para	met	er		<u> </u>	Value	_	Meth	od			Spec	cific Data	<u> </u>				Į					(*****)				1
	Wetted V	Vidt	h (m)			•				Estim	ated 3-4	c.f.s. d	lischarge	<u>.</u>				J	_								.
	Mean De	pth	(m)]					1				
***	Mean Ve	eloci	ty (m/s	;)	Т													1					1				
KT9	Discharg			•	T													1	fth:Valley/Ci	hannel Sk	one)		•			BedMa	turcal
(Alakerica)		, (···	,,,,		1																						
			EIG	H SUN	им	ARV				\neg				ST	REAM/VAI	LEV	CE	209	S-SEC	TION			_				
1	Species	Ī.,.				T		Use Me	thod/Ref	\dashv	L			٠.		ing Do						****	_			R	
		No.	+	Range(r		Life Pha	-			\dashv	_			ъ.									_			K	1
	СТ	1	 '	50-17	7	J		R	EF		_			PL	ANIMETRI	C VI	EW										\dashv
		<u>L</u> .									_																\dashv
77	Site was	30 п	in ler	gth. 1	1 C	l was c	apt	ured		L	_																$\mathbf{\Box}$
	(FL= 150	mn	1).			1																					
		Γ					-			Т	_																
	Also spot	san	pled o	/s for	60	m lengt	h o	fstream	n	\top	-																\neg
242	(270 sec.)									\dashv	-																
3 3 4 A	(210 300)	<u> </u>	~~ ~	- Capt		_ (···	·····):		-+-			 														
		-	+			\vdash	4	\vdash		+	-																\dashv
10		<u> </u>	4			ļ		$\vdash \vdash$			-																_
****					_	<u> 1 </u>																					
H													COMM	ENTS]
1	Channe	Sta	bility		Ε)ebris	J	Ma	anagen	nent C	oncerns		Obs	tructions	X Ripar	ian Z	one	. [Va	alley V	Vall Pr	oces	ses			Etc.	
				or sna									_	d material													
	C.	- ole	lam F	h da-	-101	Su			nuch!-	6v-	- d/o c				-					-	-						<u> </u>
	Limited p Surprising Suspect t	igiy	10W 119	n den	SICIO	s. Just	rec1	access	proble	INS ITO	III U/S AF	ds.															
to the	Suspect t	wo i	ish sai	npled	we	re strea	m r	resident	s.																		
AND THE																											
n)																											
																											\neg
A SEC										-		-										-					-
																-			-				т-				
1								<u>.</u>															Edit	d by:	CP		
2	1																									7/11/	76

									eTD		SHD/	EY FOR													
Stre	am Nam	• 1	gaz)	Hu	bert Creek				318			Hubert (_							Acce	ess	ΑT	V A	/letho	od -
	ershed (· · · ·	60-43							, ,						ReachNo.	4		Lnath	n(km)		1.8	3	
	ation	+			ro line crossi	nø.						Map#	0931	.065	-		SiteNo.	HU	B9	Lins	-		30		
	1000	Башр	100 2		10 IIIC C. 033.	щ.		-				U.T.M.	10702				FishCard	Y	N	•	1	Field		Hist	t. =
Deta	Y.M.D		9	7 0	8 0 7	Time	143	10	Agency	C87	Crew	RD		Photos	R1/1	1. 2	AirPhotos			_	155459				
C			_	AME	سلسلنيا	-	ALUE		METH	00.				CIFIC	_	_						OBST	TRUCT	IONS	
	Ave. Ch				IEK	-	2.5		MILTI	192	1 2 3 1	.7, 2.7, 4.		0.1.10	-							1.104	Ht(m) T		
				<u> </u>		_	1.9		-		.9, 1.9	. 1, 4. 1, 4	<u>, .</u>		_							10.2		7,50	
- A - YOU	Ave. We						1.9		-	12	.9, 1.2													\dashv	_
	Ave.Ma		<u>-</u>			-	27		 	27														-	-
17.20mms	-		Deb	ui (ci	"",	-			<u> </u>	ac.	DEF	MATER	LAI		9/	, ,	C. BAN	Ke			\dashv			-	
-19: 4	Gradien	_	T_		70 -	10	4-5	F	-	distances.		MATER		_,	 "	$\overline{}$	Autorio	0.8	'l Inet	n balan	10	**	\dashv		
W. C. C.	% Pool	20	-R	liffle	70 Run	10	Other	10		DESCRIPTION OF THE PARTY OF THE	Fines	clay,sit,sar		m)	\vdash	10		(F) (1 0		-+	\dashv	—
	Side Cha		+	\rightarrow	0 0-10	-		40		100 A	Gravels	small (2-10			$\vdash \vdash$	-	Texture			1			~		
e de la	Debris	Area%		Щ	0 0-5	5 -		>15				large (16-6			Н	10	Confinemen			EN	co				N/A
5		Stabl				<u> </u>	70					sm. cobble			\vdash	50	Valley:Char		<u> </u>	0-2		~	0 10-		
**		R: Tot	_				60		ļ		Larges	ige. cobble		8mm)	\vdash	15	Stag			Dry	_	1		Floo	
	Comp.	Dp.Poo	$\overline{}$.O.D.	Boulder	InVeg	Over		Cutbank			boulder(>2	58mm)		Щ	Щ	Flood Signs	1		0.4	+		Υ	_	2
	sum 100	20	_	20	40			10	10		Bedrock					Щ	Bars (%)	20	0	pН	٠	$\overline{}$	O ₂ (ppr	- +	
	Crown Cl	osure %	.		50	C.	Aspe	ct	<u> </u>	200	D90(cm)	17	Comp	action	L Ø	<u>} </u>	WaterTemp		nr	-	o(cm)		Cond(25	5C)	pr
res.						,	DISC	HARGE	<u> </u>									F	REA		YMB (Fish)	OL			
持持	Para	meter			Value	Me	hod			Spec	ific Data	1					į.				(rmin)				
\$2	Wetted \	∕Vidth (m)			ļ		Estima	ited 3-4	c.f.s. d	lischarg	c.					l —				,				
	Mean D							<u> </u>									į				1				
1004	Mean Ve)		ļ															ļ				
in the	Discharg	je (m3/	s)			<u> </u>											(Width: Valley/Chare	nel,Slope)					B	SedMate	enzi
			FISH	SUM	IMARY							S	TRFA	ΜΛΛΑΙ	LFY	CR	OSS-SECTI	ON			_				
c	Species	T			ım) Life Phase	lise M	ethod/Rei	H	Ł			•		(Look						_	-			R	
1000	СТ	1		140	J	R	EF	'	-			P	LANIN	IETRI	c VII	FW				-					
	DV	1		162	J/A	R	EF		-			•								_	<u>~</u>			•	
50.00	_ 	+ +				1		-	•				•											•	
10000 10000	 	1 -			_	\vdash		\dashv	•															•	
975 193≩		1 1							-															•	
		1						\dashv	-															•	
4.00		1 1				H		-	•															•	
		+				1		_	***																
-/6	-	1-1				1-1		_	•															•	
A OR		†						_	•															•	
Africa:		1				<u>l.</u>					СОММ	ENTS													
25.0	Channe	Stabil	itv	X	Debris	A	lanane	ment C	oncerns			tructions	Y	Ripar	ian 7	one	العال	y Wa	ll Pr)Ceee			. 1	Etc.	-
Self.	-		·	***	ential spawn		.u.,uye					4040113	12.	· vipai	2	-0116	V V V	., 11a							—
3				_	n cobble/riffl		No f-	orema	ll invan	iles n=	esent in	this earti													
5. S.	2000 110	as par		11			11	, v. ame	,	p1		300111													
Per 1001																		-		-					

Edited by: CP Date Y M D

															••••	LITON														
Stre	am Name		(gaz) H	lub	ert (Сгес	k							(local)	Hubert (Cre	eek							Acce	ss	Αĵ	ΓV	Metho	od
Wat	rshed C	ode	-	460 ⊸	437	0																ReachNo.		4	Lngth(km)		1.	.8	
Loca	rtion	Upstr	eam	fron	n ř	Iydr	o lir	1e. S	Sample	d ju	ust w	s from	upper			Map#	I	093L065				SiteNo.	щ	J B10	LthSu	V(m)		3	5	
		road o	cross	ing.												U.T.M.						FishCard	Υ	N		鐖	Field	ı X	His	it
Date	Y.M.D	\Box	9	7	0	8	0	7	Time		1300)	Agency	C87	Crew	RD		Photos	B1.	/3, 4		AirPhotos								
C	PARAMETER VALUE N														•		_;	SPECIFIC	D/	ATA							OBS	TRUC	TION	s
	Ave. Chan. Width (m) 2.8													2,8, 2	.6, 2.7, 3	3.1, 2.9											9	Ht(m)	Туре	Loc'n
	Ave. Wet. Width (m) 1.9													1.6, 2	.3, 1.7, 1	1.5, 2.4												See d	/s.	
	Ave.Max.Riffie Depth (cm) 12													10, 1	4 '															
	Ave.Max	.Pool	Dep	oth (cm	1)					24			23, 2	5												Ďij,			
37	Gradient	%									6			DOS	BEI	D MATER	RIA	L	П	%	O.	BAN	KS							
	% Pool	15	1	Riffie	1	80	R	un	5	Ot	ther				Fines	clay,silt,sar	nd	(<2mm)	Г	10		Height(m)	2.0	%Unsta	able					
	Side Cha	1.%	\neg	T	7	XIC	0-1	10 [10-4	0] >	40			Graveis	smail (2-1	3mı	m)	Т	15		Texture	F	GL	R		ř¢.			
		Area%	寸	T	7	0	ō	-5[2	5 -1	5] >	15[1	large (16-6	4n	nn)	Г	15	¥	Confinemen	t		EN	co	(FC)	ос	nc	N/A
	Debris	Stabl	le%								50		1			sm. cobbie	(64	L-126mm)	Т	35	Ħ	Valley:Chan	nel Ra	itio	0-2	2-5	5-1	0 10)+ N	V/A
14.1	COVE	R: To	tal%	,							75		i	104	Larges	ige. cobble	(12	28-256mm)	T	25		Stage			Dry	(M	Н	Flo	od
34	Comp.	Dp.Poo	я І	L.O.D	Ţ	Во	ulde	ır	lnVeg	Τ	Over	/eg	Cutbank			boulder(>2	56r	nm)	Т	10	鏬	Flood Signs	Ht(m)		0.4	Braid	ed	Υ		
	sum 100	20		10	T	(60			Τ	-	5	5		Bedrock							Bars (%)	;	25	pН	п	ır	O₂(pŗ	om)	
K er	Crown Clo	sure %	6	T		1:	5		C.	Α	spec	t	ļ —	1	D90(cm)	28 C		Compaction	L	ωĐ		WaterTemp	(C)	nr	Turb	(cm)	cl	Cond(2	25C)	nr
数										D	ISCH	IARGI	Ē											REA	CH S	/MB	OL			
	Parai	meter				Va	iue		Meti	noc	1			Spec	ific Data	a									(F	ish)				1
	Wetted V	Vidth (m)		T							Estim	ated 4 c.	f.s. di	scharge.															
ĦÓ	Mean De	pth (n	n)		T																	-								
20	Mean Ve	locity	(m/s	;)	1																									
	Discharg	e (m3/	/s)		1																(VMd	th:Valley/Chann	ei,Slop	•)		•			BedMat	tenal

			FISH SUMMA	ARY			Π	STREAM/VALLEY CROSS-SECTION		
C.	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	1	L (Looking Downstream)		R
	DV	3	110-153	J	R	EF	1	PLANIMETRIC VIEW		
4							Г	·		
					Г	1	Г	•		
		Г			П		Г	•		
). je ?				1	T		Г			
1.54				1			Г	•		
\$. 7					Г		Г	•		
*										
্ৰ							Г			-
					П		Г	•		
								COMMENTS		•
200	Channe	Stat	oility 🗀 D	ebris 🗀		Managemer	it C	oncerns Obstructions Riparian Zone Valley Wall Process	es _	Etc.
	Limited	pocke	ts of spawning	potential.	Ma	inly confined	cha	nnel with cobble/boulder bed.		
	Margina	luppe	er end of DV ha	bitat at tl	nis lo	ocation.				
									-	
4										
Į.										
243										
									Edited by:	СР
									Date Y M D	97/11/26

	Name N	1,	> 77	1 C1-					(local)	Halma Ca	l							Access		V2	Meth	od
_	m Name			ips Creek					(IOCAI)	Helps Cr	CER			- 1 .	ReachNo.	2		 	-		.3	~
	rshed C			370-227						1 24 #	Tona	7.000		-		H		Lngth(kr	_		<u>0</u> ·	\dashv
Loca	tion	Mid-w	ay betwe	en the cattleg	uard an	d the old	d bridge	e site.		Map#	093	L065			SiteNo.	_		LthSurv		d X		
$ldsymbol{ldsymbol{\sqcup}}$										U.T.M.	١.,				FishCard	Y	N		THE PER	a 🔼	His	L
Date	Y.M.D		9 7 0	8 1 7	Time	1115		-	C87 Crew	DB/CP		Photos A1	_		AirPhotos				_			
数据		F	ARAME	TER	VA	LUE	!	METH			SPI	ECIFIC D	ATA							TRUC		_
	Ave. Cha	tn. Wi	tth (m)			1.6			1.3, 2.2, 2.2, 1	.7, 1.3, 1.1										Ht(m)	Туре	roc,u
쮏	Ave. We	t. Widi	h (m)	·	l	1.6			WW≔CW													
	Ave.Max	.Riffle	Depth (cm)		12			10, 15, 10													
整	Ave.Max	.Pool	Depth (c	m)		32			30, 35, 35										数数			
The second	Gradient	* %				1			BEI	MATER	IAL		%	C.	BAN	iKS						
	& Pool	10	Riffie	60 Run	30	Other	\sqcap		Fines	clay,sit,san	d (<2n	mm)	30		Height(m)	1.0 %	Unst	able	25			
南京	Side Char	n.%		0 🗶 0-10	10-4	0 >4	10		Gravels	sma8 (2-16	mm)		Т	***	Texture	F	L	R		20° 1984		
4		Area%	++	0 0-5	5 -1	5 >1	15 🗆			large (18-84	4mm)		10	靈	Confineme	nt		EN C	O FC	oc (UC)	N/A
San San	Debris	Stable		1-4-1	1	na				sm. cobble (8mm)	20		Valley:Cha	nel Ratio	,	0-2	2-5 5-	_	_	V/A
100 Tel	COVE					100			Larges	ige. cobble (40	1000	Stag			Dry) н	Flo	od "
10 mg		Dp.Pool		Boulder	InVeg	OverVi		Cutbank		boulder(>25			+"	1000	Flood Signs			0.5 B	_	ΙŸ		
	Comp. sum 100%	_	1.0.0.	50	inveg	50		CUDBIIK	Bedrock	June 1/-25	VIII)		+	4000	Bars (%)	(m)		pH	7,3	O ₂ (p)		~
-					Č. Mark	Aspect			Larry St.	26 1000		paction (MН	45.45			12.0	+	_	Cond(180
-	Crown Clo	sure %		25			_		D90(cm)	25	Com	paction L	мн	施	WaterTem					Cond	(5C)	100
2 X			(D	ECID.)	1	DISCH	ARGE							-		•	EA	CH SY!				
		meter		Value	Meth	-			Specific Data	1				-								
	Wetted V			<u> </u>			Estimat	ted 2 c.	f.s. discharge.					-1								.
	Mean De				<u> </u>									4								
1	Mean Ve													4				I				
	Discharg	e (m3/	s)	l										(Wido	:Valley/Char	nel.Slope)					BedMa	tertal
		—	ISH SUI	MAADV			_			7.9	DEA	M/VALLE	V C	BOS S	SECT	ON						
-					Use Me	thod/Ref	┥.	L		31	KEA	(Looking				0.14					R	
14 42	Species	No. S	98-11	mm) Life Phase	R	EF.	┥╵	_		DI	A MII	METRIC V						_			K	ł
100	CI	 	70-11	/ 	+~+	E.F	+			7.		ME INC V	,,,,,,	•				_				-
97,5		 			 		-															-
5657		 			┼-┼-		+-															\dashv
25.8				_	\vdash		+-															
		┝		-	\vdash		+															\dashv
		⊢┼			-		+															
		$\vdash \vdash$			-		+															
- 15		-			\vdash		+-															
Zul.		\vdash					+															
27.55																						
									COMM				_	-								
	Channel		, , , , , , , , , , , , , , , , , , ,	Debris 📄		anagem				structions			Zon	e 🗶	Vali	ey Wal	l Pn	ocesse	s [Etc.	
									Fencing is on	one side o	f the	creek.										
-33	No spawi	ning po	tential. I	Banks sloughi	ng in thi	s section	ı - some	e clay.														
	Willow/a	lder ov	erstory.																			
15																						
14.0																						
12																						
582														_								
12 H. C. B.																						
12 H. C. B.																						
12 H. C. B.																			Edited by:	СР		

Stre	ım Name		(gaz) 1	Hel	ps Cr	eek							(local)	Helps Cre	ek							Acces	s	v	2	Metho	đ
Wate	ershed C	ode	1	160-	437	70-22°	7													ReachNo.	2		Lngth(km)		2.	3	
Loca	tion	Imm	ediat	ely 1	u/s 1	from	culv	ert.	Old bri	idge site					Map#	093L06	5			SiteNo.	H	2	LinSur	V (m)		33	3	
															U.T.M.					FishCard	Υ	4		经验	Field	X	Hist.	Ĺ.)
Date	Y.M.D		9	7	0	8	0	7	Time	1215		Agency	C87	Crew	DB/CP	Pho	tos A	1/3, 4		AirPhotos								
			PAF	AN	ET	ER			VA	LUE		METH				SPECI	FIC C	ATA							OBST	RUCT	ONS	
ALC: UNIVERSAL	Ave. Chan. Width (m) 8.5												6.2, 8	1.3, 9.0, 1	0.6, 9.5, 7.	5									C	Ht(m)	Туре	Loc'n
	Ave. Wet. Width (m) 2.7												3.4, 3	3.2, 1.5, 3	.9, 2.6, 1.8													
100	Ave.Max.Riffle Depth (cm) 11												10, 8,	, 14											ZH:			
	Ave.Max	.Pool	Dep	th ((cm)				na					····												\neg	
	Gradient	%		_						2			製C是	BE	MATER	AL	T	%	C	BAN	KS				50P			
	Gradient % 2												Transaction.	Fines	clay,siit,san	d (<2mm)	一	85	*	Height(m)	1.0 %	Unsta	bie	100				
	Gradient % 2													Gravels	smail (2-16	mm)	T	15	鑑	Texture	F)	3 L	R					
	% Pool Riffle 95 Run 5 Other Side Chan.% 0 2 0-10 10-40 >40 Area% 0 0 0-5 5-15 >15 0														large (16-6	4mm)	7	\top		Confinemen	nt.		EN	со	FC (oc (IC N	VA
	Side Chan.% 0														sm. cobble	(64-128mn)	\top		Valley:Char	nel Rati	io	0-2	2-5	5-10	1 +	N/A	
	Area% 0% 0-5 5-15 >15 Debris Stable% COVER: Total% 0												i in the	Larges	ige. cobble	(128-256m	m)	\top	-				Dry	(C)	M	н	lood	
יי בשי נוחלים			$\overline{}$		D .	Во	ulder		inVeg	OverV	eg	Cutbank			boulder(>25	i6mm)	\dashv	╅			Ht(m)		0.6	Braide	d	Υ	~~~	O
	sum 100%	<u> </u>					-				<u>. </u>			Bedrock				_		Bars (%)	71	0	рΗ	0	2	O₂ (pp	m)	
A. 15-10.	Crown Clo		/)		C.	Aspect		 		D90(cm)	4 5	Compac	ion (Д и н	-	WaterTemp	(C)	12.0	Turb(cm)	ci	Cond(2	(5C)	180
機									Zax ventilates		ARGE		30.00.000	/50	1					1	_	REAC	H SY	MBO	L	-		
													Spec	cific Data					1				(F	nsh)				
	Wetted V	Vidth	(m)	_	7						Estima	ted 2 c.	f.s. dis	charge.					1									
	Mean De			_	┪												-		1									
	Mean Ve)	┪														1									
	Discharg			_	7														m	th:Valley/Chan	nel,Slope	,		•			BedMat	ensi
esc e Boo		,		-	1		_		L				-						1				_					

FISH SUMMARY							Т	STREAM/VALLEY CROSS-SECTION				
	,ca						ł	(Looking Downstream)			R	
		No.			_	 	ł				<u> </u>	
1	СТ	1	43	F	R	EF	⊢	PLANIMETRIC VIEW			\dashv	
		<u> </u>					┡					
科學		<u> </u>					L	•				
, ************************************							L					
74							L					
- 18												
1 mg /dt							Γ					
50		├					Г					
ariba i		<u> </u>					Т				\neg	
-	COMMENTS											
	Channel	Channel Stability X Debris Management Concerns X Obstructions X Riparian Zone X Valley Wall Processes Etc.										
- 6.7	Very poor fish habitat - cattle have eroded the banks and the channel is very wide (Photo A1/17).											
	Sands and pea-gravels abundant within site. No cover from adjacent vegetation.											
14.2												
	Temp. is cool due to cool day.											
が発生しています。 ではない。 ではなった。												
ent in the second of the secon												
17.3									Edited by	CP		
1									Date Y M D	97/1	1/26	

DFO / MOE STREAM SURVEY FORM

Stre	am Name	0	(gaz	2)	Hel	ps Cre	ek	_				(local)	Helps Cr	eek		_			Acces	ss	V2	Meth	oa
Wat	ershed C	ode	1.0	_	_	70-227											ReachNo.	2	Lngth(km)		2.3	36
Loc	ation	Sout	h sid	e of	fiel	d - 150	0 m u/s	from T	rib HP1 con	fluence.			Map#	093L065			SiteNo.	НЗ	LthSur	v(m)		33	- 0 1
-													U.T.M.				FishCard	YN)	Sa Fi	d X	His	t.
Date	Y.M.D		9	7	0	8 0	7	Time	1400	Agency	C87	Crew	DB/CP	Photos	A1/7	, 8	AirPhotos						
C			PAR	RAN	MET	ER		VA	LUE	METH				SPECIFIC	DAT	Α				ОВ	STRUC	HON	S
100	Ave. Cha	an. W	/ldth	(m)				3.4	177	2.6,	3.0, 2.4,	3.4, 4.6, 4.1							C	Ht(m)	Туре	Loc'n
	Ave. We	t. Wie	dth (m)					2.4		2.1,	2.7, 1.7,	1.9, 3.0, 2.8										
100	Ave.Max	RIff	e De	pth	(CI	m)			12		10, 1	0, 15								100	6		
图,	Ave.Max	.Poo	I De	pth	(cn	n)			22	- 7	20, 2	5								100	1		
93	Gradient	t %							3		C	BE	D MATER	IAL	%		BAN	KS		ASS.	0	1.5	
1000	% Pool	1	5	RIM		80	Run	5	Other		編曲	Fines	clay,sit,san	d (<2mm)		15	Height(m)	2.5 %Unst	able	20	No.		
2000	Side Cha	n.%			٦	0 X	0-10	10-4	0 >40		經濟	Graveis	small (2-16	mm)		10	Texture	F)G L	R	田田	9		W.
		Area?	4		_	00	0-5	5-1	5 >15		1		large (16-6-	4mm)	П	20	Confinemen		EN	CO FC	ос	(UC)	N/A
12	Debris	Stat	ole%		_	-			na		超網		sm. cobble	(64-128mm)	\Box	40	Valley:Chan	nel Ratio	0-2	2-5 5	-10 1	0+)	N/A
200	COVE	R: To	otal%	6	_	-			75		SEE SE	Larges	ige, cobble	(128-256mm)	\Box	15	Stage		Dry	0	и н	Flo	od
444	Comp.	Dp.Po	lool	L.O.	0.	Boul	lder	InVeg	OverVeg	Cutbank	Bind		boulder(>25	6mm)	\Box		Flood Signs	Ht(m)	0.4	Braided	Y	- 1	O
	sum 100	5	5			65	5		25	5	100	Bedrock			1		Bars (%)	10	рН	8.9	O2 (p	pm)	
350	Crown Clo	osure	%			25	1	C	Aspect	1	學能	D90(cm)	15 C	Compaction	D	н	WaterTemp	(c) 11.5	Turb(cm) cl	Cond	(25C)	170
TEN				_				-	DISCHAR	GE	-					7		REA	CH SY	MBOL			
330	Para	meter	,		1	Valu	ie	Meth			Spe	cific Dat	a			\neg			(F	ish)			
100	Wetted V	Vidth	(m)		1				Esti	nated 3 c	f.s. di	scharge.				ヿ							
25 7	Mean De		, ,		7											\neg							
VIEW	Mean Ve	1		s)	1											╛							
HIST	Discharg		_	-	1												Width Valley/Chann	el,Slope)				BedMa	terial

			FISH SUMM	ARY				STREAM/VALLEY CROSS-SECTION	3	
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref	L	(Looking Downstream)		R
3	CT	1	46	F	R	EF	L	PLANIMETRIC VIEW	=	
S										
S										
9										
lin.										_
Ħ				1					-	
				17.0						
								COMMENTS		
	Channe	I Stat	oility X D	Debris _		Managemer	nt Concerns	Obstructions Riparian Zone X Valley Wall Prod	cesses _	Etc.
	Good re	aring	habitat with co	bble cove	rand	brush overs	tory.			
21	Pockets	of pot	ential spawnin	g.						
6	Banks h	ave so	me unstable cl	ay/silt sec	tions					
旭										
51										
7.0										
1									Edited by	CP
TE P									Date Y M D	97/11/26

DFO / MOE STREAM SURVEY FORM

(local) Helps Creek

Stream Name

(gaz) Helps Creek

Method

97/11/26

Date Y M D

V2

Access

Wat	ershed Co	ode	460-43	70-227	,													ReachNo.		3	Lngti	ı(km)		0.	7	
		Upper no				at top e	nd of fi	eld.				Map#	09	3L065				SiteNo.	7	H4	Lins	urv(m)		3	7.	
		оррен ш										U.T.M.	+				\neg	FishCard	Y	6	7	Ç.	Field	X	His	st.
Date	Y.M.D	9	7 0	8 1	0 7	Time	150		Agency	C87	Crew	DB/CP		Photos	A1/	9. 10		AirPhotos	-			345.74				
_	1.111.0		RAME		<u> </u>		ALUE		METH	901	0.0		9.0	PECIFIC		_			_				OBS	RUC	TION	s
	A Ob.			LEK	_				MEIN	243	2 2 4 2	.7, 3.4, 3.	_	LOII IC		<u></u>							_	Ht(m)	_	$\overline{}$
	Ave. Cha		<u> </u>				3.1		_	-			_						· :			-		()	1,500	-
	Ave. Wet						1.9		_	2.3, 1	.0, 1.0, 2	.0, 1.2, 2.					_							$\overline{}$		\vdash
	Ave.Max						10			 													44.00			1
	Ave.Max		ptn (ci	m)			60		-	ini viil.					1 .	,	الاشو		140						_	╁
	Gradient				1-	· -	- 4 -	-	<u> </u>	C		MATER			- "	6	G	BAN	-			10				\vdash
	% Pool	50	Riffle	50	Run		Other				Fines	clay,sitt,sa				20	390	Height(m)	-	%Uns		0		-		\vdash
	Side Char	1.%			0-10			40			Gravels	small (2-1	6mm)		\sqcup	80	47.35	Texture		G I	_					Щ
		Area%		0 🗌	0-5	5 -1		15			<u> </u>	large (16-	84mm	1)	-			Confineme			EN	co		\sim		N/A
	Debris	Stable%					75					sm. cobble	(64-1	128mm)	L			Valley:Cha	nel R	atio	0-2			_	+ 1	
	COVE	R: Total	%				75		<u> </u>		Larges	ige. cobble	(128-	-256mm)	$oxed{oxed}$			Stag	8		Dr	<u> </u>			Flo	_
	Comp.	Dp.Pool	L.O.D.	Bou	ilder	InVeg	Over	/eg	Cutbank	144		boulder(>2	56mm	n)	<u>L</u> .	L.		Flood Signs	Ht(m)	0.3	Braid	ed	Y		()
	sum 100%	i	40			30		10			Bedrock						爨	Bars (%)	<u> </u>	15	pH	1 8	.8	O₂(pp	m)	$oxed{oxed}$
	Crown Clo	sure %		90			Aspec	t		建築	D90(cm)	5 5	Co	mpaction	0	Н		WaterTemp	(C)	11.0	Tur	b(cm)	cl	Cond(2	(5C)	170
							DISC	IARGI	Ę		/50	3								REA		YMB	OL			
***	Parar	neter		Val	ue	Met	hod			Spec	cific Data	a										(Fish)				
疆	Wetted V	Vidth (m)						Estim	ated 3-4	c.f.s. (discharg	e.]									_
**	Mean De	pth (m)						More	flow tha	n d/s.																
避	Mean Ve	locity (m/	's)	Ľ.,																						
1	Discharge	e (m3/s)															(VMdt	h:Valley/Chan	nel,Sloj))					BedMa	itenal
_																405		0.0505	<u> </u>							_
150.00			H SUM			I. I.		H	,			3	IKE		king D			S-SECTI	UN			-			R	,
No.	Species		Range(r	nm) (Life			thod/Ref	Ч.	L						-							_			-	
	CT	15	29-47	+	F	R	EF	+	-				LAN	IIMETRI	C VI	EW					-					
	СТ	5	95-116	+	J	R	EF	┽	-																	
**		-		+		┝╌┼╴		┵	-																	
4				+					-																	
		-		-		\vdash		+	-																	
_				-		\vdash		\dashv	-																	
				+		┝╌┼╴		-																		
多一路		- -		+		┝╌┼╴		+	-																	_
1771				-		╀		+	-																	
						<u>l</u>					COMM	ENTS	-										_			
	Channel	Carbilita		Dob								structions		Ripa		7000	. *	Valle	nv 10	all D	oces				Etc.	
T-path		Stability			ris 🗀		anagei	nent C	oncerns		Obs	suucuons		Ripai	1411 4	-	Ċ	Vall	ey vv	all F	oces	363			LIC.	
San Pin	Good pot				section	١.								···	_											
	LOD for	<u> </u>	<u> </u>		-																-					
Mark	Extensive	alder ov	erstory	•																						
71.4F																	_									
59 AZ 580 E																				-						
																								_		
X1.461																										
*																										

										STR		SURV	EY FORI	м											
Stres	m Nam		(gaz) He	lps Cr	eek							Helps Cr				_			Ac	cess	V	2 1	Metho	od
	rshed (370-22													ReachNo.	3	Lny	gth(km)		0.1	7	
Loca	tion	Just	u/s fr	om re	ad cro	ossing i	n brus	hy area	. Acces	from			Map#	093I	.065			SiteNo.	Н7	LES	Surv(m)	\vdash	33	;	
		clear	ring o	n wes	t side o	of field.							U.T.M.	1				FishCard	Υ (N)	9	Field	X	Hist	.]
Date	Y.M.D		9	7 0	8	0 9	Time	11	45	Agency	C87	Crew	DB/CP	F	hotos	A1/1	1, 1	2 AirPhotos							
			PAR	AME	TER		١	/ALUE	***	METH				SPE	CIFIC	DAT	ΓA					OBS	RUCT	IONS	5
	ve. Ch	an. W	/ldth	(m)				1.6			1.8, 1.	6, 2.0, 1	.1, 1.6, 1.4										Ht(m) 1	уре	Toc,u
飘力	ve. We	t. Wi	dth (r	n)				1.4			1.3, 1.0	6, 1.7, 0	.8, 1.5, 1.3									4			
4	ve.Max	c.Riff	le De	pth (c	:m)			5			5, 5, 5											無影			
2 P	ve.Max	c.Poo	l Dep	th (c	m)			17			15, 20,	, 15										識			•
獎數C	radien	t %						1.5			ic.	BED	MATER	IAL		%		C BAN	IKS						
整	Pool	1	0 8	liffle	60	Run	30	Other	\coprod		解答 P	ines	clay,silt,san	1 (<2m	n)		60	Height(m)	0.5 %Ur	stable	0				
S S	ide Cha	n.%			0 🗶	0-10[10-	40	>40		靈麗	2revels	small (2-16)	mm)			40	Texture	FG	L R	!	通過			
38		Area	١.		0 🗆	0-5	5 -	15_	>15🗶				large (16-64	lmm)				Confinemen	t	EN	4 CO	FC	οc ι	ж i	N/A
a the	ebris	Stat	ole%					100			製土		sm. cobble (84-128r	nm)		_	Valley:Char	nel Ratio	0	-2	5-1	0 10	+ N	/A
STE	COVE	R: To	otal%					80				arges.	lge. cobble (128-256	mm)			Stag	9	D	ry (L	M	Н	Floo	od
i c	omp.	Dp.Pc	ol L	.O.D.	Bou	ulder	InVeg	Ove	rVeg	Cutbank			boulder(>25	6mm)		\sqcup	_	Flood Signs	Ht(m)	0.	2 Braic	ted	Y	9	
. F	um 1009	4		50					50			Bedrock					_	Bars (%)	10	р	H 1	8.8	O ₂ (pp	m)	
:连C	rown Ch	osure	%		90)	Contract	Aspe	ct		E C	090(cm)	4	Comp	action	D ₄	н	₩aterTemp	(C) 11	0 Tu	rb(cm)	cl	Cond(25	SC)	170
127								DISC	HARG	<u> </u>		/50	1				_		RE	ACH	SYMB	OL			
STEEL STEEL		mete			Val	ue	Me	thod	—			fic Data					_				(Freh)				
200000	Vetted V		<u>` </u>				<u> </u>		Estim	ated 1-2	c.f.s. di	ischarge	È.				_							_	
29.56	fean De	, ,							 								_								
	lean Ve)	├				+-								4				İ				
CBY PE	ischarg	e (m	3/5)				l		<u> </u>									(Width: Valley/Chare	se!,Slope)				8	edMate	na/
			FISH	SUN	MAR	Y			\neg				ST	REAL	I/VAL	LEY	CR	OSS-SECTION	ON		-	_			
C s	pecies	No.	Size R	ange(n	nm) Life	e Phase	Use N	ethod/Re	Π	L					(Looki	ng Do	wnstn	eam)						R	
									\neg				PL	ANIM	ETRIC	: VIE	w								
143										•										•	_			•	
100										•														•	
Ma 3.			NO F	ish (CAUG	нт.																		•	
	umerou	ıs fry	were	obser	ved u/s	s to for	k,																		
***	-180 m s	bove	site.		\perp																				
14,5		$oxed{oxed}$					\sqcup																		
FE.					\bot		\sqcup		\perp																
		L_																							
												COMME	ENTS												
	Channel	Stab	ility	<u>-</u>	Deb	ris 🗀	N	Manage	ment C	oncerns		Obs	tructions	_	Ripari	an Z	one	Valle	y Wall P	roces	sses		1	Etc.	
s	urprise	d no fi	ish we	re ca	ught a	t this si	te; nu	merous	fry we	e observ	ed just	u/s.													
75.																									

Edited by CP

Date Y M D

97/11/26

DFO / MOE STREAM SURVEY FORM

					_										_							1					
Stre	am Name		(gaz) H	lelp	s Cre	ek						(local)	Helps Cre	æk							Acce	ss	A'	TV	Meth	od
Wat	ershed C	ode	- 4	160 -4	1370	0-227													ReachN). <u> </u>	4	Lngth(km)		2.	.8	
Loc	ation	Helps	Cre	ek n	air	stem	below	culver	at B.(C. Hydr	o line			Map#	0931	L065			SiteNo.		Н9	LthSu	• • •			5	
		crossi	ing.											U.T.M.					FishCan	:	Y (N		0	Field	ı 🗶	His	t. 🗌
Date	Y.M.D		9	7	0	8 0	7	Time	160	Ю	Agency	C87	Crew	RD		Photos	B1/	7, 8	AirPhoto	s							
C.		1	PAR	AM	ΕTE	R		V/	LUE		METH				SPE	CIFIC	DA	TA						OBS	TRUC	TIONS	S
	Ave. Cha	n. W!	dth	(m)					2.2			2.1, 2	2.4, 1.2, 3	3.0									\neg	数端	Ht(m)	Туре	Loc'n
	Ave. Wet	L Wld	th (r	n)	_				1.3			1.4, 1	.3, 1.0, 1	1.4													
	Ave.Max	.Riffle	De	oth	(cm	1)			8			7, 9,			_									益 心			
	Ave.Max			_	_	_			20			18, 2											┪	775			
公式				,				\vdash	8-10			act.	<u> </u>	D MATERI	ΑL		9	6	В	ANKS			┪				_
	% Poel	30	1	time	Т	50	Run	20	Other	П			Fines	clay,silt,sand		nm)	 	_	Height(r		8 %Unst	able		经计			
			Ŧ	T	10		-10			40□			Gravela	smail (2-16r	<u> </u>		 	30	Texture	_	GL	R	_				
調響		Area%	+	+	+		0-5			•15 <u></u>				large (16-64	÷		-	40	Confine		10).	Y-1	_	FC	<u>ос</u>	UC	N/A
		Stabl			10		U -3[<u> </u>	90	10			\vdash	 	· ·		\vdash	10	Valley:C		Datia	0-2	<i>2-</i> 5	\smile			I/A
								_					l	sm. cobble (⊢		SECT.		Ratio	 	_	(
	COVE								50		 		Larges	ige. cobbie (128-25	8mm)	_	10	200	age		Dry	بك	_	Н	Flo	
多新型	Comp.	Dp.Poo) 1	.O.D	4	Boul	der	InVeg	Ove	Veg	Cutbank	238		boulder(>250	Brnm)		$oldsymbol{ol}}}}}}}}}}}}}}}}}}$		Flood S	gns Ht(m)	0.3	Braide	ed .	Y		
	sum 100	30		30	1	10				15	15		Bedrock						Валз (%		15	pН	n	r	O ₂ (pp	om)	
	Crown Clo	sure %	6			70		Cy	Aspe	ct			D90(cm)	11	Com	paction	Ø	н	WaterTe	mp(C)	11.0	Turb((cm)	cl	Cond(2	25C)	190
									DISC	HARGI	E										REA	CH SY	/MB(OL			
	Parar	neter				Valu	е	Meth	od			Spec	cific Data	3								(F	ish)				
À	Wetted V	Vidth (m)		Τ					Estim	ated 1.5	c.f.s.	discharg	e.				\neg									
	Mean De	pth (n	n)		Τ	-												\neg	_								
42	Mean Ve	locity	(m/s)	T													\neg									
1	Discharge	e (m3/	/s)		T														Mdth:Valley/C	hannel,S	lope)					BedMat	lenal
											_							_									

			FISH SUMMA	ARY			Г	STREAM/VALLEY CROSS-SECTION			
£	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref		(Looking Downstream)	-		R
3	СТ	8	29-33	F	R	EF		PLANIMETRIC VIEW			
新纸类	СТ	2	83-100	J	R	EF	Г	_	-		
美											
2/2											
推											
がいない。							Г				
93. GZ 13 Mar								COMMENTS			
	Channel	Stab	ility X D	ebris 🗀		Managemen	t Co	oncerns 🗶 Obstructions 🗶 Riparian Zone 🗶 Valley Wall Process	es _	E	tc.
	Small, sta	ble c	reek with lots o	f LOD an	d br	ush cover. So	me	potential spawning in this area.			
	Culvert (0.4 m) - 10 m in leng	th; no dr	op a	outlet. May	be p	passable to adults.			
	Triton ca	ught	CT above the c	ulvert.							
机锅	Suspect c	reek i	is mismapped u	√s and thi	s is t	he main Help	s C.	channel.			
.											
100											
20.5											
-3									Edited by:	CP	
割潛無到衛									Date Y M D	97/	1/26

DEO / MOE

											STR		SURV	- EY FORI	VI.												
Stre	am Nam	8	(ga	z) H	elps	Creek Tri	butar	ry I	IP1					Helps Cr		butary	HP1					Acce	ss	V	2	Metho	od
Wat	ershed C	ode		460-4	370	-227													ReachNo.		1	Lngth((km)		1.0	0	·
Loc	ation	Trib	utar	y HP1	, im	mediately	d/s fr	ош	road c	rossin	g/culver	t.		Map#	093L	65			SiteNo.	Н	l3a	LthSu	rv(m)		30) .	
									-		,			U.T.M.					FishCard	Υ	N		94	Field	X	His	t. 🗍
Date	Y.M.D		7 9	7 (9 8	8 0 7	Time	\neg	1300		Agency	C87	Crew	DB/CP	PI	iotos A	1/5, 6	;	AirPhotos								
C			PA	RAME	TE	R	,	VA	LUE		METH				SPEC	IFIC D	ATA						- 10	OBSI	RUCT	IONS	s
	Ave. Ch	en. V	Vidti	ı (m)					3.4			3.1, 3	3.8, 4.0, 3	.1, 2.6, 3.8									the state of	£ .	Ht(m) 1	Гуре	Loc'n
	Ave. We	t. Wi	dth	(m)					0.6			0.5, 0).7, 0.6, C	.6, 0.7, 0.2									(March				
	Ave.Max	.Riff	le D	epth (cm))			5					•									7		\neg		
	Ave.Max	.Poc	l De	pth (c	m)				10														17.0		\neg		
福 第	Gradien	t %							5			C	BEI	MATER	AL		%	C	BAN	KS			4				
14	% Pool	1	0	Riffle	Τ	90 Run		-	Other			7	Fines	clay,silt,sand	i (<2mm)			Height(m)	2.5	%Unst	abie	50				
	Side Cha	n.%			0	X 0-10] 10	40	<u></u> ~	10			Graveis	small (2-16	nun)		25	5	Texture	F(G)L	R	27.00				
滥		Area:	*		0[0-5	5	-15	□ >	15				large (16-64	lmm)		25	多	Confinemen	ıt		EN	co	FC	oc ı	υ¢	N/A
进	Debris	Stal	ble%						50					sm. cobble (64-128m	m)	25	5	Valley:Chan	nel Ra	lio	0-2	(-3)	5-1	0 10	+ N	I/A
	COVE	R: T	otai	%					100			规律	Larges	lge. cobble (128-256r	nm)	25	鎌	Stage	9		(P)	L	M	Н	Floo	od
	Comp.	Dp.Pc	pol	L.O.D.		Boulder	InVeg		OverV	eg	Cutbank			boulder(>25	8mm)				Flood Signs	Ht(m)		0.3	Braide	đ	Y		S
	sum 100%	6		10		90							Bedrock					数	Bars (%)	ا	98	pН	8.	3	O ₂ (pp	m)	
	Crown Ck	sure	%			25	C	Ţ.	Aspect	:			D90(cm)	40	Compa	ction (н м	20	WaterTemp	(C)	14.5	Turb((cm)	cl	Cond(2	5C)	170
<u>i</u>									DISCH	ARGE			/50	6							REA		YMBC)L			
	Para	mete	r		Ľ	Value	Me	etho	od			Spec	cific Data	1				1				(F	Fash)				ļ
1	Wetted V	Vidth	(m)		\perp	•				Trickle	flow di	schar	ge. Char	nel is mai	nly			1									
H	Mean De	epth (m)		╀					dewate	red witl	a fev	v pools w	retted.				4									
	Mean Ve		_	(s)	1									_				4					j				
14.2	Discharg	e (m	3/s)		1													(W	ith Valley/Chan	nel,Slop	•)					BedMat	onsi i
			FIS	H SU	MM	ARY		-						ST	REAM	VALL	EY C	ROS	S-SECTION	ON							
C)	Species	No.	Size	Range(mm)	Life Phase	Use	Meti	hod/Ref	7	L					(Looking	Down	strear	n)			_				R	
3.0			Т							┪.				PL	ANIMI	ETRIC	VIEW	,				_					
-130							П			$\neg \vdash$	•											_					
"dig		Elec	trofi	shed c	ulve	ert pool.		_			•																
55£2		NO	FISI	₁.							•																
14		CT :	fry w	as obs	erv	ed here in	1985.				-																
1,4			上																								
12.74																											
		<u> </u>	$oldsymbol{ol}}}}}}}}}}}}}}}}}$			<u> </u>																					
74						j																					
34													COMM	ENTS													
	Channe	Stat	bility		[Debris _		Ma	nagem	ent C	oncems	_	Obs	structions	X	Riparia	n Zon	e Î	Valle	y W	all Pro	cess	es			Etc.	
	This cree	k dri	es u	o for n	nucł	n of the sur	nmer	. C	T fry v	vas obs	erved in	1985															
	Walked	100 m	11J/S	from (ulv	ert; few is	olated	d po	ools we	tted. I	dust dry	up in	i late sur	nmer/wint	er.												
				- _		rog near t		<u>_</u>																			
- 3	Tributar	y HP	l wa	s obse	rved	at the por	werlir	ne;	chann	el was	dry - no	fish p	otential.														

CP

97/11/26

Edited by: Date Y M D

DFO / MOE STREAM SURVEY FORM

Stream Name

25 cm high drop at the mouth.

(gaz) Helps Creek Tributary HP3

(local) Helps Creek Tributary HP3

Access

Method

CP

97/11/26

Wat	ershed C	ode	4	1 60–43	70-227														ReachNo.	_	1	Login	(km)		0.5	<u> </u>	_
Loca	tion	100 m	w/s	from	mouth,	140 m	d/s fr	om	road o	n Hel	рз С.			Map#	093L065				SiteNo.	I	H6a	Linsu	rv(m)		240)	
		mainst	tem											U.T.M.					FishCard	Y	(N)_	C ₂ c	Field	X	Hist	.]
Date	Y.M.D		9	7 0	8 0	8	Time	Τ	1245		Agency	C87	Crew	СР	Photo	s na			AirPhotos								
C		P	AR	AME	ΓER		V	ΆL	UE		METH				SPECIF	IC DA	TA							OBST	RUCT	IONS	
	Ave. Cha	n. Wk	ith	(m)					1.9			2.1, 2	.4, 2.3, 1	.8, 1.3, 1.6										C.	Ht(m)	уре	Loc'n
	Ave. Wet								1.5			2.3, 1	.2, 2.3, 0	.7, 1.3, 1.4										17.70 L			
	Ave.Max				m)				6			5, 7													\neg	\neg	
	Ave.Max			<u> </u>	<u> </u>				11			10, 1	2											-feral 4		\neg	
	Gradient					-	\vdash		3-4			C.		MATER	AL	(%	Câ	BAN	IKS				707C		\neg	\neg
	% Pool	20	1	Riffle	60	Run	20	$\overline{}$	other	$\overline{}$			Fines	clay,sit,sand		+-	10		Height(m)	_	%Unst	able	0	Description of the second		\neg	_
1	Side Char		7	1		-10	10-	_		10			Gravels	small (2-16r		十	25	method.	Texture	F			+	2	\dashv	_	_
W. Maderi			+		0 🗆	0-5	5 -			<u></u> I5□	\vdash	Paris .		large (16-84		┿	35	500.64	Confinemen			EN	co	SASSECULAR .	OC I	JC I	NVA
海 新	Debris	Area%	ب		<u> </u>	<u></u>	, 5-	104	80	J	\vdash		-	 		+	20	7.0	Valley:Char		latia.	0-2		$\overline{}$			
		Stable				-	-							sm. cobble (+	-	10000000			ano	+					
, eu	COVE		$\overline{}$		-			Ŧ	90				Larges	lge. cobble (' 	10		Stag			Dry				Floo	_
		Dp.Pool	4	L.O.D.	Boul	_	inVeg	+	OverV	_	Cutbank			boulder(>25	5mm)			1000gs 70	Flood Signs	s Ht(m		0.3	 	$\overline{}$	Y	\rightarrow	U
	sum 100	10		15	20			1	50)	5		Bedrock	1 18:00		-	Ļ	20.10	Bars (%)	<u> </u>	10	pН	_	ar	O₂ (pp	m)	\dashv
de.	Crown Clo	sure %			80		Ç _{DEN}	A	Spect			浅洼	D90(cm)	12	Compactio	n L M	ψ	14	WaterTemp)(C)		Turt	• •		Cond(2	5C)	nr
				(AL	DER)		,		DISCH	ARGI								ı			REA		YMB	OL			1
2	Parar	meter			Valu	е	Me	tho	d			Spec	cific Data	a				ı				•	(Frsh)				- 1
	Wetted V	Vidth (r	n)						1	Estim	ted 2 c.	f.s. di	scharge.					l									
10	Mean De	pth (m)						_									l					1				- 1
谜】	Mean Ve	locity (m/s	;)														l					1				
	Discharge	e (m3/	s)															(VMdt	h Valley/Chan	nel, Slo	pe)					3ed Mat	lane
_																											
300		· T			IMARY		1. 1.							51		ALLE oking D			S-SECTI	ON			-				ļ
C;	Species	No. S	Size F	Range(n	nn) Life	Phase	Use M	leth	od/Ref	-	L					-			•				_			R	
Total		-			+		┝	_		+	-			PL	ANIMET	RIC V	FAA						-				\dashv
N. C.					+		\vdash			+	•																\dashv
					+		 			-																	
ĦĠ		NOT !	SAN	APLE	D.		\vdash			+																	
en en					+		\vdash			+																	
44		$\vdash \vdash$	_		+		\vdash			-																	
47		\vdash					$\vdash \vdash$			-																	_
		 			+		$\vdash \vdash$			-																	
基準		\vdash			\bot		\vdash			+																	\dashv
																											_
ŢŲ.													COMM														
A.E.	Channel	Stabil	ity	X	Debr	s _	N	lan	nagem	ent C	oncerns		Obs	structions	X Rip	arian .	Zone	X	. Valle	ey V	/all Pn	ocess	ses			Etc.	
	Sections o	of good	po	tential	spawn	ng.																					
学	Observed	some	deb	ris jan	ns/log s	teps.																					
14	Excellent	overst	огу	(alder) cover																						
*	Stable cro	ek wit	h m	1035-C0	vered l	anks	and in	stre	eam bo	oulder	s																
	Western '	Toad w	/85 (observ	ed in c	eek d	uring g	gro	und su	rvey.																	
20 mg																											
	Hiked d/s	for 38	0 m	to loc	ate Tri	b.'s H	P3a an	d ŀ	IP3b b	ut the	y were n	ot for	ınd. Sus	pect the tr	ibutaries	enter	futhe	r d/s	s.								
2.45										2-11-				r:L 11D7	70 4/-												- 1

										etb		/ MOE	EY FOR	u												
	am Nam	- I/a		TJ-1	ps Creek Tri	hute	I	JD4		SIK			Helps Cre	_	ributen	ч	P4		_		Acce	ss	F	т	Meth	nd l
_	ershed (<u>_</u>	_	70-227	Duu	пуг	114				iocaij	neips Cre		· ibuti	, 12		ReachNo.	_	1	Lingth	$\overline{}$		0		
	ation	100 m	_										Map#	093	L065			SiteNo.	├	 11a	LthSu	$\overline{}$		10		_
100	шоп	1100 111	W3 111	щ	шоши.								U.T.M.	1000				FishCard	Y	_	•	C	Field		His	
Date	Y.M.C	<u> </u>	9 7	0	8 0 9	Tim	_	1250	,	Agency	C87	Crew	DB	_	Photos /	A1/1	13	AirPhotos	\vdash	_	_	1,000				
		_	ARAI	_		1	_	LUE		METH				_	ECIFIC	_			_				OBST	RUCT	TONS	5
機動	Ave. Ch	nan. Wid				\vdash		1.2		-	1.2. 0.	9, 1.5, 1	.0											Ht(m)	Туре	Loc'n
		et. Widtl		-,				1.0				9, 0.9, 1		_		_							400		-	
		x.Riffle	· · ·	h (C	m)			5			4, 5, 7							-						\neg	_	
	Ave.Ma	x.Pool D	epth	(cn	n)			17			20, 15													\neg		
1	Gradier	nt %			·			1.5			ic.	BE	MATERI	AL		%	6	C BAN	IKS				chi i			
1.14	% Pool	60	Riff	.	30 Run	1	0	Other	\top			Fines	clay.slit.sanc	1 (<2	nm)	\neg	70	Height(m)	0.3	%Unst	able	0				
	Side Ch	ап.%	\top	П	0 🗶 0-10] 1	0-40	<u> </u>	40			Gravels	smali (2-16r	mm)			_	Texture	F	G L	R					
	-	Area%	\top	${\color{red}{ o}}$	0 0-5		5 -15	5 >	15 🛣		1		large (16-64	lmm)				Confinemen	nt		EN	СО	FO	œ	UC	N/A
	Debris	Stable	%			Г		100					sm. cobble (64-12	8mm)			Valley:Char	nel Re	itio	0-2	-5	5-1	0 10	+ N	l/A
	COV	ER: Tota	1%					100				Larges	ige. cobble (128-2	56mm)	\neg		Stag	8		Dry	L	M) н	Flo	od
特的	Comp.	Dp.Pool	L.O	D.	Boulder	InVe	,,	OverV	/eg	Cutbank			boulder(>25	Bmm)				Flood Signs	Ht(m)		0.2	Braid	ed	Υ		Z
	sum 100	%	Τ					10	00		體	Bedrock						器ars (%)		0	рΗ		ır	O ₂ (pp	Đ)	
4	Crown C	losure %			95	C.	7.0	Aspec	t		1	D90(cm)	3 C	Com	paction	Ď	н	WaterTemp	(C)	12.0	Turb	(cm)	cì	Cond(2	5C)	100
Naπ.Σ'ς								DISCH	IARGI			50/	1							REA	CH S		OL			
が対	Para	ameter			Value	N	leth	od			Speci	fic Data	1								(Fish)				
1	Wetted	Width (n	1)	\Box					Estima	ted 0.7	c.f.s. di	ischarg	е.													
	Mean D	epth (m)		ᆜ		$oxed{oxed}$											_									
4100 m		elocity (r		_		┡										_	_					1				
Z F	Dischar	ge (m3/s)															(Width: Valley/Char	nei,Slop	•)					BedMai	erial
		F	SH S	UM	MARY				\top				ST	REA	M/VAL	LEY	CR	OSS-SECTI	ON							
c	Species	No. Si	ze Ran	ge(m	nm) Life Phase	Use	Met	hod/Ref	┨	L					(Lookin	ng Do	wnst	ream)			_				R	
	-						\top		7				PL	ANII	METRIC	; VII	EW				Ξ	:				
v.N							T		\top	•																
									\top	•																
× i		N	OT S	AM	PLED.																					
									\perp																	
1																										
F COMPANY						_	L		\perp																	
						_																				
-57		+				\perp			\bot																	
4.4																										
1.4												COMM						**								
ende?		el Stabili			Debris :			<u> </u>		oncerns			structions	X	Riparia	an 2	one	X Vall	ey W	all Pr	ocess	es			Etc.	
					pears to be u				sh disti	ribution	based o	on gradi	ient.													
	_				ıks; difficult			_									_							-		
100			_		e present; a				at hig	h flows.																
1925	Small p	ockets of	poter	tial	spawning w	ere o	bsei	rved.																		

Edited by CP

Date Y M D

97/11/26

DFO / MOE STREAM SURVEY FORM

Stre	am Nam	!	(gaz)) He	lps C	reek I ril	outary .	HP4				(local)	Helps Cre	ek i rio	utary i	1174				ACC	ess	A		netrio	"
Wat	ershed C	ode	4	60-43	70-2	27											ReachNo.		2	Lngt	h(km)		0,9)	
Loca	ation	Tribu	tary	HP4	at Hy	ydro line (crossin	g .					Map#	093L0	55		SiteNo.	H	111	Lins	urv(m)			•	
													U.T.M.				FishCard	Y		\mathbf{O}	40	Field	X	Hist.	\Box
Date	Y.M.D	_ [9	7 0	8	0 7	Time	140	0	Agency	C87	Crew	RD	Pho	otos B1	/5, 6	AirPhotos								
G		Ì	PAR	AME	TER		VA	LUE		METH				SPEC	FIC DA	ATA						OBS"	TRUCT	IONS	
A (173.)	Ave. Ch	ın. Wi	dth ((m)	_			1.0			0.7, 0.	8, 0,8, 1	.2, 0.7, 1.5									e l	Ht(m) T	ype L	.oc'n
Page 1	Ave. We			·				0.5			0.4, 0	7, 0.5, 0	4, 0.5, 0.3										Steep		
煮	Ave.Max		<u>-</u>		m)			9			7, 11,		-									ner	Road	ev is	
	Ave.Max			<u> </u>				23			23, 27							:					also st	eep.	
	Gradien			_ <u>-</u> -	<u> </u>			15			G	<u> </u>	MATERI	AL	<u> </u>	%	C BAN	IKS				asiv			_
	% Pool	15	ı,	Liffle	80) Run	5	Other			-10 Med 344	Fines	clay,siit,sand			5	Height(m)	1	%Lin	stable	To			\dashv	_
12.0	Side Cha		Ť		o 🗆				40		2000-200		smail (2-16n		-	10	Texture			L R	<u> </u>		_	$\neg \dagger$	
	0100 0110	Area%	\dashv	+	0				15			QIATE:S	large (16-64		\dashv	10	Confinemen		<u> </u>	EN	co		(C)	JC N	VA.
	Debris	Stabi			V	, 0-3 2	3-1	90	· •		THE SECTION					30	Valley:Chan		tio.	0-2		_	_	+ N/	
	60)/5	-									######################################		sm. cobble (6			+	Corpera		i KU	+-	_	~	_	·	
	COVE		- 1		-			30				Larges	ige. cobble (m)	30	Stage			Dr) M		Floo	_
	Comp.	Dp.Poc	-	O.D.	B		InVeg	Over	_	Cutbank			boulder(>256	imm)	1_	15	Flood Signs				Braid		Y		
	sum 100	40	1	30	<u> </u>	5	A Realisans		10	5	Selection of	Bedrock	I Pess				Bars (%)		25	ph		nr	O ₂ (ppr	$\overline{}$	_
	Crown Clo	sure %	4			70	City	Aspe			457	D90(cm)	37	Compac	tion L	MΘ	WaterTemp		11.	_	b(cm)		Cond(25	iC)	110
									HARGE										RE/	ACH S	SYMB	OL			
		meter			V	alue	Meth	od			Spec	ific Data	1								(FRMI)				
	Wetted V	Vidth (m)		<u> </u>				Estima	ted 1 c.í	.s. disc	harge.													
	Mean De	pth (n	٦)		$ldsymbol{oxed}$																1				
**	Mean Ve	locity	(m/s)	<u> </u>																l				
	Discharg	e (m3,	/s)														(Width:Valley/Chann	nel Slop	e }				8	ledMate	mal
		-	F:01			DV.										V 05	000 000								_
				SUN		ı							SI		VALLE Looking (OSS-SECTION	ON		•-	_			_	i
n Co	Species	No.	Size R	enge(n	nm) [Life Phase	Use Me	hod/Ref	Ц	L					_		,			_	_			R	
FE PA													PL	ANIME	I RIC V	IEW				•	_			-	
			engti	of st	ream	1, 1 pass w	vith a																	_	
	lower net	$\overline{}$					+																	-	\dashv
- 57			NO F	ash (CAU	GHT.	-		+															_	_
2.5							-		+															-	
	<u> </u>						-		4															_	
数					\dashv		\dashv		4																
***					_		\perp		_															_	
***					\dashv																			_	
									\perp																
Ä												COMM	ENTS												
.28	Channel	Stabi	lity		De	bris 🗶	Ma	nager	nent Co	ncems	X	Obs	tructions	X R	iparian	Zone	X Valle	y Wa	all P	roces	ses		E	tc.	
	Small, co	nfined	, sing	gle chi	annel	i creek. I	leavy b	rush c	overing	steep cr	eek.														
4	~5 m roa	fill o	ver s	mall (70 c	m wide b	y 30 m	long),	steep (8	%) culv	ert. C	reek is v	ery steep f	urther	d/s with	~2.5	high drops o	ver d	ebri	3					
	and rock.																								

Edited by:

97/11/26

Not suitable fish habitat.

Appendix 6. Detailed results of fish sampling at all 1997 electrofishing sites

SITE: G1	REACH:	1	DATE:	Sep-22 PHOT	O: B3/15,	16
SITE LOCATION:	Goathorn Cree	ek, upper net 110 m be	elow PNG gas line cro	ssing.		
	ACCESS:	V2				
			EFFORT:	PASS 1	3425	
			(sec)	PASS 2	2937	
1				PASS 3	3079	
MARGIN = 1 FULL=2	2					
				TEMP (C):	6.0	
S = SIDE / M = MAIN:	M	SLOPE (%):	1.5	TIME:	10:00	
				COND.(uS):	100.0	
SAMPLING COMMENTS:	Difficult to hole	d the nets in due to hig	gh flows and the large	number of leaves		
	flowing into the	e net.				

		FL	FL	MEAN		PASS		EST.	95%	C.1.			B10-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	28-53	38.3	0.7	76	41	22	162	147	196	0.250	261.9	0.175
Sthd	1+	75-79	82.0	7.1	1	1	0	2	2	na	0.230	3.2	0.022
Sthd	>1+	97-143	110.0	15.4	13	7	2	23	23	32	0.035	36.3	0.533
Char fry	0+	47-53	50.3	1.3	4	2	0	6	6	9	0.009	9.7	0.012
Bull trout	>=1+	103-200	151.0	41.0	1	2	0	3	3	па	0.005	4.8	0.189
D Varden	>=1+	113	113.0	16.5	0	1	0	1	1	na	0.002	1.6	0.025
MW	>=1+	108-178	136.8	26.3	2	8	3	13	14	na	0.020	21.0	0.526
TOTAL								210			0.323	338.5	1.483

DIST	WET	CHAN		SITE		SITE	DEPTH
ופוע	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
o [12.0	24.9	LOD	10	POOL	5	45
5	10.7	17.1	COBBLE	80	RIFFLE	40	54
10	9.5	16.9	IN VEG		RUN	45	
15	9.8	18.4	OVER VEG		OTHER	10	
20	10.0	20.5	CUTBANK				
25	10.9	22.5	DEEP POOL	10			
30					D90	50	
35			TOTAL	70	D50	18	
40					(cm)		'

HABITAT COMMENTS:	Creek discharge is at medium to high flows. Site consists of riffle-run
	habitat with some flats along the margins. Bed material is mainly boulder
	and cobble.
	All char fry were identified as BT with the exception of 2 which were DV.

SITE: G2	REACH:	2	DATE:	Sep-15 PHO	TO: B3/1, 2
SITE LOCATION:	Goathorn Cree	ek above lower crossin	g; lower net at old \	Water Survey Site.	
	ACCESS:	V2			
			EFFORT:	PASS 1	3144
			(sec)	PASS 2	2916
				PASS 3	na
MARGIN = 1 FULL=2	2		· · · · · · · · · · · · · · · · · · ·		
				TEMP (C):	7.0
S = SIDE / M = MAIN:	M	SLOPE (%):	2.5	TIME:	10:20
				COND.(uS):	100.0
SAMPLING COMMENTS:	Difficult to hol	d in nets due to the hig	gh flows. Upper net	partially blew out a	t the end
	of the 2nd pass	; therefore, no 3rd pa	iss. Difficult to remo	ve fish in the fast w	ater.

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	2 3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
					ı								
Sthd	0+	30-44	36.9	0.5	73	45	na	190	118	283	0.205	271.9	0.103
Sthd	1+	73-83	77.0	5.6	4	1	na	5	5	7	0.006	7.6	0.032
Sthd	>1+	93-146	112.2	17.2	13	6	na	24	19	38	0.026	34.5	0.447
Char fry	0+	50-55	51.8	1.2	3	1	na	5	4	8	0.005	6.4	0.006
Bull trout	>=1+	84-146	117.4	19.2	3	2	na	9	5	36	0.010	12.9	0.186
D Varden	>=1+	105	105.0	14.1	1	0	na	1	1	1	0.001	1.4	0.015
MW	>=1+												
TOTAL								234			0.252	334.7	0.789

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	12.7	12.7	LOD		POOL		
5	12.0	12.5	COBBLE	80	RIFFLE	95	47
10	13.4	13.4	IN VEG	5	RUN	5	
15	14.2	15.2	OVER VEG		OTHER		
20	13.0	16.7	CUTBANK	10			
25	13.5	17.1	DEEP RUN	5			
30	14.0	16.2			D90	40	
35			TOTAL	50	D50	10	
40					(cm)	· · · · · · · · · · · · · · · · · · ·	
	13.3	14.8					
AREA	928.0	MARGIN (M)	70.0				

HABITAT COMMENTS:	Discharge = 8-10 m ³ /s. Heavy rain for 2-3 days prior to sampling resulted
	in medium to high flows.

SITE: G3	REACH:	2	DATE:	Oct-30 PHOTO): A5/11, 1	12
SITE LOCATION:	Drove down ol	d road to Goathorn	C. Top of site located	at end of road.		
	ACCESS:	ATV				
			EFFORT:	PASS 1	2240	
			(sec)	PASS 2	1695	
				PASS 3	1534	
MARGIN = 1 FULL=2	2					
				TEMP (C):	3.0	
S = SIDE / M = MAIN:	M	SLOPE (%):	2	TIME:	10:00	
				COND.(uS):	nr	
SAMPLING COMMENTS:	Difficult site to continual build	•	be constantly cleaned	d due to the		

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS
				(g)									(g/m*m)
Sthd	0+	39-51	42.3	0.9	16	ı	1	18	18	18	0.033	40.4	0.029
Sthd ·	1+												
Sthd	>1+	100-132	I11.4	16.1	9	0	0	9	9	па	0.016	20.2	0.262
Char fry	0+	46-58	50.9	1.3	16	3	1	20	20	21	0.036	44.9	0.047
Bull trout	>=1+	92-124	112.1	13.4	5	1	1	7	7	11	0.013	15.7	0.170
D Varden	>=1+	77-103	90.0	9.0	2	0	0	2	2	na	0.004	4.5	0.033
MW	>=1+		~										
TOTAL								56			0.101	125.8	0.541

DIST	WET WIDTH	CHAN WIDTH		SITE COVER		SITE WATER	DEPTH (cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0 5	14.0	50.0	LOD COBBLE	5 80	POOL RIFFLE	90	40
10	13.5		IN VEG		RUN	10	
15	11.7		OVER VEG	5	OTHER		
20 25	9.2		CUTBANK DEEP POOL	10			
30					D90	32	
35 40			TOTAL	70	D50 (cm)	14	
REA	12.4 552.7	50.0 MARGIN (M)	44.5				

HABITAT COMMENTS:	Water levels moderate; water is slightly coloured.
	Primarily fast boulder-riffle habitat - good for parr rearing. Some good
	fry habitat is present along the margins.
	Char fry were identified BT with the exception of 5 fry which were DV.

SITE: G4	REACH:	2	DATE:	Sep-27 PH	ото: 1	34/3, 4
SITE LOCATION:	Goathorn Cree	k mainstem, ~400 m	u/s from old coal min	e site.		
	ACCESS:	V2				
		 ·	EFFORT:	PASS 1	4043	
			(sec)	PASS 2	3535	
				PASS 3	2681	7
MARGIN = 1 FULL=2	2					
1				TEMP (C):	6.0	_
S = SIDE / M = MAIN:	M	SLOPE (%):	3	TIME:	10:00	
<u> </u>				COND.(uS)	: 90.0	
SAMPLING COMMENTS:	Same site as 19	84. Difficult site to sa	mple due to the build	l up of leaves in		
	the net; nets ha	ad to be continually c	leaned to prevent the	m from blowing	out.	

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	32-51	39.1	0.7	49	13	6	69	68	75	0.085	101.9	0.059
Sthd	1+												
Sthd	>1+	101-141	124.0	21.3	4	4	1	9	9	na	0.011	13.4	0.237
Char fry	0+	38-62	51.6	1.5	33	9	9	55	52	69	0.067	80.7	0.101
Bull trout	>=1+	80-126	105.3	11.7	14	3	0	17	17	17	0.021	25.0	0.243
D Varden	>=1+	73-126	99.5	11.7	3	3	0	6	6	na	0.007	8.8	0.086
MW	>=1+												
TOTAL								156			0.191	229.9	0.725

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	11.0	31.6	LOD	20	POOL	5	50
5	16.9	31	COBBLE	60	RIFFLE	75	35
10	15.8	25.9	IN VEG		RUN	20	
15	5.8	19.3	OVER VEG	5	OTHER		
20	10.9	20.2	CUTBANK				
25	11.9	28.5	DEEP POOL	15			
30					D90	35	
35			TOTAL	70	D50	nr	
					(cm)		

HABITAT COMMENTS:	Estimated discharge ~20 c.f.s. Dynamic creek; LOD within channel.
	Complex site: good fry rearing along the margins, boulder/cobble and deep
	run/pool areas provide good cover for parr. Unstable bank on R. left at top of site.
	All char fry were identified as BT with the exception of 5 fry which were DV.

SITE: G4a	REACH:	2	DATE: C	Oct-04 PHOTO	: A5/22, 23	-:
SITE LOCATION:	Goathorn Cree	k river right side ch	annel, at proposed brid	lge site.		
	ACCESS:	V2				
			EFFORT:	PASS 1	nr	
			(sec)	PASS 2		
				PASS 3		
MARGIN = 1 FULL=2	2				· · · · · · · · · · · · · · · · · · ·	
				TEMP (C):	2.0	
S = SIDE / M = MAIN:	S	SLOPE (%):	1.5	TIME:	12:12	ı
				COND.(uS):	nr	
SAMPLING COMMENTS:	Sampled upper	45 m of a 420 m lon	g side channel at propo	sed bridge		
	crossing.			•		

SPECIES A		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SI ECIES A	AGE	RANGE	MEAN	WT	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS
				(g)									(g/m*m)
Sthd	0+												
Sthd	1+												
Sthd	>1+												
Char fry	0+							NO FISH (CAUGHT	OBSERV	ED.		
Bull trout >	>=1+												
D Varden >	>=1+												
MW >	=1+												

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	2.3	6.8	LOD		POOL	90	35
5	3.7	4.2	COBBLE	15	RIFFLE	10	5
10	1.1	8.3	IN VEG		RUN		
15	2.7	7.9	OVER VEG	5	OTHER		
20			CUTBANK				
25			DEEP POOL	80			
30					D90	22	
35			TOTAL	20	D50	10	
40					(cm)		
	2.5	6.8					
REA	110.3	MARGIN (M)	45.0				

HABITAT COMMENTS:	Est. 0.5 c.f.s.
	Below 45 m section sampled, channel is dewatered; suspect is seasonally wetted.
	Numerous old beaver dams are present d/s of sample site and discharge is
	a trickle flow in the lower 20 m of channel flowing into m/s Goathorn C.

SITE: G5	REACH:	2	DATE:	Oct-24 Pl	ното:	A4/9	-12
SITE LOCATION:	Upper Goathor	n Creek, ~1 km u/s fi	rom upper bridge site	•			
•	ACCESS:	V2					
			EFFORT:	PASS 1	L	3712	
			(sec)	PASS 2		2906	
				PASS 3		2173	
MARGIN = 1 FULL=2	2				_		
				TEMP (C):	L	2.0	
S = SIDE / M = MAIN:	M	SLOPE (%):	2	TIME:		10:00	
				COND.(uS):	: <u>_</u>	nr	
SAMPLING COMMENTS:	1		is site so the side char tively. The data was				

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	34-46	38.4	0.7	14	3	1	18	18	19	0.030	34.2	0.021
Sthd ·	1+												
Sthd	>1+	95-126	108.4	14.5	4	1	0	5	5	7	0.008	9.5	0.119
Char fry	0+	33-61	50.5	1.3	19	4	5	29	28	39	0.048	55.3	0.062
Bull trout	>=1+	68-114	91.5	8.6	7	2	3	13	13	na	0.021	24.1	0.179
D Varden MW	>=1+ >=1+	77-127	95.3	9.6	6	1.	1	8	8	11	0.013	15.2	0.126
TOTAL								73			0.119	138.4	0.506

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
i							
0	13.3	40.0	LOD	5	POOL		
5	11.4	38.0	COBBLE	90	RIFFLE	75	36
10	8.6	50.0	IN VEG		RUN	20	
15	12.0		OVER VEG		OTHER	5	
20	11.4		CUTBANK	5			
25	12.9		DEEP POOL				
30					D90	85	
35			TOTAL	75	D50	19	
40					(cm)		
	11.6	42.7					
AREA	610.2	MARGIN (M)	52.6				

HABITAT COMMENTS:	Creek at moderate to high flows. Immature W. Spotted Frog caught in side channel.
	Mainstem: large boulder/cobble with riffle habitat; poor fish habitat
	due to high flows.
	Side channel: smaller bed material and consisting of 60% riffle and 40% run.

SITE: G6a	REACH:	1	DATE:	Sep-24 PHOTO	D: B3/17, 18
SITE LOCATION:	Lower Cabinet (Creek, ~100 m u/s fro	m mouth.		
	ACCESS:	FT		_	
1			EFFORT:	PASS 1	1247
			(sec)	PASS 2	935
			1	PASS 3	na
MARGIN = 1 FULL=2	2				
				TEMP (C):	7.0
S = SIDE / M = MAIN:	S	SLOPE (%):	2.5	TIME:	11:30
				COND.(uS):	70.0
SAMPLING COMMENTS:	Sample site was 170 mm DV was	a side channel. a ripe male; 168 mm	n DV was a maturin	g female.	

		FL	FL	MEAN		PASS		EST.	95%	C.1.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+			1									
Sthd	1+												
Sthd	>1+	106	106.0	13.7	1	0	na	1	1	1	0.006	4.0	0.081
Char fry	0+	nr	nr	nr	1	0	na	1	1	1	0.006	4.0	na
Bull trout	>=1+	73-138	96.3	10.2	3	1	na	5	4	8	0.027	18.0	0.273
D Varden	>=1+	74-170	122.3	28.8	6	0	na	6	6	6	0.036	24.0	1.028
MW	>=1+												
TOTAL								13			0.074	50.0	1.382

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	6.8	25.0	LOD	5	POOL	10	65
5	5.4	27.8	COBBLE	75	RIFFLE	40	25
10	6.4	27.0	IN VEG		RUN	30	
15	8.3		OVER VEG		OTHER		
20			CUTBANK				
25			DEEP POOL	20			
30					D90	40	
35			TOTAL	60	D50	17 ·	
40					(cm)		
					` '		
	6.7	26.6					
REA	168.1	MARGIN (M)	25.0				

HABITAT COMMENTS:	Est. 20 c.f.s. discharge.
	Mainly boulder-riffle habitat with one pool within the site.
i	Good fry habitat present along the margins.
	Wide, unstable channel in the lower 25 m of this creek.

SITE:	G 7		REACH:		1]		DATE:	Sej	p-25	РНОТО:	B3/22	2, 23
SITE LOCAT	TION:		Cabinet C	reek. Upp	er net	20 m d	s fron	main Cab	inet C. b	ridge.			
			ACCESS:		V2	1							
						j		EFFC	RT:	PASS 1		1721	······
								(se	c)	PASS 2		1780	
				_						PASS 3		na	
MARGIN = 1	FULL=2		2]									
				1						TEMP (C):	6.5	
S = SIDE / M	= MAIN:		M	J	SLUI	PE (%):		2		TIME: COND.(1	·e)·	70.0	
SAMPLING (COMMENTS		Good clar	ity and no	net ni	oblems	i.e. po	wind/leave	·S.	COND.(13).	70.0	
SAMI DING	COMMENT		Good Clair	ny ana no	пес р	00101113							
				POPULA	TION	ESTIM	IATES	S:					
	1	FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT	1		3		LCI	UCI	N/M*M	N/100M	MASS
				(g)									(g/m*m)
					,								
Sthd	0+			<u> </u>	-								
Sthd	1+			 -	1								
Sthd	>1+	21.45	27.6	0.5	١.,	10		20	20		0.069	72.5	0.035
Char fry Bull trout	0+ >=1+	31-45 65	37.6 65.0	3.4	10	10 0	na na	20 1	1	na 1	0.003	3.6	0.033
D Varden	>=1+	53-129	71.7	4.5	38	8	na na	48	46	53	0.166	174.4	0.749
MW	>=1+	33-127	11	1.5	1 ~	٠	***	40	40	20	01100	27.44	0
				•	•								
TOTAL								69			0.239	250.5	0.795
	<u>1</u>												····
	WET	CHAN						SITE				SITE	DEPTH
DIST	WIDTH	WIDTH						COVER				WATER	(cm)
(m)	(m)	(m)						(%)				TYPE (%)	
_			7										
0	13.1	13.7	-	LOD	_			\vdash		POOL		05	24
5	11.2	12.6	-	COBBL	Ł			90		RIFFLE RUN		95 5	34
10 15	9.3	11.5	1	IN VEG	TC.			10		OTHER		-	
20	9.6	11.0	1	CUTBA				H-10		OTHER	:		
25	10.8	12.4	1	DEEP P				\vdash					
30			1							D90		40	
35]	TOTAL				75		D50		15	
40]							(cm)			
	10.5	11.9	-										
AREA	289.3	MARGIN (27.6	1								
HABITAT C	OMMENTS:		Low BT n			at this si	te.						
			Est. 1 m ³ /	s discharg	e.								

SITE: G8	REACH:	3	DATE:	Sep-24 PHOTO	D: B3/19, 21
SITE LOCATION:	Upper Goathor	n Creek, ~80 m u/s fr	om confluence with C	Cabinet C.	
·	ACCESS:	FT			
			EFFORT:	PASS 1	1908
			(sec)	PASS 2	1420
				PASS 3	na
MARGIN = 1 FULL=2	2				
				TEMP (C):	8.5
S = SIDE / M = MAIN:	M	SLOPE (%):	2.5	TIME:	15:00
				COND.(uS):	60.0
SAMPLING COMMENTS:	The char fry w	ere identified as a mix	of BT and DV.		
	171 mm DV wa	s a maturing female;	164 mm DV was a ri	pe male.	

		FL	FL	MEAN		PASS		EST.	95%	6 C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+												
Sthd .	1+												
Sthd	>1+	116-126	120.3	19.5	3	1	na	5	5	5	0.022	12.2	0.425
Char fry	0+	49-62	55.3	1.8	17	4	na	22	21	26	0.108	60.1	0.194
Bull trout	>=1+												
D Varden	>=1+	71-171	92.9	10.5	26	10	na	42	36	55	0.205	114.2	2.151
MW	>=1+												
TOTAL								69			0.334	186.4	2.770

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	6.3	9.4	LOD	20	POOL	15	40
5	4.3	7.8	COBBLE	50	RIFFLE	70	18
10	5.7	10.4	IN VEG		RUN	15	
15	6.0	13.I	OVER VEG	5	OTHER		
20			CUTBANK	10			
25			DEEP POOL	15			
30					D90	18	
35			TOTAL	75	D50	9	
40					(cm)		
	5.6	10.2					
REA		MARGIN (M)	37.0				

HABITAT COMMENTS:	Est. 8-10 c.f.s. discharge.						
1	Excellent site with good fry habitat along the margins; unembedded cobbles						
	LOD, pools and cutbank provide good cover for parr.						
İ	Dynamic, unstable creek; observed several sediment wedges/debris jams u/s.						

SITE: G9	REACH:	2	DATE:	Sep-25 PHOT	TO: B3/24, 25
SITE LOCATION:	Cabinet Creek,	~400 m u/s from We	bster C. confluence.		
	ACCESS:	V2			
			EFFORT:	PASS 1	1084
			(sec)	PASS 2	1018
				PASS 3	па
MARGIN = 1 FULL=2	2				
				TEMP (C):	7.0
S = SIDE / M = MAIN:	M	SLOPE (%):	7	TIME:	16:00
				COND.(uS):	90.0
SAMPLING COMMENTS:	1	ted on d/s side of brid barrier. No leaf prob	•		

		FL	FL	MEAN		PASS		EST.	95%	C.I.	-		BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+												
Sthd	1+												
Sthd	>1+												
Char fry	0+	35-44	40.3	0.6	2	1	na	4	3	11	0.032	17.4	0.019
Bull trout	>=1+												
D Varden	>=1+	60-130	95.1	11.2	18	5	na	25	23	30	0.198	108.4	2.223
MW	>=1+												
TOTAL								29			0.230	125.8	2.242

	WET	CHAN		SITE	· · · · ·	SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	3.3	5.2	LOD	5	POOL	3	43
5	4.2	5.8	COBBLE	90	RIFFLE	97	22
10	5.4	6.4	IN VEG		RUN		
15	8.1	8.1	OVER VEG		OTHER		
20	6.3	7.9	CUTBANK	5			
25			DEEP POOL				
30					D90	33	
35			TOTAL	75	D50	15	
40					(cm)		•
	5.5	6.7					
REA	125.6	MARGIN (M)	23.0				

HABITAT COMMENTS:	Only DV were caught at this site.	
	Est. 10-15 c.f.s. discharge.	
L		_

SITE: G10	REACH:	1	DATE:	Sep-27 PHOTO	D: B4/1, 2
SITE LOCATION:	Webster Creek	x, ∼1.4 km u/s from m	ain road spur 120G.		
	ACCESS:	V2			
			EFFORT:	PASS 1	1400
			(sec)	PASS 2	1120
				PASS 3	na
MARGIN = 1 FULL=2	2				
	<u> </u>			TEMP (C):	5.0
S = SIDE / M = MAIN:	M	SLOPE (%):	2	TIME:	12:00
		, ,		COND.(uS):	80.0
SAMPLING COMMENTS:	1	ll to site marked with was ~2' too short; she	pink ribbon. No land ould use 50' net.	ing sites further u/s.	

GE RAN	IGE MEA	(g)	1]	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
-			1								
1+											
	1	1	7								
1+			1								
)+ 30-	32 31.0	0.3	2	0	na	2	2	2	0.012	9.5	0.004
=1+ 100-	109 104.5	12.7	2	0	na	2	2	2	0.012	9.5	0.155
=1+ 54-	37 89.2	9.4	22	3	na	25	25	27	0.156	121.3	1.462
=1+]								
						20			0.180	140.4	1.621
= :	1+ 100- 1+ 54-1	1+ 100-109 104.5 1+ 54-137 89.2	1+ 100-109 104.5 12.7 1+ 54-137 89.2 9.4	1+ 100-109 104.5 12.7 2 1+ 54-137 89.2 9.4 22	1+ 100-109 104.5 12.7 2 0 1+ 54-137 89.2 9.4 22 3	1+ 100-109 104.5 12.7 2 0 na 1+ 54-137 89.2 9.4 22 3 na	1+ 100-109 104.5 12.7 2 0 na 2 1+ 54-137 89.2 9.4 22 3 na 25	1+ 100-109 104.5 12.7 2 0 na 2 2 1+ 54-137 89.2 9.4 22 3 na 25 25 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1	1+ 100-109 104.5 12.7 2 0 na 2 2 2 1	1+ 100-109 104.5 12.7 2 0 na 2 2 2 0.012 1+ 54-137 89.2 9.4 22 3 na 25 25 27 0.156	1+ 100-109 104.5 12.7 2 0 na 2 2 2 0.012 9.5 1+ 54-137 89.2 9.4 22 3 na 25 25 27 0.156 121.3

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	· (m)	(m)		(%)	 	TYPE (%)	
0	9.5	10.5	LOD	5	POOL		
5	9.0	9.0	COBBLE	65	RIFFLE	60	25
10	7.7	7.7	IN VEG		RUN	40	53
15	6.7	7.6	OVER VEG	20	OTHER		
20	6.1	7.2	CUTBANK	10			
25			DEEP POOL				
30					D90	40	
35			TOTAL	70	D50	12	
40				- 	(cm)		
		-					
l	7.8	8.4					
AREA	163.8	MARGIN (M) 21.0				

HABITAT COMMENTS:	Est. 30 c.f.s. discharge.	
	No potential spawning in this section.	

FOUR CREEK ELECTROFISHING SITE 1997

SITE: F1	REACH:	2	DATE:	Sep-29	РНОТО:	A2/2-4; B4/5-7
SITE LOCATION: Four	Creek, ~30-40 m d/s fr	om Telkwa Coal Mine	e Road.			
	ACCESS:	V2				
		·	EFFORT:	PASS 1		460
			(sec)	PASS 2		450
				PASS 3		na
MARGIN = 1 FULL=2	2		-			
				TEMP (C)	:	5.0
S = SIDE / M = MAIN:	M	SLOPE (%):	8	TIME:	1	1:30
				COND.(uS): 1	80.0
SAMPLING COMMENTS:	Site was done b	elow the road.				
	201 mm DV wa	s a mature female. 16	66 mm DV was a mat	ure male.		

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	45-52	49.0	1.6	4	0	na	4	4	4	0.216	26.7	0.346
Sthd Sthd	1+ >1+												
Char fry	0+												
Bull trout	>=1+												
D Varden MW	>=1+ >=1+	166-201	183.5	62.1	2	0.	na	2	2	2	0.108	13.3	6.714
TOTAL								6			0.324	40.0	7.059

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
	0.5	70	LOD		DOO!		T 22
0	0.5	3.0	LOD	5	POOL	15	25
5	1.7	3.9	COBBLE	65	RIFFLE	85	14
10	1.5	6.9	IN VEG		RUN		
15		5.9	OVER VEG	10	OTHER		
20		4.2	CUTBANK	15		,	
25		3.0	DEEP POOL	5			_
30					D90	35	
35			TOTAL	65	D50	nr	
40					(cm)		
	1.2	4.5					
AREA	18.5	MARGIN (M) 15.0				

HABITAT COMMENTS:	1.5 m high drop over debris is present just d/s from road culvert: fish barrier.
1	Good cobble-boulder fry cover. Small pockets of potential DV spawning.
	Culvert dimensions: 1.9 m diameter by 17. 3 m long with ~5% gradient.
	Est. 1 c.f.s. discharge.

FOUR CREEK ELECTROFISHING SITE 1997

SITE: F2	REACH:	2	DATE:	Sep-29 PHOT	O: na
SITE LOCATION:	Four Creek, ~25 m u/s from	Telkwa Coal Mine R	oad.		
	ACCESS:	V2			
			EFFORT:	PASS 1	461
			(sec)	PASS 2	371
			1	PASS 3	na
MARGIN = 1 FULL=2	2			<u></u>	
1				TEMP (C):	5.0
S = SIDE / M = MAIN:	M	SLOPE (%):	9	TIME:	11:30
				COND.(uS):	180.0
SAMPLING COMMENTS			m below site and ~15 i observed. 2 pass ren		

AGE	RANGE		MEAN	,	PASS		EST.	95%	C.I.			BIO-
	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
0+												
1+		·		ľ	NO FIS	H CA	UGHT/OB	SERVED).			
>1+												
0+												
>=1+												
>=1+												
>=1+												
		•										
1												
	1+ >1+ 0+ >=1+ >=1+	1+ >1+ 0+ >=1+ >=1+	1+ >1+ 0+ >=1+ >=1+	1+	1+	1+ NO FISE >1+ 0+	1+ NO FISH CA >1+ 0+	1+ NO FISH CAUGHT/OE >1+ 0+	1+ NO FISH CAUGHT/OBSERVED >1+ 0+	1+ NO FISH CAUGHT/OBSERVED. >1+ 0+	1+ NO FISH CAUGHT/OBSERVED. >1+ 0+	1+ NO FISH CAUGHT/OBSERVED. >1+ 0+

DIST (m) WIDTH (m) WIDTH (m) WATER (%) 0 2.3 3.7 LOD 10 POOL 50 5 2.3 5.2 COBBLE 70 RIFFLE 50 10 2.9 3.7 IN VEG RUN 0 15 3.6 3.6 OVER VEG OTHER 0 20 2.5 4.3 CUTBANK 10 0 25 DEEP POOL 10 10 0	(m) (m) (%) TYPE (%) 2.3 3.7 LOD 10 POOL 50 33 2.3 5.2 COBBLE 70 RIFFLE 50 25 2.9 3.7 IN VEG RUN OTHER OTHER 2.5 4.3 CUTBANK 10 OTHER OTHER		WET	CHAN		SITE		SITE	DEPTH
0 2.3 3.7 LOD 10 POOL 50 5 2.3 5.2 COBBLE 70 RIFFLE 50 10 2.9 3.7 IN VEG RUN 0 15 3.6 3.6 OVER VEG OTHER 0 20 2.5 4.3 CUTBANK 10 0	2.3 3.7 LOD 10 POOL 50 33 2.3 5.2 COBBLE 70 RIFFLE 50 25 2.9 3.7 IN VEG RUN 3.6 3.6 OVER VEG OTHER 2.5 4.3 CUTBANK 10 DEEP POOL 10 D90 55 TOTAL 70 D50 20	DIST	WIDTH	WIDTH		COVER		WATER	(cm)
5 2.3 5.2 COBBLE 70 RIFFLE 50 10 2.9 3.7 IN VEG RUN 15 3.6 3.6 OVER VEG 20 2.5 4.3 CUTBANK 10	2.3 5.2 COBBLE 70 RIFFLE 50 25 2.9 3.7 IN VEG RUN OTHER 3.6 3.6 OVER VEG OTHER 2.5 4.3 CUTBANK 10 DEEP POOL 10 TOTAL 70 D50 55 TOTAL 70 D50 20	(m)	(m)	(m)		(%)		TYPE (%)	
10 2.9 3.7 IN VEG RUN 15 3.6 3.6 OVER VEG OTHER 20 2.5 4.3 CUTBANK 10	2.9 3.7 IN VEG	0	2.3	3.7	LOD	10	POOL	50	33
15 3.6 3.6 OVER VEG OTHER 20 2.5 4.3 CUTBANK 10	3.6 3.6 OVER VEG 2.5 4.3 CUTBANK DEEP POOL 10 D90 55 TOTAL 70 D50 20	5	2.3	5.2	COBBLE	70	RIFFLE	50	25
20 2.5 4.3 CUTBANK 10	2.5 4.3 CUTBANK 10 DEEP POOL 10 D90 55 TOTAL 70 D50 20	10	2.9	3.7	IN VEG		RUN		
	DEEP POOL 10 D90 55 TOTAL 70 D50 20	15	3.6	3.6	OVER VEG		OTHER		
25 DEEP POOL 10	D90 55 TOTAL 70 D50 20	20	2.5	4.3	CUTBANK	10			
	TOTAL 70 D50 20 ·	25			DEEP POOL	10			
30 D90 55		30					D90	55	
35 TOTAL 70 D50 20	(cm)	35			TOTAL	70	D50	20 ·	
40 (cm)		40					(cm)		
2.7 4.1		EA		MARGIN (M)	19.5				

HABITAT COMMENTS:	1.5 m high drop d/s from culvert is a barrier to fish.
	Boulder-pool habitat with some log-stepping; although steep, appears to be
	good for parr rearing. Little potential spawning in this section of creek.
	Est.1- 2 c.f.s. discharge.

SITE: F4	REACH: 3	DATE: Oct-01 PHOTO:	B4/12, 13
SITE LOCATION:	Four Creek, at second road cro	ssing.	
	ACCESS: V2		
		EFFORT: PASS 1	nr
		(sec) PASS 2	na
		PASS 3	na
MARGIN = 1 FULL=2	2		
		TEMP (C):	5.5
S = SIDE / M = MAIN:	M SLOPE (%): 1.5 TIME:	16:00
·		COND.(uS):	150.0
SAMPLING COMMENTS:	1 -	road culvert. Sampled 15 m enclosed site above hannel prevented a larger site from being sampled.	

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+												
Sthd	I+												
Sthd	>1+												
Char fry	0+												
Bull trout	>=1+												
D Varden	>=1+	78-110	94.0	10.0	2	na	na	2	па	na	0.060	13.3	0.599
MW	>=1+												
						NOTE	Fou	r DV were	also caugl	nt below t	he impassabl	e road	
						culvert	(FL's	= 115 mm,	, 112 mm,	77 mm a	nd 57 mm).		
TOTAL						This 10) m se	ction was sp	ot shock	ed and no	nets were us	ed.	

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	2.9	3.I	LOD	20	POOL	20	
5	2.0	2.0	COBBLE	60	RIFFLE	75	
10	2.0	2.I	IN VEG		RUN	5	
15	2.0	2.2	OVER VEG	10	OTHER		
20			CUTBANK			t	
25			DEEP POOL	. 10			
30					D90	28	
35			TOTAL	50	D50	10	
40					(cm)		
:					, ,		
	2.2	2.4					
AREA		MARGIN (M	1) 15.0				

HABITAT COMMENTS:	Est. 2 c.f.s. discharge. Low gradient, cobble stream with limited potential DV spawning.
1	Block was logged beside R. left bank; when block was burned, the small buffer
	zone was burned also, causing trees to fall across the creek and changing the
	LOD loading. Culverts at road impassable: 1m by 19m and 0.7m by 19m.

FOUR CREEK ELECTROFISHING SITE 1997

SITE: F5	REACH: 4	DATE: Oct-08 PHOTO:	A3/1, 2
SITE LOCATION:	Upper Four Creek, just d/s of fork.	•	
	ACCESS: FT		
		EFFORT: PASS 1	950
		(sec) PASS 2	814
		PASS 3	па
MARGIN = 1 FULL=2	2		
i .	, 	TEMP (C):	1.0
S = SIDE / M = MAIN:	M SLOPE (%):	4 TIME:	16:00
		COND.(uS):	130.0
SAMPLING COMMENTS:	Hiked down to site from old block.		
	All char fry were identified as DV.		

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+]									
Sthd	1+												
Sthd	>1+												
Char fry	0+	39-43	41.5	0.9	4	0	па	4	4	4	0.070	13.3	0.063
Bull trout	>=1+												
D Varden	>=1+	91-122	105.8	13.0	5	1	па	6	6	. 8	0.110	20.8	1.425
MW	>=1+												
TOTAL								10			0.180	34.2	1.489

DIST	WET WIDTH	CHAN WIDTH		SITE COVER		SITE WATER	DEPTH
							(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	2.0	2.1	LOD	10	POOL	20	25
5	2.4	2.7	COBBLE	70	RIFFLE	60	6
10	1.6	1.9	IN VEG		RUN	20	
15	1.5	1.7	OVER VEG		OTHER		
20	2.0	2.0	CUTBANK	10	•		
25			DEEP POOL	10			
30					D90	18	
35			TOTAL	60	D50	7	
40					(cm)		
	1.9	2.1					
EA	57.0	MARGIN (M)	30.0				

HABITAT COMMENTS:	Est. 2 c.f.s. discharge.
	Small, stable creek in confined gully. Some boulder/LOD habitat and pockets
İ	of potential spawning are present.
	Moderate to low gradient in this section of creek (steeper u/s).

SITE: F7	REACH:	6	DATE:	Oct-08 P	ното: [A3/	5, 6
SITE LOCATION:	Upper Four Cro	eek.					
	ACCESS:	V2					
			EFFORT:	PASS 1		190	
			(sec)	PASS 2	Ī	na	
				PASS 3	ſ	па	
MARGIN = 1 FULL=2	2		n e				
				TEMP (C):	: [1.5	
S = SIDE / M = MAIN:	M	SLOPE (%):	17	TIME:	[17:00	
	·			COND.(uS): [110.0	
SAMPLING COMMENTS:	Spot shocked be caught/observed	elow road for ~75 m le	ength of stream. No	fish were			

		FL	FL	MEAN]	PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+												•
Sthd	1+												
Sthd	>1+												
Char fry	0+							NO FISH	PRESENT	г.			
Bull trout	>=1+												
D Varden	>=1+												
MW	>=1+												
TOTAL													

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	0.9	0.9	LOD	15	POOL	15	11
5	0.7	0.7	COBBLE	30	RIFFLE	75	3
10	0.8	0.8	IN VEG		RUN	10	
15	1.1	1.1	OVER VEG	5	OTHER		
20			CUTBANK	20			
25			DEEP POOL	30			
30					D90	30	
35			TOTAL	50	D50	11	
40					(cm)		

HABITAT COMMENTS:	Trickle flow discharge.	
	Creek too small and steep; no potential fish use.	

SITE: F8	REACH:	2	DATE: (Oct-22 PHOTO	D: A4/7, 8
SITE LOCATION:	Four Creek Tri	butary 1, at spur road	l crossing.		
	ACCESS:	FT			
			EFFORT:	PASS 1	350
			(sec)	PASS 2	na
				PASS 3	na
MARGIN = 1 FULL=2	2				
•				TEMP (C):	2.5
S = SIDE / M = MAIN:	M	SLOPE (%):	2	TIME:	14:00
				COND.(uS):	or
SAMPLING COMMENTS:	Sampled 45 m i	ength of stream with a	a lower net.		
	No fish were ca	ught/observed.			

		FL	FL	MEAN	I	PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m
ithd	0+												
ithd ithd	1+ >1+												
Char fry	0+			\vdash				NO FISH I	PRESENT	г.			
Bull trout	>=1+												
) Varden	>=1+												
AW	>=1+												

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	4.1	4.1	LOD	20	POOL	20	25
5	2.9	2.9	COBBLE		RIFFLE	10	7
10	3.1	3.I	IN VEG	10	RUN	70	
15	2.8	2.8	OVER VEG	20	OTHER		
20			CUTBANK	20			_
25			DEEP POOL	30			
30					D90	nr	
35			TOTAL	30	D50	nr	
40					(cm)		

HABITAT COMMENTS:	Est. 2 c.f.s. discharge. Water turbid with ~35 cm visibility.
	Small, low gradient creek with heavy alder overstory and sand/silt bed material.
	No potential spawning present in this section. May dewater in summer/winter.
	D/S at mouth, steep (12-15%), cobble, ~1 c.f.s. and 1 m wide; suspect no fish use.

SITE: F10	REACH:	1	DATE:	Oct-08 PHOTO	D: A3/3, 4
SITE LOCATION:	Four Creek Tri	butary 2, d/s from roa	d culvert.		
	ACCESS:	V2			
			EFFORT:	PASS 1	350
			(sec)	PASS 2	na
				PASS 3	na
MARGIN = 1 FULL=2	2				
				TEMP (C):	1.5
S = SIDE / M = MAIN:	M	SLOPE (%):	18	TIME:	16:30
				COND.(uS):	130.0
SAMPLING COMMENTS:	Spot shocked 70	0 m length of stream d	/s from road. No fish	h were caught/observ	ed.
	POI	PULATION ESTIMA	TEC.		

		FL	FL	MEAN]	PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m
Sthd	0+												
Sthd	1+												
Sthd	>1+					N	O FI	SH PRESE	ENT.				
Char fry	0+												
Bull trout	>=1+												
D Varden	>=1+												
MW	>=1+												
TOTAL													

DIST	WET WIDTH	CHAN WIDTH		SITE COVER		SITE WATER	DEPTH (cm)
(m)	(m)	(m)		(%)		TYPE (%)	
			· · -· · · ·				
0	0.9	0.9	LOD	20	POOL	5	15
5	1.1	1.1	COBBLE	60	RIFFLE	95	3
10	1.4	1.4	IN VEG		RUN		
15	0.7	0.7	OVER VEG		OTHER		
20	0.9	0.9	CUTBANK				
25	1.3	1.3	DEEP POOL	20			
30					D90	25	
35			TOTAL	30	D50	nr	
40					(cm)		•
	1.1	1.1					
REA	73.5	MARGIN (M)	70.0				

HABITAT COMMENTS:	Trickle flow discharge.		
	Creek too small and steep; no potential fish use	e.	
•			

SITE: Goat1	REACH:	2	DATE: Aug	-14,1996 PHOT	O: B1/1, 2
SITE LOCATION:	Goathorn Creek, 94 m d/s f	rom upper road crossi	ng to lower net.		
	ACCESS:	V2			
l		·	EFFORT:	PASS 1	nr
			(sec)	PASS 2	nr
				PASS 3	na
MARGIN = 1 FULL=2	2				
		•		TEMP (C):	9.0
S = SIDE / M = MAIN:	M	SLOPE (%):	3	TIME:	18:00
				COND.(uS):	nr
SAMPLING COMMENT	S: Problems with	electrofisher.			
	Very large site	. 1 pass consists of 1 sv	weep d/s to lower net.		

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+												
Sthd	>=1+	67-159	122.3	nr	5	4	па	25	9	147	0.045	35.7	na
Char fry	0+												
Bull trout	>=1+	61-110	72.9	nr	7	1	na	8	7	9	0.015	11.7	na
D Varden	>=1+	60-170	119.9	nr	9	2	па	12	9	14	0.021	16.5	na
MW	>=1+												
TOTAL								45			0.081	63.9	na

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	8.8	12.1	LOD		POOL		
5	5.6	16.8	COBBLE	50	RIFFLE	70	
10	6.6	38.6	IN VEG		RUN	30	80
15	7.5	38.9	OVER VEG		OTHER		
20	10.9		CUTBANK				
25			DEEP POOL				
30					D90		
35			TOTAL		D50		
40					(cm)		

HABITAT COMMENTS:	450 mm adult BT was caught in pass 1 and another adult BT escaped @ bridge pool.
l	It appears that BT migration u/s was taking place at this time.
1	

SITE:	Goat2		REACH:		2			DATE:	Aug-	14,1996	РНОТО:	A1/	1, 2
SITE LOCAT	ION:	100 m u/s fr	om Telkwa	River Ro	ad brid	dge cros	sing.						
			A COPEC.	1	W2	1							
			ACCESS:	1	V2	j		EFFO	RT:	PASS 1		1088	
								(se	c)	PASS 2		972	
L. Don't	FXIX X 2			i			[PASS 3		777	
MARGIN = 1	FULL=2		2	İ						TEMP (C): I	9.5	
S = SIDE / M	= MAIN:		M		SLOP	E (%):		2		TIME:		13:00	
CAMPINE C	COMMENTS		r							COND.(us	S):	nr	
SAMPLING (COMMENTS	»:											
				POPULA	TION	ESTIN	ИАТЕ	S:					
		FL	FL	MEAN		PASS		EST.	959	% C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT	1	2	3		LCI	UCI	N/M*M	N/100M	MASS
<u> </u>				(g)									(g/m*m)
Sthd	0+											•	
Sthd	>=1+	56-174	94.1	nr	32	13	5	53.9	54	54	0.127	107.8	#VALUE!
Char fry	0+	32	32.0	nr	1	0	0	1.0	I	1	0.002	2.0	#VALUE!
Bull trout	>=1+	63-111	100.0	nr	2	0	3	2.0	2	2	0.005	4.0	#VALUE!
D Varden MW	>=1+ >=1+	127-231	184.0	nr	4	0	0	0.0	0	0	0.000	0.0	#VALUE!
	,				•								
TOTAL								57			0.134	113.8	#VALUE!
L													" · ALCOL
	WET	CHAN		·				SITE				SITE	DEPTH
DIST	WIDTH	WIDTH						COVER				WATER	(cm)
(m)	(m)	(m)						(%)				TYPE (%)	
			1								1		
0 5	11.6	32.0 28.0	ł	COBBLE COBBLE	,			70		POOL RIFFLE		70	
10	6.5	38.0	l	IN VEG				/0		RUN		30	90
15	7.9	49.0		OVER V	FG					OTHER		30	70
20	/./	47.0		CUTBAN						OTTL	ı		l
25			1	DEEP PO									
30			1							D90			1
35			1	TOTAL						D50			1
40]							(cm)	,		
	8.5	36.8	-										
AREA	425.0	MARGIN (M)	50.0	<u> </u>								
II A DITTATE CO	OMMENTO		T ::	6		4 +L*	-16-						
HABITAT CO	OMINIEN IS:		Limited an					ge cobble b	ed mate	rial.			

Very unstable channel evidence.

SITE: Goat2-rep	REACH:	2	DATE: Aug	-14,1996 PHOTO:	A1/3
SITE LOCATION:	100 m u/s from top of Site Go	at2.	•		
	ACCESS:	V2			
			EFFORT:	PASS 1	936
			(sec)	PASS 2	1300
				PASS 3	1040
MARGIN = 1 FULL=2	2				
				TEMP (C):	12.0
S = SIDE / M = MAIN:	<u>M</u>	SLOPE (%):	2	TIME:	16:00
				COND.(uS):	nr
SAMPLING COMMENTS	S:				

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+												
Sthd	>=1+	50-151	76.2	nr	32	14	5	56.9	38	76	0.083	113.8	na
Char fry	0+	38	38.0	nr	1	0	0	1.0	1	1	0.001	2.0	na
Bull trout	>=1+	69-115	82.8	nr	4	2	0	8.0	-2	18	0.012	16.0	na
D Varden	>=1+	58-105	75.4	nr	3	2	2	9.0	-18	36	0.013	18.0	na
MW	>=1+	93-218	174.3	nr	0	2	1	3.0	3	. 3	0.004	6.0	na
TOTAL								78			0.114	155,8	na

DIST	WET WIDTH	CHAN WIDTH		SITE COVER		SITE WATER	DEPTH (cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0 5 10 15 20 25 30	16.1 14.9 12.3 11.5	19.0 25.0 23.0 12.8	LOD COBBLE IN VEG OVER VEG CUTBANK DEEP POOL	60	POOL RIFFLE RUN OTHER	80 20	70
35 40			TOTAL		D50 (cm)		
	13.7						
AREA	685.0	MARGIN (M	50.0				

HABITAT COMMENTS:	Similar to Goat2; slightly wider wetted width, shallower, and smaller bed material
	than in Goat2.
	Very limited potential spawning; more fines/less cover around bed material.

SITE: T1	REACH:	1	DATE: S	бер-16 РНОТО	B3/3, 4
SITE LOCATION:	Tenas Creek, ~	30 m u/s from old brid	ge site.		
	ACCESS:	V2			
			EFFORT:	PASS 1	4040
			(sec)	PASS 2	3520
			<u> </u>	PASS 3	3510
MARGIN = 1 FULL=2	2			TEMP (C).	0.0
S = SIDE / M = MAIN:	N .	SLOPE (%):	1.5	TEMP (C): TIME:	9:00
S = SIDE / M = MAIN:	M	SLUPE (%):	1.5	COND.(uS):	120.0
SAMPLING COMMENTS:	Same site locat				1 120.0
	A lot of debris	collecting in the net du	e to heavy alder overst	ory within the site.	

POPULATION ESTIMATES:

_		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UC1	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	29-52	38.9	0.7	127	76	29	265	248	297	0.409	318.7	0.287
Sthd	1+	66-91	81.1	6.7	8	1	1	10	10	11	0.015	12.0	0.104
Sthd	>1+	92-152	108.6	15.6	20	12	4	39	37	55	0.060	46.9	0.939
Char fry	0+	42	42.0	0.8	0	I	0	1	1	na	0.002	1.2	0.001
Bull trout	>=1+	106-127	113.3	15.1	2	1	0	3	3	na	0.005	3.6	0.070
D Varden	>=1+												
TOTAL								317			0.491	382.4	1.401

	WET	CHAN		SITE		SITE	DEPTH
. DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
l							
0	7.5	7.9	LOD	10	POOL	20	
5	9.2	10.3	COBBLE	60	RIFFLE	70	14
10	7.6	12.7	IN VEG		RUN	10	35
15	8.4	10.9	OVER VEG	5	OTHER		
20	8.3	8.8	CUTBANK	5			
25	5.7	9.3	DEEP POOL	20			
30					D90	30	
35			TOTAL	70	D50	nr	
40					(cm)		•
					\ ,		
	7.8	10.0					
AREA		MARGIN (M)	83.0				

HABITAT COMMENTS:

Good SST parr rearing in the cobble-riffle sections and moderate fry rearing along the margins. Flows are moderate and water is slightly coloured (heavy rain).

A large debris jam and a side channel are present within site.

SITE: T2	REACH:	1	DATE:	Sep-20 PHOTO	B3/13, 1	4
SITE LOCATION:	Lower Tenas C	Creek, hiked in from e	dge of block.			
	ACCESS:	FT				
			EFFORT:	PASS 1	2724	
			(sec)	PASS 2	2605	
				PASS 3	2350	
MARGIN=1 FULL=2	2				<u></u>	
·				TEMP (C):	5.5	
S = SIDE / M = MAIN:	M	SLOPE (%):	1.5	TIME:	9:30	
				COND.(uS):	90.0	
SAMPLING COMMENTS:	Hiked into site	from old block; trail	ribboned with pink fl	agging tape.		
	152 mm DV w	as a spent male. Susp	ect the char fry is a D	v		

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS
			-	(g)									(g/m*m
Sthd	0+	31-49	41.0	0.8	71	24	5	102	101	107	0.242	151.8	0.194
Sthd	I+	69-91	84.9	8.2	19	1	0	20	20	20	0.048	29.9	0.391
Sthd	> I +	93-146	112.9	18.7	8	2	0	10	10	11	0.024	14.9	0.446
Char fry	0+	50	50.0	1.2	1	0	0	1	1	na	0.002	1.5	0.003
Bull trout	>=1+	102-132	117.0	17.8	2	0	0	2	2	na	0.005	3.0	0.085
D Varden	>=1+	90-152	118.3	19.1	2	I	0	3	3	na	0.007	4.5	0.137
TOTAL								138			0,328	205.5	1.255
												-00.0	2.200

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	7.1	8.4	LOD	10	POOL	10	52
5	6.4	6.9	COBBLE	65	RIFFLE	50	25
10	6.9	8.3	IN VEG		RUN	30	
15	5.6	6.8	OVER VEG	10	OTHER	10	
20	5.3	7.7	CUTBANK	5		<u> </u>	
25			DEEP POOL	10			
30					D90	32	
35			TOTAL	60	D50	19	
40					(cm)		

ABITAT COMMENTS:	Lower Tenas C. at moderate flows.
	Site mainly boulder-cobble riffle with some run and flats along the margin.
	Two pools in site associated with LOD.

SITE: T3	REACH:	2	DATE:	Sep-17 PHOTO	B3/5,	6
SITE LOCATION:	Upper Tenas C	Creek; hiked down h	nillside from block. J	ust u/s from periphyton	site.	
	ACCESS:	FT				
		· <u></u>	EFFORT:	PASS 1	1790	
			(sec)	PASS 2	1605	
				PASS 3	na	
MARGIN = 1 FULL=2	2					
				TEMP (C):	6.0	
S = SIDE / M = MAIN:	M	SLOPE (%):	3	TIME:	11:00	
	<u> </u>			COND.(uS):	90.0	
SAMPLING COMMENTS:	, ,	al area as 1984 site bused flow/turbidity to	out at new location. o increase during san	ipling.		

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	· 2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	28-36	30.7	0.4	5	4	na	25	9	147	0.099	56.7	0.040
Sthd	1+												
Sthd	>1+	98-183	140.5	34.0	1	1	na	2	2	na	0.008	4.5	0.271
Char fry	0+	41-53	47.5	1.0	9	2	na	12	11	14	0.046	26.2	0.046
Bull trout	>=1+												
D Varden	>=1+	67-171	98.7	I1.0	19	1	na	20	20	21	0.080	45.5	0.878

	WET	CHAN		SITE		SITE	DEPTI
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	6.2	12.3	LOD	5	POOL		
5	5.5	12.2	COBBLE	90	RIFFLE	90	30
10	5.9	10.5	IN VEG		RUN	10	33
15	5.8	9.8	OVER VEG	5	OTHER		
20	5.1	9.1	CUTBANK				
25			DEEP POOL				
30					D90	40	
35			TOTAL	70	D50	24	
40					(cm)		
	5.7	10.8					
EA	251.4	MARGIN (M)	44.1				

HABITAT COMMENTS:	Upper Tenas C. at moderate flows.
	Site mainly riffle with a small section (5-10%) of run. Pools were too
	deep/turbid to sample.
	171 mm DV was a ripe male. All but 3 char fry were identified as a BT.

SITE: T4	REACH:	1	DATE: S	ер-19 РНОТО	: B3/11,	12
SITE LOCATION:	Mid section of	Tenas Creek at outlet	t of small beaver pond			
	ACCESS:	FT				
			EFFORT:	PASS 1	2357	_
1			(sec)	PASS 2	1854	
İ			1	PASS 3	na	
MARGIN = 1 FULL=2	2					
				TEMP (C):	7.5	
S = SIDE / M = MAIN:	M	SLOPE (%):	2.5	TIME:	13:00	
				COND.(uS):	100.0	
SAMPLING COMMENTS:	Hiked in from	ATV road on old cuti	block . ATV could not	be used due to the		
	abundance of t	rees/brush on the blo	ck. Char fry were a m	ix of BT and DV.		

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	32-44	38.5		83	10		106	101	112	0.344	221 2	0.207
Sthd	1+	67-91	82.1	5.2	7	18 0	na na	106 7	7	113 7	0.023	321.2 21.2	0.207
Sthd	>1+	92-157	110.0	17.8	22	1	na	23	23	24	0.075	69.8	1.333
Char fry	0+	44-51	47.3	1.1	1	2	па	3	3	10	0.010	9.1	0.011
Bull trout	>=1+												
D Varden	>=1+	62-73	67.5	3.4	1	1	na	2	2	na	0.006	6.1	0.022
TOTAL								141			0.458	427.4	1.691

DIST	WET WIDTH	CHAN WIDTH		SITE COVER		SITE WATER	DEPTH (cm)
(m)	(m)	(m)		(%)		TYPE (%)	
						<u></u>	
0	9.0	10.9	LOD	10	POOL	5	30
5	9.8	12.7	COBBLE	80	RIFFLE	70	24
10	9.4	11.1	IN VEG		RUN	15	
15	9.1	13.0	OVER VEG	5	OTHER	10	
20			CUTBANK	5			
25			DEEP POOL				
30					D90	25	
35			TOTAL	65	D50	13	
40					(cm)		
	9.3	11.9					
AREA	307.7	MARGIN (M	33.0				

HABITAT COMMENTS:	Est. 20 c.f.s. discharge; creek at moderate flows.	
	Mainly boulder-riffle habitat with some run and 2 small edge pools.	
	Alcove at base of seepage outlet from the beaver pond was also sampled.	
<u> </u>	Excellent fry habitat section in the side channel section.	

SITE: T5	REACH:	1	DATE:	Sep-18 РНОТО	D: B3/9,	10
SITE LOCATION:	Upper Tenas (Creek, ~100 m u/s the	East Fork.			
	ACCESS:	FT				
			EFFORT:	PASS 1	868	
			(sec)	PASS 2	864	
				PASS 3	na	
MARGIN = 1 FULL=2	2		<u> </u>			
				TEMP (C):	6.0	
S = SIDE / M = MAIN:	M	SLOPE (%):	4.5	TIME:	11:30	
		,		COND.(uS):	120.0	
SAMPLING COMMENTS:	The 3 largest o	har fry were identifie	d as BT.			
		•				

		FL	FL	MEAN		PASS		EST.	95%	6 C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+												
Sthd	1+												
Sthd	>1+												
Char fry	0+	31-51	45.6	0.9	3	2	na	9	5	36	0.067	27.3	0.060
Bull trout	>=1+	197	197.0	77.8	1	0	na	1	1	1	0.007	3.0	0.581
D Varden	>=1+	77-144	110.5	19.9	2	0	na	2	2	2	0.015	6.1	0.297
TOTAL								12			0.090	36.4	0.938

DIST	WET WIDTH	CHAN WIDTH		SITE COVER		SITE WATER	DEPTH (cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0 5 10 15	5.5 3.9 4.1 3.3	17.8 12.1 12.4 10.8	LOD COBBLE IN VEG OVER VEG	65	POOL RIFFLE RUN OTHER	20 75 5	41 24
20 25 30	3.5	9.5	CUTBANK DEEP POOL	15	D90	40	
35 40			TOTAL	70	D50 (cm)	16	
AREA	4.1 134.0	12.5 MARGIN (M) 33.0				

HABITAT COMMENTS:	Est 5-6 c.f.s. discharge. Large gravel eroding bank present along river left side of site.
	Mainly boulder-riffle with some pool/LOD habitat. Creek quite steep for good
	fish habitat. Dynamic creek with potential to move debris.
	Drops over debris up to 1 m high present d/s; access is restricted to high flow periods.

SITE: T6	REACH:	3	DATE: S	Sep-18 РНОТО	: B3/7.	, 8
SITE LOCATION:	Upper Tenas Cree	ek; ~70 m u/s the We	st Fork.			
•	ACCESS:	FT				
			EFFORT:	PASS 1	1030	
			(sec)	PASS 2	901	
			1	PASS 3	na	
MARGIN = 1 FULL=2	2					
				TEMP (C):	4.5	
S = SIDE / M = MAIN:	M	SLOPE (%):	3	TIME:	11:00	
				COND.(uS):	90.0	
SAMPLING COMMENTS:	Char fry were ide	ntified as DV except	the largest fry which	h was a BT.		

SPECIES		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
	AGE	RANGE	MEAN	WT	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS
				(g)									(g/m*m)
Sthd	0+	33-36	34.6	0.4	5	2	na	8	7	14	0.078	34.7	0.031
Sthd	1+	89-90	89.5	10.2	2	0	na	2	2	2	0.019	8.3	0.192
Sthd	>1+	95-98	96.7	11.9	2	1	na	4	3	11	0.038	16.7	0.448
Char fry	0+	36-49	41.6	0.8	3	2	na	9	5	36	0.085	37.5	0.068
Bull trout	>=1+												
D Varden	>=1+	70-143	100.6	11.9	11	4	na	17	15	24	0.163	72.0	1.937

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)	_	(%)		TYPE (%)	
0	3.0	12.3	LOD	10	POOL	15	46
5	3.4	7.3	COBBLE	60	RIFFLE	80	14
10	5.8	7.7	IN VEG		RUN	5	
15	5.5	6.3	OVER VEG	15	OTHER		
20			CUTBANK				
25			DEEP POOL	15			
30					D90	28	·
35			TOTAL	90	D50	7	
40				<u> </u>	(cm)		
	4.4	8.4					
AREA	106.2	MARGIN (M	24.0				

HABITAT COMMENTS:	Discharge: moderate to low flows.
Į.	Complex site consisting of riffle, 2 pools, small debris along the margins, and
	a small trickle side channel suitable for fry.
	Bed material is primarily cobble; very limited potential spawning in lower 100 m.

SITE: T7	REACH:	2	DATE: O	et-14 PHOTO:	A3/13, 14
SITE LOCATION:	Tenas Creek Tribu	itary 1, upper reach a	along cutblock.		
	ACCESS:	V2			
			EFFORT:	PASS 1	520
			(sec)	PASS 2	na
				PASS 3	na na
MARGIN = 1 FULL=2	2				
				TEMP (C):	3.0
S = SIDE / M = MAIN:	M	SLOPE (%):	1.5	TIME:	12:00
				COND.(uS):	50.0
SAMPLING COMMENTS:	Electrofished u/s fo	or 70 m. No fish were	e caught/observed.		

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LC1	UCI	N/M*M	N/100M	MASS (g/m*m
Sthd	0+												
Sthd	1+												
Sthd	>1+							NO FISH	PRESEN	Γ.			
Char fry	0+												
Bull trout	>=1+												
D Varden	>=1+												
D Varden	>=1+		1										
TOTAL													

DIST (m)	WET WIDTH (m)	CHAN WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)	DEPTH (cm)
				· · · · · · · · · · · · · · · · · · ·			
0	0.6	0.6	LOD	20	POOL	15	35
5	0.8	0.8	COBBLE		RIFFLE	5	12
10	0.4	0.4	IN VEG		RUN	80	
15			OVER VEG	10	OTHER		
20			CUTBANK	50			
25			DEEP POOL	20			_
30					D90	3	·
35			TOTAL	40	D50	nr	
40					(cm)		
	0.6	0.6					
AREA		MARGIN (M)	70.0				

HABITAT COMMENTS:	Small, stable, low gradient, meandering creek with moss-covered banks.
	No spawning potential present in this section. Bed material consists of sand/silt.
	Creek was buffered on each side from new cutblocks.

SITE: SC1	REACH:	1	DATE: S	ер-30 РНОТО	B4/8,	9
SITE LOCATION:	Lower Telkwa	River side channel; no	ear Buikley R. conflu	ience.		
	ACCESS:	V2				
			EFFORT:	PASS 1	3271	
			(sec)	PASS 2	1817	
			1	PASS 3	na	
MARGIN = 1 FULL=2	2					
· !				TEMP (C):	9.0	
S = SIDE / M = MAIN:	S	SLOPE (%):	0.5	TIME:	15:00	
1				COND.(uS):	80.0	
SAMPLING COMMENTS:	Sampled a ver	y small side channel.				

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
					,								_
Sthd	0+	37-63	46.0	1.2	29	11	na	47	40	59	0.143	61.5	0.172
Sthd	1+	69-96	80.0	5.9	12	1	na	13	13	14	0.040	17.2	0.236
Sthd	>1+	111-160	132.3	27.3	3	0	na	3	3	3	0.009	3.9	0.251
Char fry	0+												
Bull trout	> ≖ [+		i										
D Varden	>=1+	103	103.0	10.5	1	0	na	1	1	1	0.003	1.3	0.032
Coho	0+	47-76	62.0	3.2	91	10	na	102	101	105	0.313	134.5	1.001
Coho	1+	77-104	85.3	8.1	22	1	na	23	23	24	0.071	30.3	0.571
MW	0+	47-63	54.1	1.4	28	7	na	37	35	43	0.114	49.1	0.160
TOTAL					•			226			0.693	297.9	2.423

	IDTH WIDTH (m) (m)	Ĭ	COVER		WATER	(cm)
(m)	(m) (m)					(*****/
	(m) (m)		(%)		TYPE (%)	
0	1.6 344.0	LOD	10	POOL		
	1.8	COBBLE	20	RIFFLE	5	15
10	1.6	IN VEG		RUN		
15	8.9	OVER VEG	10	OTHER	95	35
20	7.2	CUTBANK	30			
25	5.1	DEEP POOL	30			
30	4.9			D90	20	
35	3.3	TOTAL	20	D50	7	
40				(cm)		

HABITAT COMMENTS:	Est. <1 c.f.s. discharge.
	Sampled a slow, flat section with cutbank and alder overstory providing
	good cover. Nice fry habitat along the cobble margins.
	Many fish present in this site; may be survival problems in the winter?

SITE: SC2	REACH:	1	DATE: C	ct-01 PHOTO	: B4/10, 11	
SITE LOCATION:	Telkwa River s	side channel.				
	ACCESS:	V2	EFFORT: (sec)	PASS 1 PASS 2 PASS 3	2057 1847 1270	
MARGIN = 1 FULL=2 S = SIDE / M = MAIN: SAMPLING COMMENTS:	S S	SLOPE (%):	1	TEMP (C): TIME: COND.(uS):	8.0 12:00 130.0	

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	30-59	43.9	1.0	142	41	15	203	199	211	0.791	406.4	0.791
Sthd	1+	72-78	75.0	5.0	1	0	1	2	2	na	0.008	4.0	0.039
Sthd	>1+												
Char fry	0+												
Bull trout	>=1+	157	157.0	45.8	0	1	0	1	1	na	0.004	2.0	0.178
Coho	0+	51-76	66.7	3.5	9	9	8	73	29	na	0.285	146.2	0.996
Coho	1+	77-103	82.1	6.7	7	3	1	11	11	16	0.043	22.0	0.287
MW	0+	35-63	48.1	1.0	19	10	2	32	31	39	0.123	63.4	0.123
LND	0+	27-32	28.7	0.3	3	3	0	6	6	na	0.023	12.0	0.007
TOTAL								328			1.277	656.0	2.422

	WET	CHAN		SITE		SITE	DEPTI
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	5.3	328.0	LOD		POOL	10	35
5	5.0		COBBLE	50	RIFFLE	30	10
10	2.8		IN VEG	40	RUN	60	
15	4.1		OVER VEG		OTHER		
20	7.4		CUTBANK				
25	6.3		DEEP POOL	10			
30	5.2				D90	30	
35	5.0		TOTAL	30	D50	7	
40					(cm)		
	5.1	328.0					
ΕA	256.9	MARGIN (M)	50.0				

HABITAT COMMENTS:	Est. 2 c.f.s. discharge, very low flows.
	Sampled a slow, wide flat section with cobble margins along one side of the
	site. Good fry cover despite the sandy bed material due to the extensive
	amount of brown algae growing within the channel.

SITE: SC3	REACH:	1	DATE:	Oct-03	РНОТО:	B5/	6, 7
SITE LOCATION:	Telkwa River sid	le channel; located b	etween margin sites !	MS6 and MS7.			
	ACCESS:	FT					
			EFFORT:	PASS 1		2854	
			(sec)	PASS 2	i i	1806	
				PASS 3		na	
MARGIN = 1 FULL=2	2						
				TEMP (C	C): [4.5	
S = SIDE / M = MAIN:	S	SLOPE (%):	1	TIME:		13:00	
				COND.(u	S):	60.0	
SAMPLING COMMENTS:	Hiked in from pr	ivate property; sam	pled a side channel o	n river right.			
	Char fry were id	entified as BT.					

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	31-48	37.4	0.7	147	25	na	177	172	184	0.672	708.5	0.470
Sthd	1+	63-86	73.2	4.5	12	2	na	14	14	16	0.055	57.6	0.246
Sthd	>1+	97-122	108.3	13.5	5	1	na	6	6	8	0.024	25.0	0.320
Char fry	0+	57	57.0	1.7	1	0	na	1	1	1	0.004	4.0	0.006
Bull trout	>=1+	71-107	89.0	8.4	2	0	па	2	2	2	0.008	8.0	0.064
D Varden	>=1+	82	82.0	4.9	1	0	na	1	I	1	0.004	4.0	0.019
Coho	0+												
Coho	1+												
MW	0+	59-61	60.3	2.0	4	0	na	4	4	4	0.015	16.0	0.030
TOTAL								206			0.780	823.1	1.155

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	8.0	200.0	LOD		POOL		
5	7.7	164.0	COBBLE	100	RIFFLE	80	12
10	8.9	140.0	IN VEG		RUN		***
15	11.3	168.0	OVER VEG		OTHER	20	
20	12.9		CUTBANK				
25	14.5		DEEP POOL				
30					D90	33	
35			TOTAL	65	D50	20	
40					(cm)		

HABITAT COMMENTS:	Est. 10 c.f.s. discharge.
	Habitat consists mainly of wide, fast cobble-riffle with some flats along the
	margins.
	Bed material is covered with brown algae.

SITE: SC4	REACH:	1	DATE:	Oct-21 PI	ното:	A4/1, 2
SITE LOCATION:	Telkwa River s	side channel, at propo	sed bridge crossing.			
	ACCESS:	V2				
			EFFORT:	PASS 1	158	10
			(sec)	PASS 2	115	; 0
				PASS 3	117	70
MARGIN = 1 FULL=2	2		•			
		•		TEMP (C):	4.	5
S = SIDE / M = MAIN:	S	SLOPE (%):	1.5	TIME:	11:	30
•				COND.(uS):	. nı	,

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	34-58	43.6	1.0	37	10	6	54	53	61	0.288	164.8	0.288
Sthd	1+	66-96	79.8	5.8	9	2	1	12	12	14	0.064	36.4	0.369
Sthd	>1+	97-153	115.0	17.9	13	1	2	16	16	16	0.085	48.5	1.518
Char fry	0+												
Bull trout	>=1+	88-219	146.4	38.2	5	0	0	5	5	na	0.027	15.2	1.012
D Varden	>=1+	117-124	120.5	16.8	0	2	0	2	2	na	0.011	6.1	0.178
Coho	0+	62-72	67.8	4.0	4	1	0	5	5	7	0.027	15.2	0.106
Coho	1+	78	78.0	5.9	1	0	0	1	1	na	0.005	3.0	0.031
MW	>=1+												
TOTAL					1			95			0.506	289.1	3.503

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	6.4	120.0	LOD	25	POOL	20	75
5	5.4		COBBLE	60	RIFFLE	35	16
10	5.5		IN VEG		RUN	30	
15	6.7		OVER VEG		OTHER	15	
20	5.8		CUTBANK				
25	4.5		DEEP POOL	15			
30					D90	36	
35			TOTAL	60	D50	12	
40					(cm)		21
		 ,					
1	5.7	120.0					
AREA	188.7	MARGIN (M)	33.0				

HABITAT COMMENTS:	Excellent small side channel complex of habitat types (riffle, pool, run, flats).
	Cobble bed material with some debris along R. left margin. Excellent parr and
	juv. char habitat for 75% of the site. Good fry habitat along the slower flat
1	areas.

SITE: MS1	REACH:	1	DATE: C	Det-09 PHOTO:	A3/7
SITE LOCATION:	Lower Telkwa Ri	ver margin site; at en	nd of Cottonwood S	t. in Telkwa.	
			EFFORT: (sec)	PASS 1 PASS 2 PASS 3	945 780 na
MARGIN = 1 FULL=2 S = SIDE / M = MAIN:	1 M	SLOPE (%):	1	TEMP (C): TIME: COND.(uS):	1.9 10:00 60.0
SAMPLING COMMENTS:					

		FL	FL	MEAN		PASS		EST.	95%	C.1.			B10-
SPECIES	AGE	RANGE	MEAN	WT	1	2	3	NUMB	LC1	UC1	N/M*M	N/100M	MASS
				(g)									(g/m*m)
Sthd	0+	32-47	39.6	0.7	24	6	na	32	30	37	0.397	280.7	0.278
Sthd	1+	64-90	75.2	4.8	4	1	па	5	5	7	0.066	46.8	0.318
Sthd	>1+	108	108.0	12.4	0	1	na	1	1	1	0.012	8.8	0.154
Char fry	0+												
Buil trout	>=1+	152	152.0	31.9	1	0	na	1	1	1	0.012	8.8	0.396
D Varden	>=1+												
Coho	0+												
Coho	1+												
MW	>=1+				l								
TOTAL								39			0.488	345.0	1.146

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		· (%)		TYPE (%)	
0	2.0	172	LOD		POOL		
5	3.8	208	COBBLE	100	RIFFLE	60	38
10	4.2	240	IN VEG	[RUN	40	
15	4.3	184	OVER VEG		OTHER		
20	3.8		CUTBANK				
25	3.1		DEEP POOL				
30					D90	35	
35			TOTAL	70	D50	18	
40					(cm)		•
	3.5	201					
AREA		MARGIN (M)	22.8				

HABITAT COMMENTS:	Site consists mainly of boulder and cobble with high flows on the edge of the
	site and some slow flats within ~1.5 m of the margin.

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	33-51	41.0	0.9	26	2	na	28	28	29	0.294	278.9	0.264
Sthd	1+	67-86	76.5	5.2	2	0	na	2	2	2	0.021	19.8	0.108
Sthd	>1+												
Char fry	0+												
Bull trout	>=1+												
D Varden	>=1+												
Coho	0+												
Coho	1+												
Chinook	0+	58	58.0	2.4	1	0	na	1	1	1	0.010	9.9	0.025
TOTAL					1			31			0.325	308.6	0.133

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)	·	TYPE (%)	
0	3.3	172	LOD		POOL		
5	5.3	208	COBBLE	100	RIFFLE	20	20
10	6.7	240	IN VEG		RUN	80	58
15	6.0	184	OVER VEG		OTHER		
20	4.3		CUTBANK			"	
25	2.9		DEEP POOL				
30					D90	28	
35			TOTAL	60	D50	14	
40					(cm)		
	4.8	201					
AREA	96.0	MARGIN (M)	20.2				

HABITAT COMMENTS:	Cobble margin site with primarily run habitat with a bit of riffle.
<u> </u>	

SITE: MS3	REACH:	1	DATE:	Oct-09 PHOTO	A3/9.	, 10
SITE LOCATION:	Telkwa River	margin site, u/s from	Site MS2.			
	ACCESS:	V2	EFFORT:	PASS 1	1207	
			(sec)	PASS 2	1297 899	
MARGIN = 1 FULL=2	1		<u> </u>	PASS 3	na	
				TEMP (C):	2.0	
S = SIDE / M = MAIN:	M	SLOPE (%):	1	TIME:	14:00	
				COND.(uS):	60.0	
SAMPLING COMMENTS:	The char fry w	as visually identified	as a DV.			

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS
				(g)									(g/m*m)
Sthd	0+	32-58	42.0	0.9	28	8	na	39	36	46	0.356	502.6	0.320
Sthd	1+	64-91	78.9	5.2	4	4	па	8	8	na	0.073	102.6	0.378
Sthd	>1+	103	103.0	10.9	1	0	na	1	1	1	0.009	12.8	0.099
Char fry	0+	53	53.0	1.3	1	0	na	1	1	1	0.009	12.8	0.012
Buil trout	>=1+												
D Varden	>=1+												
Coho	0+												
Coho	1+												
MW	>=1+												
TOTAL								49			0.447	630.8	0.809

DIST WIDTH WIDTH (m) WIDTH (m) COVER (%) WAT (%) 0 4.1 172 LOD (%) POOL (%) 5 7.3 208 COBBLE (N) (N) (N) (N) (N) (N) (N) (N) (N) (N)	, ,
0 4.1 172 LOD POOL 5 7.3 208 COBBLE 100 RIFFLE 60 10 9.4 240 IN VEG RUN 40	(%)
5 7.3 208 COBBLE 100 RIFFLE 60 10 9.4 240 IN VEG RUN 40	
5 7.3 208 COBBLE 100 RIFFLE 60 10 9.4 240 IN VEG RUN 40	ļ
10 9.4 240 IN VEG RUN 40	25
15 10.3 184 OVER VEG OTHER	
20 9.5 CUTBANK	
25 5.7 DEEP POOL	
30 3.1 D90 36	
35 TOTAL 70 D50 19	
40 (cm)	

HABITAT COMMENTS:	Sampled a short, wide, cobble-riffle section.
	Excellent parr habitat for outer half of site. Good fry and small juv. habitat
	along margin section of site.

SITE: MS4	REACH:	1	DATE: O	et-09 PHOTO:	A3/11.	, 12
SITE LOCATION:	Telkwa River m	argin site, just u/s fro	om MS3.			
	ACCESS:	V2		<u> </u>		
			EFFORT:	PASS 1	1663	
			(sec)	PASS 2	847	
				PASS 3	na	
MARGIN = 1 FULL=2	1					
				TEMP (C):	1.9	
S = SIDE / M = MAIN:	M	SLOPE (%):	1	TIME:	16:00	
				COND.(uS):	60.0	
SAMPLING COMMENTS:						-

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/M*M N/100M	MASS (g/m*m)
Sthd	0+	32-49	40.3	0.8] 19	7	na	30	26	40	0.253	290.7	0.202
Sthd	1+	68-94	78.0	5.3	8	0	na	8	8	8	0.067	77.3	0.357
Sthd	>1+	102	102.0	11.0] 1	0	na	1	1	1	0.008	9.7	0.093
Chinook	0+	60-67	64.3	2.8	3	0	na	3	3	3	0.025	29.0	0.071
Bull trout	>=1+	225	225.0	102.5	1	0	na	1	1	1	0.008	9.7	0.862
D Varden	>=1+												
Coho	0+	69	69.0	4.6	1	0	na	1	1	I	0.008	9.7	0.039
Coho	1+	78-85	81.5	5.5	2	0	na	2	2	2	0.017	19.3	0.093
MW	0+	60	60.0	1.9	1	0	na	1	1	1	0.008	9.7	0.016
TOTAL				"	-			47			0.396	454.9	1.732

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
				-		·	
0	4.7	172	LOD	5	POOL		
5	6.6	208	COBBLE	95	RIFFLE	10	20
10	7.6	240	IN VEG		RUN	90	32
15	7.4	184	OVER VEG		OTHER		
20	6.0		CUTBANK			·	
25	5.6		DEEP POOL				_
30	2.3				D90	27	
35			TOTAL	60	D50	11	
40					(cm)	•	-
l							
1	5.7	201					
AREA	118.9	MARGIN (M)	20.7				

HABITAT COMMENTS:	Primarily run habitat within site.	
	Debris along margin with most of it dewatered.	
	Fines/cobble within 2 m of the margin.	

SITE: MS5	REACH:	1	DATE:	Oct-03 PHOT	O: B4/22,	, 23
SITE LOCATION:	Telkwa River,	bay area just off priv	vate property.			
	ACCESS:	FT				
			EFFORT:	PASS 1	1454	
			(sec)	PASS 2	1049	
				PASS 3	na	
MARGIN = 1 FULL=2	2					
				TEMP (C):	4.0	
S = SIDE / M = MAIN:	S	SLOPE (%):	1	TIME:	10:00	
•				COND.(uS):	60.0	
SAMPLING COMMENTS:	Sampled a bay	area off the mainste	m of the Telkwa R.			
	' '					

		FL	FL	MEAN		PASS		EST.	95%	C.I.	-		BIO-
SPECIES	AGE	RANGE	MEAN	WT	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS
				(g)									(g/m*m)
					ı								
Sthd	0+	31-61	40.6	0.9	60	7	na	68	67	70	0.300	205.8	0.270
Sthd	1+	71	71.0	4.5	0	1	na	1	1	1	0.004	3.0	0.020
Sthd	>1+	108	108.0	14.0	1	0	na	1	1	1	0.004	3.0	0.062
Char fry	0+												
Buil trout	>=1+	180	180.0	55.3	1	0	па	1	1	1	0.004	3.0	0.244
D Varden	>=1+												
Coho	0+												
Coho	1+												
MW	0+	54-68	61.0	1.8	1	1	na	2	2	na	0.009	6.1	0.016
TOTAL								73			0.322	221.0	0.612

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	8.5	200	LOD		POOL		
5	8.9	164	COBBLE	80	RIFFLE	10	10
10	8.2	140	IN VEG	10	RUN	90	45
15	8.1	168	OVER VEG		OTHER		
20	3.1		CUTBANK				
25	7.1	1	DEEP POOL	. 10			_
30	2.8				D90	32	
35			TOTAL	25	D50	9	
40					(cm)		
	6.7	168		*Note: Bay area was	added to the calculat	ed area:	
AREA	226.2	MARGIN (M)	33.0	4.6 m * 1.3 m =			

HABITAT COMMENTS:	Trickle flow discharge entering the top of the bay.	

SITE: MS6	REACH:	1	DATE:	Oct-03 PHOTO	D: B5/2,	3
SITE LOCATION:	Telkwa River 1	nargin site, 50 m u/s	from Site MS5.			
	ACCESS:	FT				
			EFFORT:	PASS 1	830	
			(sec)	PASS 2	540	
				PASS 3	na	
MARGIN = 1 FULL=2	1					
				TEMP (C):	4.0	
S = SIDE / M = MAIN:	M	SLOPE (%):	1	TIME:	11:30	
·				COND.(uS):	60.0	
SAMPLING COMMENTS:	The char fry w	as visually identified	as a BT.			

		FL	FL	MEAN		PASS		EST.	95%	C.1.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	31-48	38.0	0.7	25	7	na	35	32	41	0.316	420.9	0.221
Sthd	1+	70-79	74.5	4.9	2	0	na	2	2	2	0.018	24.2	0.089
Sthd	>1+	104-109	106.5	13.1	2	0	na	2	2	2	0.018	24.2	0.238
Char fry	0+	51	51.0	1.0	1	0	na	1	1	1	0.009	12.I	0.009
Bull trout	>=1+												
D Varden	>=1+												
Coho	0+												
Coho	1+												
MW	>=1+												
TOTAL								40			0.361	481.5	0.558

DIST (m)	WET WIDTH (m)	CHAN WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)	DEPTH (cm)
						(/	
0	5.5	200	LOD		POOL		
5	7.2	164	COBBLE	100	RIFFLE		
10	7.7	140	IN VEG		RUN	100	39
15	7.9	168	OVER VEG		OTHER		
20	5.0		CUTBANK			<u> </u>	
25			DEEP POOL				
30					D90	32	
35			TOTAL	75	D50	17	
40					(cm)	I 	

HABITAT COMMENTS:	Sampled a slow run section with large cobble and boulder bed material.
	Excellent fry habitat for ~1.5 m along the margin.
	Good parr habitat throughout site.

SITE: MS7	REACH:	1	DATE:	Oct-03 PHOTO	B5/4,	5
SITE LOCATION:	Telkwa River 1	margin site, 150 m u/s	s from Site MS6.			
	ACCESS:	FT				
			EFFORT:	PASS 1	2069	
			(sec)	PASS 2	1344	
				PASS 3	na	
MARGIN = 1 FULL=2	1					
				TEMP (C):	4.5	
S = SIDE / M = MAIN:	M	SLOPE (%):	1	TIME:	12:00	
				COND.(uS):	60.0	
SAMPLING COMMENTS:	The char fry w	as visually identified	as a BT.			

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	31-45	38.4	0.7	61	17	na	85	78	94	0.757	768.8	0.530
Sthd	1+	78-89	82.8	5.7	4	0	na	4	4	4	0.036	36.4	0.204
Sthd	>1+	101-127	108.5	15.9	4	0	na	4	4	4	0.036	36.4	0.569
Char fry	0+	56	56.0	1.5	1	0	na	1	1	1	0.009	9.1	0.013
Bull trout	>=1+												
D Varden	>=1+												
Coho	0+												
Coho	1+												
MW	0+	60	60.0	1.5	0	1	na	I	1	1	0.009	9.1	0.013
TOTAL								95			0.846	859.7	1.330

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	2.8	200	LOD		POOL		
5	5.7	164	COBBLE	100	RIFFLE	90	25
10	7.4	140	IN VEG		RUN		
15	6.6	168	OVER VEG		OTHER	10	
20	2.9		CUTBANK				
25			DEEP POOL				
30					D90	35]
35			TOTAL	80	D50	18	
40					(cm)		
EA	5.1 111.8	168 MARGIN (M)	22.0				

HABITAT COMMENTS:	Sampled a very fast boulder-riffle section.
	Excellent fry habitat for I-2 m along the margin. Good parr habitat throughout
[most of the site. Poor fish habitat along outer edge of net due to high water
	velocities.

SITE:	WL1		REACH:		1	DATE:	Nov-04 PHOTO	D: A5/18, 19
SITE LOCAT	ION:		Lower 300	m of Teli	(wa R. flood chai	nel located below	v road at PNG crossing.	
			ACCESS:		FT		=	
						EFFORT:		na
						(sec)	PASS 2	na
				_		L	PASS 3	na
MARGIN = 1	FULL=2		na					
				•			TEMP (C):	4.0
S = SIDE / M =	344731							
S - SIDE / MI -	= MAIN:		S		SLOPE (%):	2	TIME:	9:00
		`S:			SLOPE (%): channel for 24 h ATION ESTIMA	our period.	COND.(uS):	9:00 nr
			Set 10 trap	POPUL	channel for 24 h	our period.		
SAMPLING C	COMMENT	FL	Set 10 trap	POPUL. MEAN	channel for 24 h ATION ESTIMA NO.	our period.		
			Set 10 trap	POPUL MEAN WT	channel for 24 h	our period.		
SAMPLING C	COMMENT	FL	Set 10 trap	POPUL. MEAN	channel for 24 h ATION ESTIMA NO.	our period.		
SAMPLING C	COMMENT	FL	Set 10 trap	POPUL MEAN WT	channel for 24 h ATION ESTIMA NO.	our period.		
SAMPLING C SPECIES	AGE	FL	Set 10 trap	POPUL MEAN WT	channel for 24 h ATION ESTIMA NO.	our period.		
SAMPLING C SPECIES Sthd Sthd	AGE 0+	FL RANGE	Set 10 trap	POPUL MEAN WT (g)	ATION ESTIMA NO. FISH	our period.		
SAMPLING C	AGE 0+ 1+	FL RANGE	Set 10 trap	POPUL MEAN WT (g)	ATION ESTIMA NO. FISH	our period.		
SPECIES Sthd Sthd Sthd Coho	AGE 0+ 1+ >1+ 0+	FL RANGE 83 49-76	FL MEAN 83.0	POPUL MEAN WT (g)	ATION ESTIMA NO. FISH	our period.	COND.(uS):	
SAMPLING C SPECIES Sthd Sthd Sthd Sthd	AGE 0+ 1+ >1+	FL RANGE	FL MEAN 83.0	POPUL MEAN WT (g)	ATION ESTIMA NO. FISH	our period.	COND.(uS):	

	WET	CHAN		SITE		SITE	DEPTI
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	1.8	2.5	LOD	15	POOL	10	38
5	2.3	4.8	COBBLE	20	RIFFLE	60	3
10	3.8	4.0	IN VEG		RUN	30	
15	3.5	4.7	OVER VEG		OTHER		
20			CUTBANK				
25			DEEP POOL	65			
30					D90	13	1
35			TOTAL	50	D50	nr	1
40					(cm)		•

HABITAT COMMENTS:	Est. 1 c.f.s. discharge. Nice low gradient seepage-fed channel. Evidence of
	high flows - flood waters had blown out old beaver dams and left debris above the
	banks. Sand/silt bed material with some cobble in riffle areas. Good coho
	rearing and potential coho enhancement area. No potential spawning.

SITE: B1	REACH:	6	DATE:	Oct-02 PH	OTO: B4/1	5, 16
SITE LOCATION:	Bulkley River 1	nargin site, ~100 m d/	's from Hubert C. mo	outh.		
	ACCESS:	BT				
			EFFORT:	PASS 1	1046	
			(sec)	PASS 2	948	1
				PASS 3	na	1
MARGIN = 1 FULL=2	1					_
		-		TEMP (C):	8.0]
S = SIDE / M = MAIN:	M	SLOPE (%):	1	TIME:	11:00	
				COND.(uS):	110.0	
SAMPLING COMMENTS:	L Company	n to 1984; directions o k outcrop (site descrip		00 m d/s Hubert	C.	-

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
~		-22.50	40.6			_		20	26	43	0.364	202.2	0.330
Sthd	0+	33-59	42.6	0.9	29	7	na	38	36	43	0.364	382.3	0.328
Sthd	1+	71-74	72.3	4.1	3	0	na	3	3	3	0.029	30.0	0.117
Sthd	>1+												
Chinook	0+	44-70	54.3	2.1	38	8	na	48	46	53	0.458	481.3	0.963
Chinook	>=1+												
Coho	0+												
Coho	1+												
LND	0+	37	37.0	0.7	1	0	na	1	1	1	0.010	10.0	0.007
TOTAL				L	l			90			0.861	903.6	1.414

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)	····	(%)		TYPE (%)	
0	2.4	80	LOD		POOL		
5	4.6	120	COBBLE	100	RIFFLE		
10	6.5	100	IN VEG		RUN	100	44
15	6.7	100	OVER VEG		OTHER		
20	7.2		CUTBANK				
25	4.1		DEEP POOL				
30					D90	30	
35			TOTAL	40	D50	12	
40					(cm)		
	5.3	100					
AREA	105.0	MARGIN (M)	20.0				

HABITAT COMMENTS:	Slow, flat, run habitat with cobble bed material.		
İ			

SITE: B2	REACH:	6	DATE:	Oct-02 PHOTO	D: B4/17	
SITE LOCATION:	Bulkley River	margin site, 100 m d/s	from rock outcrop al	ong CNR rip-rap.		
	ACCESS:	BT				
			EFFORT:	PASS 1	750	
			(sec)	PASS 2	640	
				PASS 3	na	
MARGIN = 1 FULL=2	1					
İ				TEMP (C):	8.0	
S = SIDE / M = MAIN:	M	SLOPE (%):	1	TIME:	13:00	
				COND.(uS):	50.0	
SAMPLING COMMENTS:	Same location Fish habitat is	as 1984. not as good as that fo	und at Site B1.			

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	40-47	43.0	1.0	4	0	na	4	4	4	0.059	34.8	0.059
Sthd	1+												
Sthd	>1+												
Chinook	0+	57-58	57.7	2.4	2	1	na	4	3	11	0.059	34.8	0.141
Chinook	>=1+												
Coho	0+												
Coho	1+												
LND	0+												
TOTAL								8			0.117	69.6	0.199

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
1 .							
0	2.6	80	LOD		POOL		
5	3.4	120	COBBLE	100	RIFFLE		
10	4.2	100	IN VEG		RUN	100	60
15	4.4	100	OVER VEG		OTHER		
20	2.2		CUTBANK				
25	1.0		DEEP POOL				
30					D90	28	
35			TOTAL	65	D50	15	
40					(cm)		
1					. ,		
ı	3.0	100					
AREA	68.2	MARGIN (M)	23.0				

HABITAT COMMENTS:	Fast and deep along outer edge of margin site and moderate flows within
	margin site. Bed material consists of cobble.

SITE: B3	REACH:	6	DATE: (Oct-02 PHOTO	B4/18,	19
SITE LOCATION:	Bulkley River ma	rgin site.				
	ACCESS:	BT				
i			EFFORT:	PASS 1	500	
			(sec)	PASS 2	475	
				PASS 3	na	
MARGIN = 1 FULL=2	1					
		•		TEMP (C):	8.5	
S = SIDE / M = MAIN:	M	SLOPE (%):	0.5	TIME:	14:00	
1				COND.(uS):	50.0	
SAMPLING COMMENTS:	Approx. same loca	ation as 1984.				

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS
				(g)									(g/m*m)
Sthd	0+	37-54	44.5	1.3	9	1	na	10	10	I 1	0.137	94.2	0.177
Sthd	1+	70	70.0	4.1	0	1	na	1	1	1	0.013	9.3	0.055
Sthd	>1+												
Chinook	0+	45-66	54.9	1.5	11	3	па	15	14	19	0.204	140.7	0.306
Chinook	>=1+												
Coho	0+												
Coho	1+												
LND	0+												
TOTAL		·		i				26			0.354	244.2	0.539

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	2.7	80	LOD		POOL		
5	4.3	120	COBBLE	80	RIFFLE		
10	4.5	100	IN VEG		RUN	100	55
15	3.6	100	OVER VEG		OTHER		
20	3.4		CUTBANK				
25	2.2		DEEP RUN	20			
30					D90	27	
35			TOTAL	70	D50	12	
40					(cm)	•	

HABITAT COMMENTS:	Cobble bed material in a slow, run section.

SITE: B4	REACH:	6	DATE:	Oct-02 PHOTO	B4/20, 21
SITE LOCATION:	Bulkley River ma	argin site, 50 m d/s fr	rom Site B3.		
	ACCESS:	BT			<u> </u>
			EFFORT:	PASS 1	824
1			(sec)	PASS 2	544
				PASS 3	na
MARGIN = 1 FULL=2	1				
				TEMP (C):	8.5
S = SIDE / M = MAIN:	M	SLOPE (%):	0.5	TIME:	16:00
-				COND.(uS):	50.0
SAMPLING COMMENTS:	Approx. same loc	cation as 1984.			-

		FL	FL	MEAN		PASS		EST.	95%	C.I.		-	BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Sthd	0+	32-53	41.7	0.9	18	5	na	25	23	30	0.331	237.4	0.298
Sthd	1+	71-82	77.8	4.8	6	0	na	6	6	6	0.080	57.1	0.383
Sthd	>1+												
Chinook	0+	39-69	52.2	2.0	20	6	na	29	26	35	0.380	272.1	0.759
Chinook	>=1+												
Coho	0+												
Coho	1+												
LND	0+												
TOTAL			L	1				59			0.791	566.6	1.440

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
			100	·····	DOO!	[
0	3.0	80	LOD		POOL		
5	4.3	120	COBBLE	100	RIFFLE	5	29
10	4.6	100	IN VEG		RUN	95	41
15	4.3	100	OVER VEG		OTHER		
20	3.4		CUTBANK				
25	1.9		DEEP POOL				
30					D90	30	
35			TOTAL	75	D50	17	
40					(cm)		
	3.6	100					
AREA	75.3	MARGIN (M)	21.0				

HABITAT COMMENTS:	Slow, run habitat. Cobble bed material.	<u></u>
	Good chinook and SST parr rearing habitat.	Moderate habitat for large parr.
	Good fry habitat within 1 m of margin.	

SITE: HUB6	REACH:	2	DATE: A	ug-09 PHOTO): A1/14, 15	
SITE LOCATION:	Immediately w/s from PNG	crossing of Hubert C	creek. Access via fields	at Help's Farm.		
	ACCESS:	V2				
			EFFORT:	PASS 1	700	
			(sec)	PASS 2	795	
				PASS 3	na	
MARGIN = 1 FULL=2	2					
				TEMP (C):	11.0	
S = SIDE / M = MAIN:	M	SLOPE (%):	2	TIME:	14:20	
i				COND.(uS):	110.0	
SAMPLING COMMENT	S: Easy site to sam	ple. Good net sets a	and visibility etc.			
	The two fish car	ptured at this site ap	pear to be residents.			

		FL	FL	MEAN		PASS		EST.	95%	C.I.		-	B10-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Ct	0+												
Ċt	>1+	135-179	157.0	nr	2	0	па	2	2	2	0.023	5.3	па
Char fry	0+												
D Varden	>=1+												
LN dace	>=1+												
LN sucker	0+												
TOTAL								2			0.023	5.3	na

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	3.0	6.3	LOD	5	POOL	20	27
5	2.3	2.8	COBBLE	75	RIFFLE	60	10
10	2.5	2.5	IN VEG		RUN	20	
15	2.5	2.5	OVER VEG	10	OTHER		
20	1.7	2.6	CUTBANK	10			
25	1.5	3.8	DEEP POOL				
30					D90	20	
35			TOTAL	60	D50	5	
40					(cm)		
	2.3	3.4					
REA	85.5	MARGIN (M)	38.0				

HABITAT COMMENTS:	Appears to be excellent rearing habitat, especially for fry.	
1 .	Low fish abundance in this section; access problems d/s - beaver?	
	Hiked 400 m d/s: some spawning potential, 3% slope, thick brush, and several	
	0.5 m high debris drops (not barriers).	

SITE: HUB8	REACH:	3	DATE:	Sep-22 PHOTO): A4/5,	6
SITE LOCATION:	Between PNG crossing and	Hydro line.				
	ACCESS:	ATV	EFFORT: (sec)	PASS 1 PASS 2	500 390	-
MARGIN = 1 FULL=2	2			PASS 3	na	
S = SIDE / M = MAIN:	M	SLOPE (%):	3-4	TEMP (C): TIME: COND.(uS):	4.0 11:30 nr	
SAMPLING COMMENTS		oled d/s for 60 m (270 s CT (FL = 177 mm).	sec.).			

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Ct	0+												
Ct	>1+	150-177	163.5	nr	1	0	na	1	1	1	0.011	3.3	na
Char fry	0+												
D Varden	>=1+												
LN dace	>=1+												
LN sucker	0+												
TOTAL								1			0.011	3.3	na

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	1.9	5.1	LOD	10	POOL	20	-30
5	2.3	4.6	COBBLE	20	RIFFLE	60	11
10	2.8	5.9	IN VEG		RUN	15	
15	3.2	6.5	OVER VEG	20	OTHER	5	
20	4.3	4.8	CUTBANK	20		-,	
25			DEEP POOL	30	•		
30					D90	11	
35			TOTAL	50	D50	6	·
40					(cm)		•
İ		·					
l	2.9	5.4					
AREA	87.0	MARGIN (M	30.0				

HABITAT COMMENTS:	Limited potential spawning in this section - mainly large gravel/small cobble
	bed material.
	Surprisingly low fish densities. Suspect access problems d/s.
	Suspect the two fish sampled were stream residents.

SITE:	HUB9	REACH:	3	DATE:	Aur-07 PHO	OTO: B	1/1, 2
SITE LOCAT	ION:	Sampled at Hydro line cro	ossing.				
		ACCESS:	ATV				
				EFFORT:	PASS 1	390	
Ī				(sec)	PASS 2	460	7
				1	PASS 3	na	7
MARGIN = 1	FULL=2	2					
l					TEMP (C):	nr	
S = SIDE / M	= MAIN:	M	SLOPE (%):	4-5	TIME:	14:30	
ł					COND.(uS):	nr	
SAMPLING (COMMENT	S: Two pass rem	oval with an upper and	lower net.		_	
		Estimated 3-4	c.f.s. discharge.				

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Ct	0+												
Ct	>1+	140	140.0	nr	2	0	na	2	2	2	0.036	6.7	na
Char fry	0+												
D Varden	>=1+	162	162.0	nr	1	0	na	1	1	1	0.018	3.3	na
LN dace	>=1+												
LN sucker	0+												
TOTAL								3			0.054	10.0	na

	WET	CHAN	,	SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	1.8	1.8	LOD	20	POOL	20	27
5	1.9	2.1	COBBLE	40	RIFFLE	70	12
10	1.9	2.3	IN VEG		RUN	10	
15		1.7	OVER VEG	10	OTHER		
20		2.7	CUTBANK	10			
25		4.5	DEEP POOL	20			
30					D90	17	
35			TOTAL	60	D50	nr	
40					(cm)		
	1.9	2.5					
REA	56.0	MARGIN (M)	30.0				

HABITAT COMMENTS:	Small cobble bed material; limited potential spawning.	
	Good trout parr habitat in the cobble/riffle areas.	
	No fry or small juveniles were present in this section.	

SITE: HUB10	REACH:	4	DATE:	Sep-07 PHOTO): B1/3,	4
SITE LOCATION:	Upstream from Hydro line.	Sampled just d/s fro	om upper road crossii	ng.		
	ACCESS:	ATV				
İ			EFFORT:	PASS 1	740	
			(sec)	PASS 2	440	
				PASS 3	na	
MARGIN = 1 FULL=2	2					
,				TEMP (C):	nr	
S = SIDE / M = MAIN:	M	SLOPE (%):	6	TIME:	13:00	
				COND.(uS):	nr	
SAMPLING COMMENTS	S: 2 pass removal	with upper and low	er nets.			

		FL	FL	MEAN		PASS		EST.	95%	C.1.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	. 2	3	NUMB	LCI	UC1	N/M*M	N/100M	MASS (g/m*m)
Ct Ct	0+ >1+												
Char fry	0+												
D Varden LN dace	>=1+ >=1+	110-153	131.3	nr	2	1	na	4	3	11	0.060	11.4	na
LN sucker	0+										. •	τ.	
TOTAL													
TOTAL								4			0.060	11.4	na

	WET	CHAN		SITE	-	SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	1.6	2.8	LOD	10	POOL	15	24
5	2.3	2.6	COBBLE	60	RIFFLE	80	12
10	1.7	2.7	IN VEG		RUN	5	
15	1.5	3.1	OVER VEG	5	OTHER		
20	2.4	2.9	CUTBANK	5			
25			DEEP POOL	20			
30					D90	28	
35			TOTAL	75	D50	nr	
40					(cm)		
					, ,		
	1.9	2.8					
AREA	66.5	MARGIN (M	35.0				

HABITAT COMMENTS:	Limited pockets of potential spawning gravels.
	Mainly confined channel with cobble/boulder bed material.
	Upper end of DV habitat at this location.

SITE:	H1	REACH:	2	DATE: A	ug-17 PHOTO	: A1/1, 2	
SITE LOCAT	TION: Mid-	way between cattlegua	rd and old bridge site.				
		ACCESS:	· V2				
1			 	EFFORT:	PASS I	500	
1				(sec)	PASS 2	400	
1					PASS 3		
MARGIN = 1	FULL=2	2					
			•		TEMP (C):	12.0	
S = SIDE / M	= MAIN:	M	SLOPE (%):	1	TIME:	11:15	
1				·	COND.(uS):	180.0	
SAMPLING	COMMENTS:	Estimate 2 c.f.s	s. discharge at the time	of sampling.			

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	I	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Ct	0+											•	
Ct	>1+	98-117	109.6	nr	8	0	na	8	8	8	0.163	26.7	na
Char fry	0+												
D Varden	>=1+												
LN dace	>=1+												
LN sucker	0+												
TOTAL								8			0.163	26.7	na

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
. 0	1.3	1.3	LOD		POOL	10	32
5	2.2	2.2	COBBLE	50	RIFFLE	60	12
10	2.2	2.2	IN VEG	- 50	RUN	30	
15	1.7	1.7	OVER VEG	50	OTHER		
20	1.3	1.3	CUTBANK			·	
25	1.1	1.1	DEEP POOL				_
30					D90	25]
35			TOTAL	100	D50	nr	
40					(cm)		_
	1.6	1.6					
AREA	49.0	MARGIN (M)	30.0				

HABITAT COMMENTS:	Creek has been diverted through this section and runs along a ditch with
	fencing on one side. Banks sloughing in this section - some clay.
	No spawning potential.
	Willow/alder cover.

SITE: H2	REACH:	2	DATE:	Aug-07 PHOTO	A1/3, 4	
SITE LOCATION: Imm	ediately u/s from culve	rt. Old bridge site.				
	ACCESS:	V2		7.004	1 170	
			EFFORT:	PASS 1	450	
			(sec)	PASS 2 PASS 3	450 na	
MARGIN = 1 FULL=2	2					
S = SIDE / M = MAIN:	M	SLOPE (%):	2	TEMP (C): TIME:	12.0 12:15	
				COND.(uS):	180.0	
SAMPLING COMMENTS:	Easy to enclose Estimate 2 c.f.s	with stopnets. discharge at the time	of sampling.			
	PO	PULATION ESTIMAT	TES:			
	FL FL M	EAN PASS	EST. 9	5% C.I.	I	BIO-

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS
				(g)									(g/m*m)
Ct	0+	43	43.0	nr	1	0	na	1	1	1	0.011	3.0	na
Ct	>1+												
Char fry	0+												
D Varden	>=1+												
LN dace	>=1+												
LN sucker	0+												
TOTAL								1			0.011	3.0	na
1.01.1.2								•			0.011	0.0	

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	3.4	6.2	LOD		POOL		
5	3.2	8.3	COBBLE		RIFFLE	95	11
10	1.5	9.0	IN VEG		RUN	5	
15	3.9	10.6	OVER VEG		OTHER		
20	2.6	9.5	CUTBANK				
25	1.8	7.5	DEEP POOL				
30					D90	4	
35			TOTAL	0	D50	1	
40					(cm)		

HABITAT COMMENTS:	Very poor fish habitat - cattle have eroded the banks and channel is very wide	
	from erosion. Sands/pea gravels abundant. No vegetative cover.	
	Suspect this site dewaters in most summers/winters due to excess bed material.	
	Well installed 4' culvert replaces old bridge. Temp. is cool due to cool day.	
		_

REACH:	2	DATE:	Aug-07	РНОТО:	A1/7	7, 8
th side of field - 150 m u/	's from Trib. 1 conflu	ence.				
ACCESS:	V2					
		EFFORT:	PASS 1		550	
		(sec)	PASS 2		500	
		, í	PASS 3		na	
2			·			
			TEMP (C)	: '	11.5	
M	SLOPE (%):	3	TIME:		14:00	
			COND.(uS	i):	170.0	
Estimate 3 c.f.s.	discharge.					
	ACCESS:	ath side of field - 150 m u/s from Trib. 1 conflu ACCESS: V2	ath side of field - 150 m u/s from Trib. 1 confluence. ACCESS: V2 EFFORT: (sec) M SLOPE (%): 3	ath side of field - 150 m u/s from Trib. 1 confluence. ACCESS: V2 EFFORT: PASS 1 (sec) PASS 2 PASS 3 2 TEMP (C) M SLOPE (%): 3 TIME: COND.(uS	### ACCESS: V2 EFFORT: PASS 1 (sec) PASS 2 PASS 3	th side of field - 150 m u/s from Trib. 1 confluence. ACCESS: V2 EFFORT: PASS 1 550 (sec) PASS 2 500 PASS 3 na 2 TEMP (C): 11.5 M SLOPE (%): 3 TIME: 14:00 COND.(uS): 170.0

		FL	FL	MEAN		PASS		EST.	95%	C.I.	<u>.</u>		BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Ct Ct	0+ >1+	46	46.0	nr	1	0	na	1	1	1	0.013	3.0	na
Char fry	0+												
D Varden LN dace	>=1+ >=1+												
LN sucker	0+												
TOTAL								1			0.013	3.0	na
								_				2.3	

DIST	WET WIDTH	CHAN WIDTH		SITE		SITE	DEPTI
				COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	2.1	2.6	LOD		POOL	15	22
5	2.7	3.0	COBBLE	65	RIFFLE	80	12
10	1.7	2.4	IN VEG		RUN	5	
15	1.9	3.4	OVER VEG	25	OTHER		
20	3.0	4.6	CUTBANK	5		••••	
25	2.8	4.1	DEEP POOL				
30					D90	15	
35			TOTAL	5	D50	nr	
40					(cm)		

HABITAT COMMENTS:	Good rearing habitat with cobble cover and brush overstory.	•
	Pockets of potential spawning.	
	Banks have some unstable clay/silt sections.	

SITE:	НЗа		REACH:		1		DATE:	A	ug-07	РНОТО:	A1/	5, 6
SITE LOCA	TION:	Tributary	HP1 immed	liately d/s f	from road cros	sing/c	ulvert.					
			ACCESS:	ſ	V2							
						1	EFFO	RT:	PASS 1		140	
							(se	c)	PASS 2		140	
			,	,					PASS 3		na	
MARGIN = 1	I FULL=2		2]					TEMP (C	· ·	14.5	
S = SIDE / M	i = MAIN·		M	1	SLOPE (%):	ſ	5		TIME:	-)•	13:00	
J-SIDE 7 IV				J	5201 £ (/0).	1			COND.(u	(S):	170.0	
SAMPLING	COMMENT	S:	Flows are	just a trick	de at the time	of san	pling.					
·	•		1	POPULA	TION ESTIM	ATES	S:					
		FL	FL	MEAN	PASS		EST.	95	% C.I.			B10-
SPECIES	AGE	RANGE	MEAN	WT (g)	1 2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Ct	0+	f	1									
Ċt	>1+		 	\vdash		N	O CATCH					
Char fry	0+					.,	o caren	•				
D Varden	>=1+											
LN dace	>=1+											
LN sucker	0+											
TOTAL												
	WET	CHAN			·		SITE				SITE	DEPTH
DIST	WIDTH	WIDTH					COVER				WATER	(cm)
(m)	(m)	(m)					(%)				TYPE (%)	(0)
			_									
0	0.5	3.1	1	LOD		- 1	10		POOL		5	10
5	0.7	3.8	-	COBBLE		1	90		RIFFLE		95	5
10	0.6	4.0	4	IN VEG		-			RUN			
15	0.6	3.1	-	OVER VI		}			OTHER			
20 25	0.7	3.8	1	CUTBAN		}						
30	0.2	3.0	1	DEEP PO	OL	L			D 90	ı	40	
35			1	TOTAL		ſ	100		D50		6	
40			1	TOTAL		L	100		(cm)	I		
	0.6	3.4	-									
AREA	16.5	MARGIN (30.0							<u> </u>	
HABITAT C	OMMENTS:		The creek	dries up fo	or much of the	summ	ier.					
				-	ed in 1985.							
						_						
			Walked IU	ou m u/s ire	om the culvert;	; a fe	v isolated p	oools ar	e wetted.			

SITE:	H4]	REACH:	3	DATE:	Aug-07	РНОТО:	A1/9	, 10
SITE LOCAT	ION:	Upper net 8	m below culvert at	top end of field.					
			ACCESS:	V2					
Ì					EFFORT	: PASS 1		1300	
					(sec)	PASS 2		800	
		_				PASS 3		na	
MARGIN = 1	FULL=2	[2		•				
l		-				TEMP (C):	11.0	
S = SIDE / M	= MAIN:	Į	M	SLOPE (%):	4	TIME:		15:00	
						COND.(uS):	170.0	
SAMPLING (COMMENT	i i		cker on initial passes	•	mpling.			
			Estimate 3-4 c.f.s.	lischarge - higher fl	ow than d/s.				

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	1 2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Ct .	0+	29-47	37.6	nr	13	2	na	15	14	17	0.222	41.5	na
Ct	>1+	95-116	102.4	nr	5	0	na	5	5	5	0.072	13.5	na
Char fry	0+												
D Varden	>=1+												
LN dace	>=1+												
LN sucker	0+												

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER	,	WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	2.3	2.4	LOD	40	POOL	50	60
5	1.0	3.3	COBBLE	"	RIFFLE	50	10
10	1.8	3.4	IN VEG	30	RUN		
15	2.0	2.7	OVER VEG	30	OTHER		
20	1.2	3.4	CUTBANK			·	
25	2.9	3.1	DEEP POOL				
30					D90	5	
35			TOTAL	75	D50	3	
40					(cm)		

HABITAT COMMENTS:	Good potential spawning in this section.	
	LOD forming stepped pools.	
	Good alder overstory.	

SITE:	H7	·	REACH:		3		DATE:	À	ug-09	РНОТО:	A1/1	1, 12
	CION:	Just u/s fro	m road aros	eina in hr	uchy ore	a Acc	ess from cleari	ing on we	st side of fie	14		
SITE LOCAT	ION:	Just u/s II o	m road cros	ising in Dire		a. Att	ess irom cicari	ing on we	st side of ne			
			ACCESS:	1	V2		FEE	ORT:	PASS 1		530	
								sec)	PASS 2		400	
									PASS 3		na	
MARGIN = 1	FULL=2		2]						a. 1		
S = S1DE / M	- MAIN		М	1	SLOPE	(%).	1.5	٦	TEMP (C	ــــــــــــــــــــــــــــــــــــــ	11.0 11:45	
S - SIDE / WI	- MAIN.		171	J	SLOI E	(/0).	1.5	_	COND.(u	ıS):	170.0	
SAMPLING (COMMENT	S:	No fish in above this		lowever,	, nume	rous fry were	noted u/s				
				POPULA	TION E	ESTIM	ATES:					
		FL	FL	MEAN	P	ASS	EST.	95	% C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3 NUMB		UCI	N/M*M	N/100M	MASS (g/m*m)
	_											
Ct Ct	0+ >1+	-	-									
Char fry	0+		 	\vdash			NO CATO	н.				
D Varden	>=1+		 	1			No care	•				
LN dace	>=1+											
LN sucker	0+											
TOTAL												
r	WET	CHAN					SITE				SITE	DEPTH
DIST	WIDTH	WIDTH					COVER	Ł			WATER	(cm)
(m)	(m)	(m)					(%)				TYPE (%)	
	1.2	10	1	LOD			<u> </u>	7	BOOL		10	15
5	1.3	1.8	1	LOD COBBLE			50	4	POOL RIFFLE		10 60	17 5
10	1.7	2.0	1		•		-	1				
15	0.8	1.1	1	OVER VI	FG		50	┥	RUN OTHER		30	
20	1.5	1.6	1	CUTBAN			30	1	OTTLER			
25	1.3	1.4	1	DEEP PO				1				
30			1					_	D90		4	
35				TOTAL			80]	D50		i	
40]					_	(cm)			
	1.4	1.6	-									
AREA	45.1	MARGIN (33.0								
HABITAT C	OMMENTS:		Surprised	no fish at	this site:	frv a	re numerous ju	ıst u/s.				
				1-2 c.f.s. d								
		· · · · · · · · ·										

SITE:	Н9	REACH:	4	DATE:	Aug-07	РНОТО:	B1/	7,8
SITE LOCAT	ION:	Helps Creek mainstem be	low culvert at B.C. H	ydro line crossing.				
		ACCESS:	ATV					
				EFFO	RT: PASS 1		750	
				(sec	PASS 2		530	
				j	PASS 3		na	
MARGIN = 1	FULL=2	2						
1					TEMP (C):	11.0	
S = SIDE / M =	= MAIN:	M	SLOPE (%):	8-10	TIME:		16:00	
					COND.(1	ıS):	190.0	
SAMPLING O	COMMENTS	Estimated 1.	5 c.f.s. discharge.					
		Used lower n	et. Culvert served as	upper barrier.				

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Ct	0+	29-33	31.3	nr	6	2	na	9	5	13	0.202	25.7	na
Ct	>1+	83-100	91.5	nr	2	0	na	2	2	2	0.045	5.7	na
Char fry	0+												
D Varden	>=1+												
LN dace	>=1+												
LN sucker	0+												
LN sucker	0+			L									
TOTAL								11			0.246	31.4	na

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	1.4	2.1	LOD	30	POOL	30	20
5	1.3	2.4	COBBLE	10	RIFFLE	50	8
10	1.0	1.2	IN VEG		RUN	20	
15	1.4	3.0	OVER VEG	15	OTHER		
20			CUTBANK	15			
25			DEEP POOL	30			
30					D90	11	
35			TOTAL	50	D50	nr	
40					(cm)		
	1.3	2.2					
REA	44.6	MARGIN (M)	35.0				

HABITAT COMMENTS:	Small stable creek with a lot LOD and brush cover. Some potential spawning.
	Culvert (0.4 m) - 10 m long; no drop at outlet. May be passable by adults.
	Triton caught CT above the culvert.
	Suspect creek mismapped u/s and this is the main Helps Creek channel.

SITE: H11	REACH:	2	DATE:	Aug-07 PI	ното:	B1/5	. 6
SITE LOCATION:	Tributary HP4 at Hydro li	ne crossing.					
	ACCESS:	ATV					
			EFFORT:	PASS 1		350	
			(sec)	PASS 2	Г	па	
			1	PASS 3	Γ	na	
MARGIN = 1 FULL=2	2						
				TEMP (C):		11.0	
S = SIDE / M = MAIN:	M	SLOPE (%):	15	TIME:		14:00	
				COND.(uS):		110.0	
SAMPLING COMMENT	S: 1 pass with a l	ower net.					
	Sampled direc	tly below road culvert.					

		FL	FL	MEAN		PASS		EST.	95%	C.I.			BIO-
SPECIES	AGE	RANGE	MEAN	WT (g)	1	2	3	NUMB	LCI	UCI	N/M*M	N/100M	MASS (g/m*m)
Ct	0+												
Ct Char fry	>1+ 0+						N	О САТСН	i .				
D Varden LN dace	>=1+ >=1+												
LN sucker	0+												
TOTAL													

	WET	CHAN		SITE		SITE	DEPTH
DIST	WIDTH	WIDTH		COVER		WATER	(cm)
(m)	(m)	(m)		(%)		TYPE (%)	
0	0.4	0.7	100		D 00*		
0	0.4	0.7	LOD	30	POOL	15	23
5	0.7	0.8	COBBLE	5	RIFFLE	80	9
10	0.5	0.8	IN VEG		RUN	5	
15	0.4	1.2	OVER VEG	10	OTHER		
20	0.5	0.7	CUTBANK	15			
25	0.3	1.5	DEEP POOL	40			
30					D90	37	1
35			TOTAL	30	D50	nr	
40					(cm)		
	0.5	1.0					
AREA	18.7	MARGIN (M)	40.0				

11 11 - 11 - 11 - 11	
HABITAT COMMENTS:	Not suitable fish habitat. Series of steep 0.8 m high drops over debris/rock.
	Culvert (0.7 m) - 8% slope - 30 m long - 0.8 m high drop at outlet. 5 m high
	road fill over small cuivert.
	Very brushy, confined, single channel.

Appendix 7 Table 1. Summary of juvenile fish densities at Goathorn Creek sites for 1983-97.

SITE	YEAR	SPECIES	AGE	N	95%	C.I.	N/100m	N/100m*m
					LCI	UCI		
G1	1983	SST	0+	321	271	371	494.0	49.3
			1+	53	48	58	82.0	8.1
			>1+	18	12	24	28.0	2.8
		CHAR	0+	1	1	na	2.0	0.2
		CHAR	>=1+	5	4	10	8.0	0.8
		MW	>=1+	1	1	na	2.0	0.2
	1984	SST	0+	282	223	341	455.0	38.9
			1+	77	64	90	124.0	10.6
			>1+	15	10	27	24.0	2.1
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	4	3	9	6.0	0.6
		MW	>=1+	1	- 1	na	2.0	0.1
	1985	SST	0+	251	197	305	386.0	42.4
			1+	19	18	22	29.0	3.2
			>1+			na	2.0	0.2
		CHAR	0+	0	. 0	0	0.0	0.0
		CHAR	>=1+	0	0	0	0.0	0.0
		MW	>=1+	0	0.00	0	0.0	0.0
	1997	SST	0+	162	147	196	261.9	25.0
			1+	2	2	na	3.2	0.3
			>1+	23	23	32	36.3	3.5
		CHAR FRY	0+	6	6	9	9.7	0.9
		BT	>=1+	3	3	na	4.8	0.5
		DV	>=1+	1	na	na	1.6	0.2
	•	MW	>=1+	13	14	na	21.0	2.0
G2	1983	SST	0+	106	67	142	151.0	12.7
	.,,,,,	331	1+	35	29	44	-	4.2
			>1+	22	16	34	31.0	2.6
		CHAR	0+	1		na	1.0	0.1
		CHAR	>=1+			17	+	1.7
	1984	SST	0+	64	. 13	83	91.0	9.0
	1707	331	1+	50	45	55	71.0	7.0
		<u> </u>	>1+	10	10	10	14.0	1.4
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	3	3	na	4.0	0.4
	1985	SST	0+	194	135	253		24.7
	1703	551	1+	9	7	16	13.0	1.1
			>1+	15	13	20	22.0	1.9
		CHAR	0+		1	na		0.1
		CHAR	>=1+	4	4	4	6.0	0.1
	1997	SST	0+	190	118	283	271.9	20.5
	177/	331	1+	5	5	7	7.6	0.6
			>1+	24	19	38	34.5	2.6
		CHAR FRY	0+	5	4	8	6.4	0.5
 ;		BT	>=1+	9	5	36	12.9	1.0
!		DI	/ −1+	7	<u>)</u>	סכ	1.4	0.1

Appendix 7 Table 1. Summary of juvenile fish densities at Goathorn Creek sites for 1983-97.

SITE	YEAR	SPECIES	AGE	N	95%	C.I.	N/100m	N/100m*m
					LCI	UCI		
G3	1983	SST	0+	25	18	37	56.0	5.1
			1+	17	16	18	38.0	3.5
			>1+	11	9	17	25.0	2.2
		CHAR	0+	32	19	50	72.0	6.5
		CHAR	>=1+	20	17	27	45.0	4.1
	1984	SST	0+	29	18	45	66.0	6.4
			1+	9	9	na ·	20.0	2.0
			>1+	19		27	43.0	4.2
		CHAR	0+	30	21	: 44	68.0	6.6
		CHAR	>=1+			40	70.0	6.8
	1985	SST	0+	42		66	99.0	12.1
			1+	0		0	0.0	0.0
			>1+		7		29.0	3.5
	-	CHAR	0+	24	15	40	57.0	7.0
		CHAR	>=1+	26	17	37	62.0	7.5
	1997	SST	0+	18	18	18	40.4	3.3
			1+	0	0	0	0.0	0.0
			>1+	9	9	na	20.2	1.6
		CHAR FRY	0+		20	21	44.9	3.6
		BT	>=1+	7	7	11	15.7	1.3
		DV	>=1+	2	2	na	· · · · · · · · · · · · · · · · · · ·	0.4
G4	1983	SST	0+		10	27		3.3
<u> </u>		551	1+	2	2	na	4.0	0.4
			>1+	3	3	na	6.0	0.7
		CHAR	0+	63	24	126	124.0	14.0
		CHAR	>=1+	39		46	76.0	8.6
	1984	SST	0+	5	: 3	na na	10.0	1.1
	1704	551	1+	1	1		2.0	0.2
			>1+	3	3	na	6.0	0.2
		CHAR	0+	30	18	ла 46	 	6.6
		CHAR	>=1+	33	27	42		
	1985	SST	0+	25	13		63.0 50.0	7.2
	1763	331	1+	0	0	52	rim-	6.0
			>1+	0	0	0	0.0	0.0
		CHAR	0+	77	39			0.0
		CHAR	>=1+	18	16	119 22	154.0	18.6
	1997	SST	0+				36.0	4.3
	177/	551		69	68	75	101.9	8.5
		1	1+	0	0	0	0.0	0.0
		CHARERY	>1+		9	na	13.4	1.1
		CHAR FRY	0+	55	52	69		6.7
		BT	>=1+	17	17	. 17	25.0	2.1
		DV	>=1+ :	6	6	na	8.8	0.7
		: :					: 	•
		:	-					
						· · ·	:	

Appendix 7 Table 1. Summary of juvenile fish densities at Goathorn Creek sites for 1983-97.

SITE	YEAR	SPECIES	AGE	N	95% C.I.		N/100m	N/100m*m
					LCI	UCI		
G5	1983	SST	0+	3	2	na	3.0	0.4
			1+	0	0	0	0.0	0.0
			>1+	4	4	na	4.0	0.5
		CHAR	0+	26	17	42	28.0	3.2
-		CHAR	>=1+	67	52	82	73.0	8.2
	1984	SST	0+	3	2	na	3.0	0.3
			1+	1	1	na	1.0	0.1
			>1+	1	1	na	1.0	0.1
••••		CHAR	0+	18	15	24	19.0	1.8
		CHAR	>=1+	80	60	100	85.0	8.2
	1985	SST	0+	7	5	15	8.0	0.9
			1+	0	0	0	0.0	0.0
			>1+	5	5	5	5.0	0.6
		CHAR	0+	50	37	64	54.0	6.1
		CHAR	>=1+	54	42	68	59.0	6.7
	1997	SST	0+	18	18	19	34.2	3.0
			1+	0	0	0	0.0	0.0
	i		>1+	5	5	7	9.5	0.8
	-	CHAR FRY	0+	29	28	39	55.3	4.8
		BT	>=1+	13	13	na	24.1	2.1
		DV	>=1+	8	8	11	15.2	1.3
G6	1984	SST	0+	0	0	0	0.0	0.0
			1+	1	1	na	4.0	0.5
	i	· · ·	>1+	0	0	. 0	0.0	0.0
	:	CHAR	0+	4	4	na	14.0	2.2
		CHAR	>=1+	43	40	49	151.0	23.2
G6a	1997	SST	0+	0	0	: 0	0.0	0.0
			1+	0		0	0.0	0.0
-	:		>1+	1	· 1	1	4.0	0.6
		CHAR FRY	0+	1	1 1	1	4.0	0.6
		BT	>=1+	5	4	8	18.0	2.7
	!	DV		6	6	6	24.0	3.6
G7	1984	SST	0+	0	0	. 0	0.0	0.0
	1704	551	1+	0	0	0	0.0	0.0
			>1+	0	0	0	0.0	0.0
		CHAR	0+	0	0	0	0.0	0.0
	1	CHAR	>=1+	56	49	63	237.0	22.4
	1997	SST	0+	0	0	0	0.0	0.0
<u> </u>	177/	331	1+	0	0	0	0.0	0.0
	!	 	>1+	0	: 0	0	0.0	0.0
		CHAR FRY	0+	20	20	na	72.5	6.9
	<u> </u>	BT	>=1+	1	1	1	3.6	0.3
	!	DV	>=1+	48	46	53	174.4	16.6
				70	: 40		174.4	10.0
. <u></u>	:					<u> </u>		

Appendix 7 Table 1. Summary of juvenile fish densities at Goathorn Creek sites for 1983-97.

SITE	YEAR	EAR SPECIES	AGE	N	95%	6 C.I.	N/100m	N/100m*m
					LCI	UCI		
G8	1997	SST	0+	0	. 0	0	0.0	0.0
			1+	0	. 0	0	0.0	0.0
			>1+	5	5	5	12.2	2.2
		CHAR FRY	0+	22	21	26	60.1	10.8
		BT	>=1+	0	0	0	0.0	0.0
		DV	>=1+	42	36	55	114.2	20.5
G9	1997	SST	0+	0	0	0	0.0	0.0
			1+	0	0	0	0.0	0.0
			>1+	0	0	0	0.0	0.0
		CHAR FRY	0+	4	3	11	17.4	3.2
		BT	>=1+	0	0	0	0.0	0.0
		DV	>=1+	25	23	30	108.4	19.8
G10	1997	SST	0+	0	0	. 0	0.0	0.0
			1+	0	0	0	0.0	0.0
			>1+	0	0	0	0.0	0.0
		CHAR FRY	0+	. 2	2	2	9.5	1.2
		BT	>=1+	2	2	2	9.5	1.2
		DV	>=1+	25	25	27	121.3	15.6

Appendix 7 Table 2. Summary of juvenile fish densities in Tenas Creek for 1983-97.

SITE	YEAR	SPECIES	AGE	N	95%	C.I.	N/100m	N/100m*m
					LCI	UCI		
T1	1983	SST	0+	478	403	553	531.0	87.7
			1+	55	46	64	61.0	10.0
			>1+	18	15	21	20.0	3.3
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	5	4	10	6.0	0.9
	1984	SST	0+	213	161	265	256.0	36.6
			1+	45	18	72	54.0	7.7
		· · · · · · · · · · · · · · · · · · ·	>1+	2	2	na	2.0	0.3
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	4	4	na	5.0	0.7
		MW	>=1+	2	2	na	2.0	0.3
	1985	SST	0+	267	207	327	318.0	50.4
			1+	10	6	14	12.0	1.9
			>1+	23	8	38	27.0	4.3
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	2	2	na	2.0	40.0
	1997	SST	0+	265	248	297	318.7	40.9
			1+	10	10	11	12.0	1.5
			>1+	39	37	55	46.9	6.0
		CHAR FRY	0+	1	1	na	1.2	0.2
		BT	>=1+	3	3	na	3.6	0.5
		DV	>=1+	0	0	0	0.0	0.0
T2	1983	SST	0+	210	173	255	245.0	52.2
	1703	551	1+	44	35	53	71.0	10.7
			>1+	27	21	33	44.0	6.6
	-	CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	6	5	12	10.0	1.5
	1984	SST	0+	18	9	39	29.0	4.4
	1704	551	1+	53	47	59	85.0	13.0
			>1+	33	22	44	53.0	8.1
	-	CHAR	0+	0	0	0	0.0	0.0
·	 	CHAR	>=1+	6	6	·	10.0	1.5
	1985	SST	0+	183	111	255	295.0	46.8
	1963	331	1+	15	13	17	24.0	3.8
			>1+	46	34	58	75.0	11.9
		CHAR	0+		<u>i</u>		2.0	0.3
		CHAR	>=1+	3.	na na	na na	5.0	0.8
	1997	SST	0+	102	101	107	151.8	24.2
	177/	331	1+	20	20	20	29.9	4.8
			>1+	10	10	11	14.9	2.4
		CHAPEDV	0+		10		1.5	0.2
		CHAR FRY		1	2	na	3.0	0.2
		BT DV	>=1+ >=1+	3	3	na	4.5	0.5
		DV)—IT	3		na	4.3	0.7
						!	!	

Appendix 7 Table 2. Summary of juvenile fish densities in Tenas Creek for 1983-97.

SITE	YEAR	SPECIES	AGE	N	95%	C.I.	N/100m	N/100m*m
					LCI	UCI		
T3	1983	SST	0+	9	. 9	9	24.0	4.6
			1+	0	0	: 0	0.0	0.0
			>1+	0	0	0 :	0.0	0.0
		CHAR	0+	30	18	72	81.0	15.3
	i	CHAR	>=1+	27	26	41	73.0	13.8
	1984	SST	0+	1	1	na	3.0	0.5
	!		1+	6	6	6	16.0	2.9
			>1+	. 0	0	0	0.0	0.0
		CHAR	0+	7	7	7	19.0	3.3
		CHAR	>=1+	22	22	22	59.0	10.5
	1985	SST	0+	2	2	2	5.0	1.2
			1+	0	0	0	0.0	0.0
			>1+	6	6	6	16.0	3.5
		CHAR	0+	14	12	19	36.0	7.8
		CHAR	>=1+	38	37	42	104.0	22.1
	1997	SST	0+	25	9	147	56.7	9.9
			1+	0				
			>1+	2	2	na	4.5	0.8
		CHAR FRY	0+	12	11	14	26.2	4.6
		BT	>=1+	0	0	0	0.0	0.0
		DV	>=1+	20	20	21	45.5	8.0
T4	1984	SST	0+					
			1+	6	6	6	24.0	4.0
			>1+	7	. 7	7	28.0	4.7
	-	CHAR	0+	12	10	20	48.0	8.0
	: .	CHAR	>=1+	11	10	14	44.0	
	1997	SST	• •				1 7.0	7.3
		331	0+	106	101	113	321.2	7.3 4.4
		331	1+	7	7	7	321.2 21.2	
							321.2	4.4
		CHAR FRY	1+	7 23 3	7	7	321.2 21.2	4.4 2.3
		CHAR FRY BT	1+ >1+ 0+ >=1+	7 23 3 0	7 23 3 0	7 24	321.2 21.2 69.8 9.1 0.0	4.4 2.3 7.5 1.0 0.0
		CHAR FRY	1+ >1+ 0+	7 23 3 0	7 23 3	7 24 10	321.2 21.2 69.8 9.1	4.4 2.3 7.5 1.0
T5	1997	CHAR FRY BT	1+ >1+ 0+ >=1+	7 23 3 0	7 23 3 0	7 24 10 0	321.2 21.2 69.8 9.1 0.0 6.1	4.4 2.3 7.5 1.0 0.0
T5	1997	CHAR FRY BT DV	1+ >1+ 0+ >=1+ >=1+	7 23 3 0 2	7 23 3 0	7 24 10 0 na	321.2 21.2 69.8 9.1 0.0 6.1	4.4 2.3 7.5 1.0 0.0 0.6 0.0
T5	1997	CHAR FRY BT DV	1+ >1+ 0+ >=1+ >=1+ 0+	7 23 3 0 2	7 23 3 0 2	7 24 10 0 na 0	321.2 21.2 69.8 9.1 0.0 6.1	4.4 2.3 7.5 1.0 0.0 0.6 0.0
T5	1997	CHAR FRY BT DV	1+ >1+ 0+ >=1+ >=1+ 0+ 1+	7 23 3 0 2 0	7 23 3 0 2 0	7 24 10 0 na 0 0	321.2 21.2 69.8 9.1 0.0 6.1 0.0	4.4 2.3 7.5 1.0 0.0 0.6 0.0 0.0
T5	1997	CHAR FRY BT DV SST	1+ >1+ 0+ >=1+ >=1+ 0+ 1+ >1+	7 23 3 0 2 0 0 0	7 23 3 0 2 0 0	7 24 10 0 na 0 0 0 0 0	321.2 21.2 69.8 9.1 0.0 6.1 0.0 0.0	4.4 2.3 7.5 1.0 0.0 0.6 0.0 0.0 0.0
T5	1997	CHAR FRY BT DV SST	1+ >1+ 0+ >=1+ >=1+ 0+ 1+ 0+ 1+ >1+ 0+	7 23 3 0 2 0 0 0	7 23 3 0 2 0 0 0	7 24 10 0 na 0 0 0 0 36	321.2 21.2 69.8 9.1 0.0 6.1 0.0 0.0 27.3	4.4 2.3 7.5 1.0 0.0 0.6 0.0 0.0 0.0 0.0 6.7
T5	1997	CHAR FRY BT DV SST CHAR FRY BT	1+ >1+ 0+ >=1+ >=1+ 0+ 1+ >1+ 0+ 1+ >1+ >++ 0+ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ +	7 23 3 0 2 0 0 0 9	7 23 3 0 2 0 0 0 0 5	7 24 10 0 na 0 0 0 0 36 1	321.2 21.2 69.8 9.1 0.0 6.1 0.0 0.0 27.3 3.0	4.4 2.3 7.5 1.0 0.0 0.6 0.0 0.0 0.0 0.0 6.7 7.0
		CHAR FRY BT DV SST CHAR FRY BT DV	1+ >1+ 0+ >=1+ 0+ 1+ 0+ 1+ >1+ >+ 0+ 1+ >+ + + + + + + + + + + + + + + + +	7 23 3 0 2 0 0 0 0 9	7 23 3 0 2 0 0 0 0 5 1 2	7 24 10 0 na 0 0 0 36 1 2	321.2 21.2 69.8 9.1 0.0 6.1 0.0 0.0 27.3 3.0 6.1	4.4 2.3 7.5 1.0 0.0 0.6 0.0 0.0 0.0 6.7 7.0
		CHAR FRY BT DV SST CHAR FRY BT DV	1+ >1+ 0+ >=1+ 0+ 1+ >+ 1+ 0+ 1+ >+ 1+ 0+ >+ 0+ >+ 0+ >+ 0+ >+ 0+ >+ 0+ >+ 0+	7 23 3 0 2 0 0 0 9 1 2 8	7 23 3 0 2 0 0 0 5 1 2	7 24 10 0 na 0 0 0 36 1 2 14	321.2 21.2 69.8 9.1 0.0 6.1 0.0 0.0 27.3 3.0 6.1 34.7	4.4 2.3 7.5 1.0 0.0 0.6 0.0 0.0 0.0 6.7 7.0 1.5 7.8
		CHAR FRY BT DV SST CHAR FRY BT DV	1+ >1+ 0+ >=1+ >=1+ 0+ 1+ >+ 1+ 0+ >+ >+ 0+ + >+ 0+ + >+ + + + + + + +	7 23 3 0 2 0 0 0 9 1 2 8 2	7 23 3 0 2 0 0 0 5 1 2	7 24 10 0 na 0 0 0 36 1 2 14 2	321.2 21.2 69.8 9.1 0.0 6.1 0.0 0.0 27.3 3.0 6.1 34.7 8.3	4.4 2.3 7.5 1.0 0.0 0.6 0.0 0.0 0.0 6.7 7.0 1.5 7.8 1.9
		CHAR FRY BT DV SST CHAR FRY BT DV SST	1+ >1+ 0+ >=1+ 0+ 1+ 0+ 1+ >1+ 0+ 1+ 0+ >=1+ 0+ >=1+ >=1+ 0+ 1+ >1+	7 23 3 0 2 0 0 0 9 1 2 8 2 4	7 23 3 0 2 0 0 0 5 1 2 7 2	7 24 10 0 na 0 0 36 1 2 14 2 11	321.2 21.2 69.8 9.1 0.0 6.1 0.0 0.0 27.3 3.0 6.1 34.7 8.3 16.7	4.4 2.3 7.5 1.0 0.0 0.6 0.0 0.0 0.0 6.7 7.0 1.5 7.8 1.9 3.8

Appendix 7 Table 3. Summary of juvenile fish densities in the Telkwa River for 1983-97.

SITE	YEAR	SPECIES	AGE	E N	95%	C.I.	N/100m	N/100m*m
					LCI	UCI		
SC1	1983	SST	0+	215	180	250	307.0	33.0
			1+	27	15	51	39.0	4.1
			>1+	11	8	20	16.0	1.7
		CHAR	0+	2	2	na	3.0	0.3
		CHAR	>=1+	0	0	0	0.0	0.0
		СО	0+	2	2	na	3.0	0.3
		СН	0+	1	1	. na ·	1.0	0.2
		MW.	0+	41	33	52	59.0	6.3
		MW	>=1+	1	1	na	1.0	. 0.2
	1984	SST	0+	70	45	95	90.0	12.7
			1+	84	62	106	108.0	15.2
			>1+	9	6	19	12.0	1.6
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	0	0	0	0.0	0.0
		СО	0+	1	1	na	1.0	0.2
		СН	0+	9	5	na	12.0	1.6
		LND	0+	1	1	na	12.0	0.2
		MW	0+	27	19	40	35.0	4.9
		MW	>=1+	1	1	na	12.0	0.2
	1985	SST	0+	80	51	109	105.0	15.3
			1+	9	9	10	12.0	1.7
	i		>1+	4	4	6	6.0	0.8
	•	CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	0	0	0	0.0	0.0
		CO	0+	18	15	24	23.0	3.4
		СО	1+	1	1	na	1.0	0.2
		MW	0+	9	6	13	12.0	1.7
	i :	MW	>=1+	0	0	0	0.0	0.0
	1997	SST	0+	47	40	59	61.5	14.3
			1+	13	13	14	17.2	4.0
			>1+	3	3	3	3.9	0.9
		BT	>=1+	0	0	0	0.0	0.0
		DV	>=1+	. 1	1	1	1.3	0.3
		СО	0+	102	101	105	134.5	31.3
		СО	1+	23	23	24	30.3	7.1
	:	MW	0+	37	35	43	49.1	11.4
SC2	1983	SST	0+	88	29	173	342.0	20.3
			1+	15	12	22	58.0	3.5
			>1+	12	9	15	47.0	2.8
	!	CHAR	>=1+	1	1	na	4.0	0.2
		СО	0+	2	2	na	8.0	0.5
		СО	1+	0	0	0	0.0	0.0
		MW	0+	49	13	na	191.0	11.3
•								
	4	!						!

Appendix 7 Table 3. Summary of juvenile fish densities in the Telkwa River for 1983-97.

SITE	YEAR	SPECIES	AGE	N	95%	C.I.	N/100m	N/100m*
					LCI	UCI		
	1984	SST	0+	36	17	71	73.0	4.8
	i	i	1+	59	44	75	120.0	7.9
			>1+	21	19	26	43.0	2.8
		CHAR	>=1+	0	0	0	0.0	0.0
		СО	0+	7	5	15	14.0	0.9
		СН	0+	2	2	na	4.0	0.3
		MW	0+	7	7	na ·	14.0	0.9
	1985	SST.	0+	108	70	146	271.0	17.2
			1+	7	7	7	18.0	1.1
			>1+	16	13	22	39.0	2.5
	!	CHAR	>=1+	0	0	0	0.0	0.0
		СО	0+	1	1	na	3.0	0.2
		СО	1+	1	1	na	3.0	0.2
	-	LNS	1+	1	1	na	3.0	0.2
	1	MW	0+	1	1	na	3.0	0.2
	1997	SST	0+	203	199	211	376.3	73.2
			1+	2	2	na	3.7	0.7
	:		>1+	0	0	0	0.0	0.0
	:	BT	>=1+	1	1	na	1.9	0.4
		DV	>=1+	0	0	0	0.0	0.0
		СО	0+	73	29	na	135.4	26.3
	ļ	CO	1+	11	11	16	20.4	4.0
	!	LND	0+	6	6	na	11.1	2.2
		MW	0+	32	31	39	58.7	11.4
SC3	1983	SST	0+	20	19	28	80.0	43.5
	1703		1+	0	0	0	0.0	0.0
	;		>1+	0	0	0	0.0	0.0
		CHAR	0+	0	0	0	0.0	0.0
	:	CHAR	>=1+	0	0	0	0.0	0.0
	-	CO	0+	12	11	14	48.0	26.1
		MW	0+	4	3		16.0	
	1984	SST	0+	17	15	na 24	68.0	52.3
	1707	331	1+	0	0	0		
	<u> </u>		>1+	0	0	0	0.0	0.0
		CHAR	0+	0	0		0.0	
	1	CHAR	>=1+	0	0	0	0.0	0.0
	:	CHAR	>=1+ <=1+				0.0	0.0
				60	58	63	240.0	184.6
	1007	MW	>=1+	177	0	0	0.0	0.0
	1997	SST	0+	177	172	184	708.5	67.2
			1+	14	14	16	57.6	5.5
	!	OTTA P TO T	>1+	6	6	8	25.0	2.4
	<u> </u>	CHAR FRY	0+	1	1	1	4.0	0.4
	!	BT	>=1+	2	2	2	8.0	0.8
-		DV	>=1+	1	1	1	4.0	0.4
	i	CO	0+	0	0	· · · · · · · · · · · · · · · · · · ·	0.0	0.0
		MW	0+	4	4	4	16.0	1.5

Appendix 7 Table 3. Summary of juvenile fish densities in the Telkwa River for 1983-97.

SC4 1997 SST 0+ 54 53 61 164.8 28.8	SITE	YEAR	SPECIES	AGE	N	95%	C.I.	N/100m	N/100m*n
1+ 12 12 14 36.4 6.4						LCI	UCI		
STATE 16	SC4	1997	SST	0+	54	53	61	164.8	28.8
CHAR FRY				1+	12	12	14	36.4	6.4
BT >=1+ 5 5 na 15.2 2.7				>1+	16	16	16	48.5	8.5
DV >=1+ 2 2 ma 6.1 1.1			CHAR FRY	0+	0	<u> </u>	0	0.0	0.0
CO			BT	>=1+	5	5	na	15.2	2.7
CO >=1+			DV	>=1+	2	2	na	6.1	1.1
MS1 1983 SST 0+ 38 33 43 262.0 45.5			СО	0+	5	5	7	15.2	2.7
MS1 1983 SST 0+ 38 33 43 262.0 45.5			СО	>=1+	1	1	na	3.0	0.5
1+ 9 9 9 9 62.0 10.8			MW	0+	0	0	0	0.0	0.0
CHAR	MS1	1983	SST	0+	38	33	43	262.0	45.5
CHAR 0+ 0 0 0.0				1+	9	9	9	62.0	10.8
CHAR				>1+	3	3	3	21.0	3.6
CO 0+ 0 0 0 0 0.0 0.0 CO 1+ 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0.0 0.0 1984 SST 0+ 11 8 14 58.0 12.3 1+ 15 11 19 79.0 16.8 >1+ 8 7 9 42.0 9.0 CHAR 0+ 0 0 0 0 0.0 0.0 CHAR >=1+ 0 0 0 0 0.0 CO 0+ 0 0 0 0.0 0.0 CO 1+ 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0.0 0.0 CO 1+ 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0.0 0.0 1985 SST 0+ 50 39 68 248.0 5.9 1+ 7 7 7 35.0 8.3 >1+ 5 4 8 23.0 5.4 CHAR 0+ 0 0 0 0 0.0 0.0 CHAR >=1+ 0 0 0 0 0.0 CHAR >=1+ 1 1 1 5.0 1.2 CO 1+ 0 0 0 0 0.0 0.0 CHAR >=1+ 1 0 0 0 0 0.0 CHAR >=1+ 1 1 1 1 8.8 1.2 CHAR PO 0 0 0 0 0.0 0.0 CHAR SST 0+ 1 1 1 1 8.8 1.2 CHAR PO 0 0 0 0 0.0 0.0 CO 0+ 1 1 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0 0 0.0 0.0 CO 0+ 1 1 1 1 1 8.8 1.2 CHAR PO 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0 0.0 CO 0+ 0 0 0 0 0 0.0 CO 0+ 0 0 0 0 0.0 CO 0+ 0 0 0 0 0.0 CO 0+ 0 0 0 0 0.0 CO 0+ 0 0 0 0 0.0 CO 0+ 0 0 0 0 0.0 CO 0+ 0 0 0 0 0.0 CO 0+ 0 0 0 0 0.0 CO 0+ 0 0 0 0 0.0			CHAR	0+	0	0	0	0.0	0.0
CO			CHAR	>=1+	0	0	0	0.0	0.0
MW			CO	0+	0	0	0	0.0	0.0
1984 SST 0+ 11 8 14 58.0 12.3			СО	1+	0	0	0	0.0	0.0
1+ 15 11 19 79.0 16.8			MW	0+	0	0	0	0.0	0.0
CHAR		1984	SST	0+	11	8	14	58.0	12.3
CHAR				1+	15	11	19	79.0	16.8
CHAR >=1+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 CO 1+ 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0.0 0.0 1985 SST 0+ 50 39 68 248.0 5.9 1+ 7 7 7 7 35.0 8.3 >1+ 5 4 8 23.0 5.4 CHAR 0+ 0 0 0 0 0.0 0.0 CHAR >=1+ 0 0 0 0 0.0 CHAR >=1+ 0 0 0 0 0.0 CHAR >=1+ 0 0 0 0 0.0 CHAR >=1+ 0 0 0 0 0.0 CO 0+ 1 1 1 1 1 5.0 1.2 CO 1+ 0 0 0 0 0.0 MW 0+ 0 0 0 0 0.0 MW 0+ 0 0 0 0 0.0 1997 SST 0+ 32 30 37 280.7 39.7 1+ 5 5 7 46.8 6.6 >1+ 1 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0 0 0.0 BT >=1+ 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0 0 0.0 CO 0+ 0 0 0 0.0 BT >=1+ 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0 0 0.0 CO 0+ 0 0 0 0.0 CO 0+ 0 0 0 0.0 CO 0+ 0 0 0 0.0 DO 0.0 CO 0+ 0 0 0 0 0.0 DO 0.				>1+	8	7	9	42.0	9.0
CO 0+ 0 0 0 0 0.0 0.0 CO 1+ 0 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0.0 0.0 1985 SST 0+ 50 39 68 248.0 5.9 1+ 7 7 7 35.0 8.3			CHAR	0+	0	0	0	0.0	0.0
CO 1+ 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0.0 0.0 1985 SST 0+ 50 39 68 248.0 5.9 1+ 7 7 7 7 35.0 8.3 >1+ 5 4 8 23.0 5.4 CHAR 0+ 0 0 0 0 0.0 0.0 CHAR >=1+ 0 0 0 0 0.0 CO 0+ 1 1 1 1 5.0 1.2 CO 1+ 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0.0 0.0 1997 SST 0+ 32 30 37 280.7 39.7 1+ 5 5 7 46.8 6.6 >1+ 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0 0 0.0 0.0 BT >=1+ 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0.0 0.0 BT >=1+ 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0.0 0.0			CHAR	>=1+	0	0	0	0.0	0.0
MW			СО	0+	0	: 0	0	0.0	0.0
1985 SST 0+ 50 39 68 248.0 5.9		i	СО	1+	0	0	0	0.0	0.0
1+ 7 7 7 7 35.0 8.3 >1+ 5 4 8 23.0 5.4 CHAR 0+ 0 0 0 0 0.0 0.0 0.0 CHAR >=1+ 0 0 0 0 0 0.0 0.0 0.0 CO 0+ 1 1 1 1 1 5.0 1.2 CO 1+ 0 0 0 0 0 0.0 0.0 0.0 MW 0+ 0 0 0 0 0 0.0 0.0 0.0 1997 SST 0+ 32 30 37 280.7 39.7 1+ 5 5 7 46.8 6.6 >1+ 1 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0 0 0 0.0 0.0 BT >=1+ 1 1 1 1 8.8 1.2 DV >=1+ 0 0 0 0 0.0 0.0 0.0 CO 0+ 0 0 0 0 0.0 0.0 0.0 MW 0+ 0 0 0 0 0 0.0 0.0 CO 0+ 0 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0 0.0 0.0 CO 1+ 0 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0 0.0 0.0 CO 1+ 0 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0 0.0 0.0 MW 0+ 0 0 0 0 0 0.0 0.0 CO 0.0 0.0 0.0 0.0 MW 0+ 0 0 0 0 0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 MW 0+ 0 0 0 0 0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0 CO 0.0 0.0 0.0	· -	1	MW	0+	0	0	0	0.0	0.0
SI		1985	SST	0+	50	39	68	248.0	5.9
CHAR 0+ 0 0 0.0 0.0 CHAR >=1+ 0 0 0.0 0.0 CO 0+ 1 1 1 5.0 1.2 CO 1+ 0 0 0 0.0 0.0 MW 0+ 0 0 0 0.0 0.0 MW 0+ 32 30 37 280.7 39.7 1+ 5 5 7 46.8 6.6 2++ 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0.0 0.0 BT >=1+ 1 1 1 8.8 1.2 DV >=1+ 0 0 0 0.0 0.0 CO 0+ 0 0 0 0.0 0.0 CO 1+ 0 0 0 0.0 0.0 MW 0+ 0<		!	!	1+	7	7	7	35.0	8.3
CHAR >=1+ 0 0 0.0 0.0 CO 0+ 1 1 1 5.0 1.2 CO 1+ 0 0 0 0.0 0.0 MW 0+ 0 0 0 0.0 0.0 1997 SST 0+ 32 30 37 280.7 39.7 1+ 5 5 7 46.8 6.6 >1+ 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0.0 0.0 BT >=1+ 1 1 1 8.8 1.2 DV >=1+ 0 0 0 0.0 0.0 CO 0+ 0 0 0.0 0.0 0.0 MW 0+ 0 0 0 0.0 0.0		:		>1+	5	4	8	23.0	5.4
CO 0+ 1 1 1 5.0 1.2 CO 1+ 0 0 0 0.0 0.0 MW 0+ 0 0 0 0.0 0.0 1997 SST 0+ 32 30 37 280.7 39.7 1+ 5 5 7 46.8 6.6 >1+ 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0.0 0.0 BT >=1+ 1 1 1 8.8 1.2 DV >=1+ 0 0 0 0.0 0.0 CO 0+ 0 0 0.0 0.0 0.0 MW 0+ 0 0 0 0.0 0.0 MW 0+ 0 0 0 0.0 0.0			CHAR	0+	0	0	0	0.0	0.0
CO 1+ 0 0 0 0.0 0.0 MW 0+ 0 0 0.0 0.0 0.0 1997 SST 0+ 32 30 37 280.7 39.7 1+ 5 5 7 46.8 6.6 >1+ 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0.0 0.0 0.0 BT >=1+ 1 1 1 8.8 1.2 DV >=1+ 0 0 0 0.0 0.0 0.0 CO 0+ 0 0 0 0.0 0.0 0.0 MW 0+ 0 0 0 0.0 0.0 0.0		! !	CHAR	>=1+	0	0	0	0.0	0.0
MW 0+ 0 0 0.0 0.0 1997 SST 0+ 32 30 37 280.7 39.7 1+ 5 5 7 46.8 6.6 >1+ 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0.0 0.0 BT >=1+ 1 1 1 8.8 1.2 DV >=1+ 0 0 0 0.0 0.0 CO 0+ 0 0 0.0 0.0 0.0 CO 1+ 0 0 0 0.0 0.0 MW 0+ 0 0 0 0.0 0.0			CO	0+	1	1	1	5.0	1.2
1997 SST 0+ 32 30 37 280.7 39.7 1			СО	1+	0	0	0	0.0	0.0
1+ 5 5 7 46.8 6.6 >1+ 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0.0 0.0 BT >=1+ 1 1 1 8.8 1.2 DV >=1+ 0 0 0 0.0 0.0 CO 0+ 0 0 0 0.0 0.0 CO 1+ 0 0 0 0.0 0.0 MW 0+ 0 0 0 0.0 0.0			MW	0+	0	0	0	0.0	0.0
>1+ 1 1 1 8.8 1.2 CHAR FRY 0+ 0 0 0.0 0.0 BT >=1+ 1 1 1 8.8 1.2 DV >=1+ 0 0 0 0.0 0.0 CO 0+ 0 0 0 0.0 0.0 CO 1+ 0 0 0 0.0 0.0 MW 0+ 0 0 0 0.0 0.0		1997	SST	0+	32	30	. 37	280.7	39.7
CHAR FRY 0+ 0 0 0.0 0.0 BT >=1+ 1 1 1 8.8 1.2 DV >=1+ 0 0 0 0.0 0.0 CO 0+ 0 0 0 0.0 0.0 CO 1+ 0 0 0 0.0 0.0 MW 0+ 0 0 0 0.0 0.0				1+	5	5	7	46.8	6.6
BT >=1+ 1 1 1 8.8 1.2 DV >=1+ 0 0 0 0.0 0.0 CO 0+ 0 0 0 0.0 0.0 CO 1+ 0 0 0 0.0 0.0 MW 0+ 0 0 0.0 0.0 0.0		1			1			8.8	
DV >=1+ 0 0 0 0.0 0.0 CO 0+ 0 0 0 0.0 0.0 CO 1+ 0 0 0 0.0 0.0 MW 0+ 0 0 0.0 0.0 0.0			CHAR FRY	0+	0	0	0		
CO 0+ 0 0 0 0.0 0.0 CO 1+ 0 0 0 0.0 0.0 MW 0+ 0 0 0 0.0 0.0			BT	>=1+	1				
CO 1+ 0 0 0 0.0 0.0 MW 0+ 0 0 0 0.0 0.0			DV	>=1+	0	0	0	0.0	
MW 0+ 0 0 0 0.0 0.0			СО	0+	0	0	<u> </u>	<u> </u>	
				 					
			MW	0+	0	0	0	0.0	0.0
			1						_
			1	:					•
									1

SITE	YEAR	SPECIES	AGE	N	95%	C.I.	N/100m	N/100m*n
			**		LCI	UCI		
MS2	1983	SST	0+	39	38	40	197.0	37.2
			1+	3	3	3	15.0	2.9
			>1+	2	2	2	10.0	1.9
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	0	0	0	0.0	0.0
		CO	0+	2	2	2	10.0	1.9
		CO	1+	0	0	0	0.0	0.0
	:	MW	0+	1	1	1	5.0	1.0
	1984	SST	0+	14	12	19	65.0	13.7
			1+	5	5	7	23.0	4.9
			>1+	3	3	na	14.0	2.9
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	0	0	0	0.0	0.0
		СО	0+	2	2	na	9.0	2.0
	: :	СО	1+	0	0	0	0.0	0.0
		MW	0+	1	1	na	5.0	1.0
	1985	SST	0+	37	36	38	149.0	37.3
			1+	5	5	5	20.0	5.0
	! !	<u> </u>	>1+	1	1	1	4.0	1.0
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	1	1	1	4.0	1.0
		СО	0+	8	8	8	32.0	8.0
		СО	1+	3	3	3	12.0	3.0
-		MW	0+	0	0.00	0	0.0	0.0
	1997	SST	0+	28	28	29	278.9	29.4
	<u> </u>		1+	2	2	2	19.8	2.1
			>1+	0	0	0	0.0	0.0
~_		CHAR FRY	0+	0	0	0	0.0	0.0
	:	BT	>=1+	0	0	0	0.0	0.0
		DV	>=1+	0	0	0	0.0	0.0
		СО	0+	0	0	0	0.0	0.0
	 	СО	1+	0	0	0	0.0	0.0
		CH	0+	1	1	1		1.0
MS3	1983	SST	0+	26	: 26	27	234.0	31.7
			1+	5	5	7	45.0	6.1
	:		>1+	1	1	i	0.9	1.2
	•	CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	0	. 0	0	0.0	0.0
	:	CO	0+	0	0	0	0.0	0.0
		MW	>=1+	1	1	<u> </u>	9.0	1.2
· · · · · · · · · · · · · · · · · · ·	1984	SST	0+	16	16	37	100.0	15.4
		331	1+	12	12	, 13	75.0	11.5
		1	>1+	3	3	3	19.0	2.9
	!	CHAR	0+	0	0	0	0.0	0.0
	:	CHAR	>=1+	0	0	0	0.0	0.0
	<u>:</u>	 			:	1	6.0	1.0
		CO	0+	, 1	1			

Appendix 7 Table 3. Summary of juvenile fish densities in the Telkwa River for 1983-97.

SITE	YEAR	SPECIES	AGE	N	95% C.I.		N/100m	N/100m*n
					LCI	UCI		
	1985	SST	0+	39	36	46	218.0	30.2
			1+	11	11	. 11	61.0	8.5
			>1+	8	8	8	44.0	6.2
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	1	1	1	6.0	0.8
		CO	0+	0	0	0	0.0	0.0
		MW	0+	0	0	0	0.0	0.0
	1997	SST	0+	39	36	46	502.6	35.6
			1+	.8	8	na	102.6	7.3
			>1+	1	1	1	12.8	0.9
		CHAR FRY	0+	1	1	1	12.8	0.9
		BT	>=1+	0	0	0	0.0	0.0
		DV	>=1+	0	0	0	0.0	0.0
		co	0+	0	0	0	0.0	0.0
		MW	0+	0	0	0	0.0	0.0
MS4	1983	SST	0+	12	11	. 14	65.0	18.5
			1+	0	0	0	0.0	0.0
			>1+	0	0	0	0.0	0.0
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	0	0	0	0.0	0.0
		CO	0+	0	0	0	. 1	0.0
		CO	1+	0	0	0	0.0	0.0
		MW	0+	2	<u> </u>	2	11.0	3.1
	1984	SST	0+	0		0	0.0	0.0
	1701	331	1+	5	5	5		6.2
			>1+	0	0	0	0.0	0.0
	!	CHAR	0+	0	0	0	0.0	0.0
	<u>:</u>	CHAR	>=1+	0	0	0		0.0
		CO	0+	0	_	0	0.0	0.0
	:	co	1+	0	0	0		0.0
	<u>. </u>	MW	0+	1	1	na	6.0	1.2
	1005	SST	0+	7	7	7	35.0	7.4
	1985	551			, 0	0	0.0	0.0
	:		1+ >1+	0	. 0	0	0.0	0.0
		CITAD			1	1	5.0	1.1
	:	CHAR	0+	1	- -	0	0.0	0.0
•		CHAR	>=1+	0	, 0	0		0.0
		CO	0+	0 .	0		0.0	0.0
		CO	1+	0		0	0.0	0.0
		MW	>=1+	0	0	: 0	0.0	0.0
	:						-	1
						<u> </u>		
	:					1		
	<u>:</u>	!						1
					<u>:</u>	· 	<u> </u>	
		1						

SITE	YEAR	SPECIES	AGE	N	95%	C.I.	N/100m	N/100m*m	
					LCI	UCI			
	1997	SST	0+	30	. 26	40	290.7	25.3	
	1		1+	8	8	8	77.3	6.7	
			>1+	1	1	1	9.7	0.8	
		СН	0+	3	3	3	29.0	2.5	
		BT	>=1+	1	1	1	9.7	0.8	
		DV	>=1+	0	0	0	0.0	0.0	
		СО	0+	1	1	1	9.7	0.8	
		co	1+	2	2	2	19.3	1.7	
		MW	0+	1	1	1	9.7	0.8	
MS5	1983	SST	0+	36	30	42	150.0	23.8	
			1+	0	0	0	0.0	0.0	
			>1+	0	0	0	0.0	0.0	
		CHAR	0+	0	0	0	0.0	0.0	
		CHAR	>=1+	0	0	0	0.0	0.0	
		СО	0+	15	15	32	62.0	9.9	
		СО	1+	1	1	na	4.0	0.7	
		MW	0+	7	4	na	29.0	4.6	
		MW	>=1+	1	1	na	4.0	0.7	
	1984	SST	0+	38	25	60	169.0	32.5	
			1+	0	0	0	0.0	0.0	
			>1+	0	0	0	0.0	0.0	
		CHAR	0+	0	0	0	0.0	0.0	
		CHAR	>=1+		0	0	0.0	0.0	
		CO	0+	0	0	0	0.0	0.0	
	<u> </u>	co	1+	0		0	0.0	0.0	
		MW	>=1+	0	0	0	0.0	0.0	
	1985	SST	0+	64	57	75	354.0	72.3	
		331	1+	1	1	1	6.0	1.1	
			>1+	2	2	2	11.0	2.3	
		CHAR	0+	0	0	0	0.0	0.0	
	<u> </u>	CHAR	>=1+	1	1	na	6.0	1.1	
-	:	CO	0+	15	15	17	85.0	17.4	
-		CO	1+	4	4	4	22.0	4.5	
		MW	0+	1	1.00	1	6.0	1.1	
	1997	SST	0+	68	67	; 70	205.8	30.0	
	1997	331		-	:			0.4	
			1+ >1+	1	1	1		0.4	
	*	CHAREDA	>1+ 0+	1.	1	0	3.0	- 	
		CHAR FRY		0	0		0.0	0.0	
		BT	>=1+	1	1	1	3.0	0.4	
-	:	DV	>=1+	0	0	0	0.0	0.0	
		CO	0+	0	0	. 0	0.0	0.0	
		CO	1+	0	0	0	0.0	0.0	
		MW	0+	2	2	na	6.1	0.9	
****	,		•		<u>.</u>	!		:	
		<u> </u>	•		-			:	
	i contract of the contract of				1	i			

Appendix 7 Table 3. Summary of juvenile fish densities in the Telkwa River for 1983-97.

SITE	YEAR	SPECIES	AGE	N		95% C.I.		35.2 4.4 2.2 0.0 0.0 0.0 0.0 0.0 22.9 6.3 1.6 0.0 0.0
	-				LCI	UCI		
MS6	1983	SST	0+	32	31	35	246.0	35.2
			1+	4	.4	na	31.0	4.4
			>1+	2	2	2	15.0	2.2
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	0	0	0	0.0	0.0
		СО	0+	0	. 0	0	0.0	0.0
		СО	1+	0	0	0	0.0	0.0
		MW.	>=1+	0	0	0	0.0	0.0
	1984	SST	0+	29	29	59	165.0	22.9
	-		1+	8	6	18	45.0	6.3
			>1+	2	2	na	11.0	1.6
		CHAR	0+	0	0		0.0	
		CHAR	>=1+	0	0		0.0	
		СО	0+	0	0	0	0.0	0.0
		CO	1+	0	0	·	0.0	0.0
		MW	0+		4	na	23.0	3.2
	1985	SST	0+	32	31	35		30.3
	1700	- 551	1+	7	7	7	37.0	6.6
. —			>1+	<u>-</u>		1	5.0	0.9
		CHAR	0+	0	0		0.0	0.0
		CHAR	>=1+	0	0	0	0.0	0.0
	1	CO	0+	1	1	1	5.0	0.9
	-	co	1+	0	0	0	0.0	0.0
	· · · · · · · · · · · · · · · · · · ·	MW	0+	36	29.00	52	191.0	34.2
	1997	SST	0+	35	32	41	420.9	31.6
	1777	551	1+	2	2	2	24.2	1.8
		 	>1+	2	2	2	24.2	1.8
		CHAR FRY	0+	1		1	12.1	0.9
	1	BT	>=1+	0	0	0	0.0	0.0
		DV	>=1+		0	0	0.0	0.0
		CO	0+	0 .	0	0	0.0	0.0
		CO	1+	0	0	0	0.0	0.0
		MW	>=1+		0	0	0.0	0.0
MS7	1983	SST	0+	32	28	40	213.0	30.9
14107	1703	+ 551	1+	12	11	14	80.0	11.6
	<u>:</u>	!	>1+	8	7	14	53.0	7.7
		CHAR	0+	0	0	0	0.0	0.0
	1	CHAR	>=1+	4	3	na	27.0	3.9
		CO	0+	0	0	0	0.0	0.0
		co	1+	0	0	0	0.0	0.0
		MW	>=1+	<u></u>		na	7.0	1.0
		112.14		<u> </u>				
			1 d d d d d d d d d d d d d d d d d d d	_		·		
		i				1		

Appendix 7 Table 3. Summary of juvenile fish densities in the Telkwa River for 1983-97.

SITE	YEAR	SPECIES	AGE	N	95%	C.I.	N/100m	N/100m*m
					LCI	UCI		
	1984	SST	0+	24	24	24	145.0	16.9
			1+	25	-25	26	152.0	17.6
			>1+	10	9	13	61.0	7.0
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	4	4	na	24.0	2.8
		CO	0+	4	4	7	24.0	2.8
		MW	0+	1	1	na .	6.0	0.7
		MW.	>=1+	1	1	na	6.0	0.7
	1985	SST	0+	72	69	77	341.0	72.5
			1+	20	19	22	94.0	20.0
			>1+	15	15	16	72.0	15.3
		CHAR	0+	0	0	0	0.0	0.0
		CHAR	>=1+	0	. 0	0	0.0	0.0
		СО	0+	1	1	1	5.0	1.0
		СО	1+	1	1	1	5.0	1.0
		MW	0+	0	0.00	0	0.0	0.0
	1997	SST	0+	85	78	94	768.8	75.7
			1+	4	4	4	36.4	3.6
			>1+	4	4	4	36.4	3.6
		CHAR FRY	0+	1	1	1	9.1	0.9
		BT	>=1+	0	0	0	0.0	0.0
		DV	>=]+	0	0	0	0.0	0.0
		СО	0+	0	0	0	0.0	0.0
		CO	1+	0	0	0	0.0	0.0
1		MW	0+	1	1	1	9.1	0.9
MS8	1997	SST	0+	13	12	15	129.5	13.7
			1+	1	1	1	10.4	1.1
			>1+	1	1	1	10.4	1.1
	1	CHAR FRY	0+	0	0	0	0.0	0.0
		BT	>=1+	0	0	0	0.0	0.0
		DV	>=1+	0	0	0	0.0	0.0
		СО	0+	0	0	0	0.0	0.0
		СО	1+		0	0	0.0	0.0
- ;		MW	0+	2	2	na	20.7	2.2

Appendix 7 Table 4. Summary of juvenile fish densities in the Bulkley River 1984-97.

SITE	YEAR	SPECIES	AGE	N	95%	C.I.	N/100m	N/100m*m
					LCI	UCI		
B1	1984	SST	0+	5	5	na	23.0	7.5
			1+	4	4	na	19.0	6.0
·			>1+	3	3	na	14.0	4.5
		CH	0+	8	8	na	37.0	12.1
		LND	0+	0	0	0	0.0	0.0
	1997	SST	0+	38	: 36	43	382.3	36.4
			1+	3	3	3	30.0	2.9
			>1+	0	0	0	0.0	0.0
		CH	0+	48	46	53	481.3	45.8
		LND	0+	1	1	1	10.0	1.0
B2	1984	SST	0+	2	2	na	8.0	3.8
			1+	0	0	0	0.0	0.0
•			>1+	4	4	7	16.0	7.6
		СН	0+	1	1	na	4.0	1.9
		LND	0+	0	0	0	0.0	0.0
	1997	SST	0+	4	: 4	4	34.8	5.9
			1+	0	0	0	0.0	0.0
			>1+	0	0	0	0.0	0.0
		СН	0+	4	3	11	34.8	5.9
		LND	0+	0	0	0	0.0	0.0
В3	1984	SST	0+	10	. 9	13	52.0	15.2
			1+	4	4	na	21.0	6.1
			>1+	1	1	na	5.0	1.5
		СН	0+	5	5	7	26.0	7.6
		MW	0+	1	1	na	5.0	1.5
		LND	0+	0	0	0	0.0	0.0
	1997	SST	0+	10	10	11	94.2	13.7
	;		1+	1	1	1	9.3	1.3
			>1+	0	; 0	0	0.0	0.0
		CH	0+	15	14	19	140.7	20.4
	1	MW	0+	0	0	0	0.0	0.0
		LND	0+	0	0	0	0.0	0.0
B4	1984	SST	0+	. 7	, 7	na	35.0	11.3
			1+	1	1	na	5.0	1.6
			>1+	1	1	na	5.0	1.6
		СН	0+	2	2	na	10.0	3.2
		MW	0+	1	1	na	5.0	1.6
	:	LND	0+	0	0	0	0.0	0.0
	1997	SST	0+	25	: 23	: 30	237.4	33.1
			1+	6	6	6	57.1	8.0
	.		>1+	0	0	0	0.0	0.0
		СН	0+	29	26	35	272.1	38.0
	1	MW	0+	0	0	0	0.0	0.0
	+	LND	0+	0	0	0	0.0	0.0

Appendix 8 Table 1. Length by age data for steelhead and char in Goathorn Creek (Sites G1-G5).

	<u>S</u>	TEELHEA	D			<u>CHAR</u>				
Age	Year	n	%	fl (mm)	Age	Year	n	%	fl (mm)	
0+	1983	470	74.0	43.7		1983	123	45.9	50.7	
	1984	378	67.0	38.3		1984	78	34.1	47.8	
	1985	519	89.5	34.4		1985	152	59.8	47.3	
	1997	457	86.6	38.2		1997	115	65.3	51.1	
1+	1983	107	16.9	79.7	>=1+	1983	145	54.1	100.9	
	1984	138	24.5	77.7		1984	151	65.9	100	
	1985	28	4.8	71.7		1985	102	40.2	100.7	
	1997	7	1.3	78.4		1997	61	34.7	104.3	
>=2+	1983	58	9.1	144.7		1997				
	1984	48	8.5	125.5		Bull trout	43	70.5	107.2	
	1985	33	5.7	114.9		DV	18	29.5	97.6	
	1997	64	12.1	112.7						

Appendix 8 Table 2. Length by age data for steelhead and char in Tenas Creek (Sites T1-T3).

	S	TEELHEA	<u> </u>				CHAR		
Age	Year	n	%	fl (mm)	Age	Year	n	%	fl (mm)
0+	1983	701	83.0	45.1		1983	30	44.1	45.2
UT		232	62.5	38.0		1984		17.9	44.7
	1984	452	81.9	38.0		1985	15	25.9	44.3
	1985	392	82.9	38.7		1997	14	33.3	47.3
	1997	392	02.9	30.7		1997		33.3	77.5
	4000					4002	38	55.9	109.2.
1+	1983	99	11.7	83.2	>=1+	1983			109.2.
·	1984	104	28.1	78.5		1984	32	82.1	
	1985	25	4.5	70.3		1985	43	74.1	90.2
	1997	30	6.3	82.9		1997	28	66.7	103.7
						1997			
>=2+	1983	45	5.3	126.1		DV	23	82.2	101.3
	1984	35	9.4	123.2		Bull trout	5	17.8	114.8
	1985	75	13.6	111.5					
	1997	51	10.8	111.2					

Appendix 8 Table 3. Length by age data for steelhead in the lower Telkwa River.

		STEELHEA	<u>D</u>	
Age	Year	n	%	fl (mm)
0+	1983	538	82.5	45.5
U 1	1984	255	48.7	37.8
	1985	489	80.4	38.7
	1997	744	90.5	40.7
1+	1983	75	11.5	82.6
	1984	213	40.6	76.2
	1985	67	11	74.6
	1997	59	7.2	77.1
				_
>=2+	1983	39	6	132.9
	1984	56	10.7	126.6
	1985	52	8.6	107.7
	1997	19	2.3	106.8

Appendix 9 Table 1. Length-age for scales taken from juvenile steelhead in Goathorn Creek, 1997.

SLIDE#	SITE	DATE	RBT	
			FL (mm)	AGE
1	G1	22-Sep-97	105	2+
	-		. 98	2+
			133	3+
2	Adiasi is an		107	2+
			114	2+
			125	3+
3			106	2+
	-		89	1+
			137	• 3+
4		428	97	2+
			108	2+
			123	3+
5			75	1+
			143	3+
e temperatura	G2 ×	15_San_07	108	2+
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	15-Sep-97	128	3+
			127	3+
			100	2+
2				3+
			138	
			99	r
3			120	3+
		paga Maraja da Dan Bilangang Kal	105	2+
			96	2+
4			73	1+
			104	2+
			146	3+
1111-1415 N			115	2+
		president and the	93	2+
		The second secon	82	1+
6			113	2+
			113	2+
			103	2+
7			113	2+
4.	Tarati in a	mala mada sa sawa sa mining	108	2+
f 1			102	2+
8			83	1+
1	G3	23-Sep-97	122	3+
1	G4	27-Sep-97	136	3+
			129	3+
			101	2+
2,	1.1		130	3+
	-	:	120	3+
· · · · · · · · · · · · · · · · · · ·			121	3+
3			116	2+
-			122	3+
			141	3+
1	G8	24-Sep-97	116	2+
1	-	2.500	118	2+
			121	2+

SLIDE#	SITE	DATE	RBT			
			FL (mm)	AGE		
1	Tl	16-Sep-97	103	2+		
			107	2+		
			117			
2			72	1+		
			88. 54.	r		
regular j			121	3+		
3			92	1+		
			91	2+		
			98	2+		
4		9 6	125	2+		
	<u></u>		81	1+		
			108	2+		
		10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
5			118	2+		
			118	2+		
			110	2+		
6			87	l+ r		
	ļ		88	1+		
			107	2+		
7			113	2+		
			114	2+		
			93	2+		
8			104	2+		
			120	3+ r		
			88	1+		
9			114			
			100	2+		
	<u> </u>		66	0+ ??		
10			101	2+		
			95	2+		
		<u> </u>	152	3+		
11			98	2+ r		
• • • • • • • • • • • • • • • • • • • •			102	2+		
			100	2+		
12			107	2+		
12						
			83	1+ r		
13			98	2+		
13			103	2+		
			114	r		
			122	2+		
14			125	2+		
			137	3+		
			67	1+		
1	T2	20-Sep-97	122	г		
			132	3+		
			83	1+		
2			164	3+		
-			69	1+		
	·		76	1+		
1	T3	17-Sep-97	183	3+		
1	T4	19-Sep-97	118			

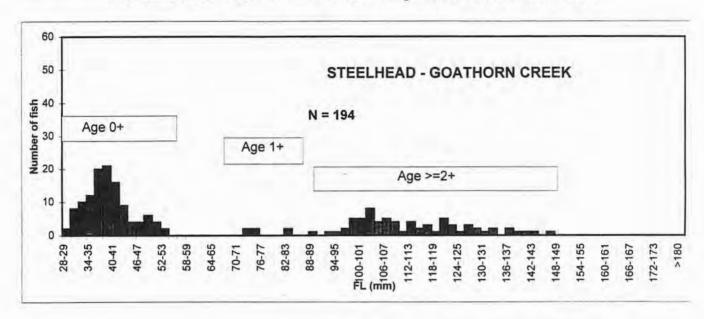
Appendix 9 Table 2. Length-age for scales taken from juvenile steelhead in Tenas Creek, 1997.

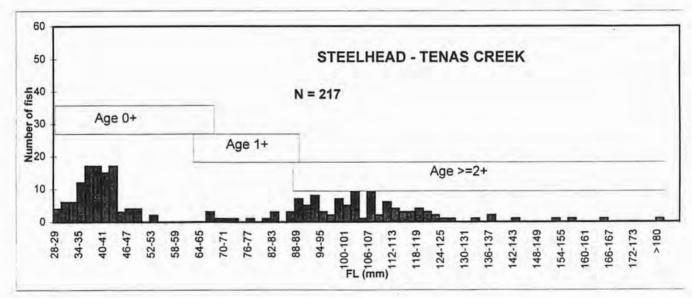
SLIDE#	SITE	DATE	RBT	· · · · · · · · · · · · · · · · · · ·
			FL (mm)	AGE
			113	
			127	2+
2			136	2+
			119	2+
			83	r
3			107	2+
· · · · · · · · · · · · · · · · · · ·			157	3+
			70	r
1	T5	18-Sep-97	89	1+

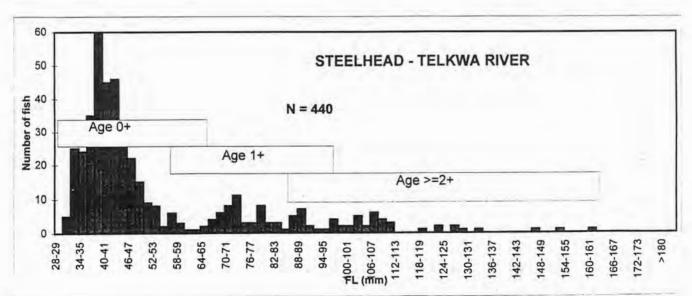
Appendix 9 Table 3. Length-age for scales taken from juvenile steelhead in the Lower Telkwa River, 1997.

SLIDE #	E# SITE DATE		RBT		
			FL (mm)	AGE	
1	SC1	30-Sep-97	111	2+	
			96	1+	
			78	1+	
2			80	1+	
	to the figure of the		69	1+	
	:		82	1+	
3			73	1+	
			88	1+	
			79	1+	
4		900 (17 h 900 (17 h	63	0+	
2			88] +·	
1.15	are dixe	and the second	160	>= 3	
5			78	1+	
			126	3+	
			78	1+	
1	SC2	01-Oct-97	72]+	
1	SC3	03-Oct-97	71	1+	
			97	2+	
			111	2+	
2			75	1+	
			107	2+	
			122	3+	
3			66	1+ r	
			81	1+	
			110	2+ r	
4			71	1+	
			63	1+	
			103	2+	
1	MS1	09-Oct-97	82	1+	
			68	1+	
			64	1+	
1	MS3	09-Oct-97	58	0+	
			91	2+	
			56	0+	
2			64	1+ r	
1	MS4	09-Oct-97	94	1+	
			82	1+	
1	MS5	03-Oct-97	108	2+	
			71	1+	
1	MS6	03-Oct-97	104	2+	
		***************************************	109	2+	
			70	1+	
1	MS7	03-Oct-97	104	2+	
			102	2+	
			127	3+	
2	.5		86	1+	
2 .:		<u> </u>	101	1+	
			78		
3				1+	
3			89	1+	

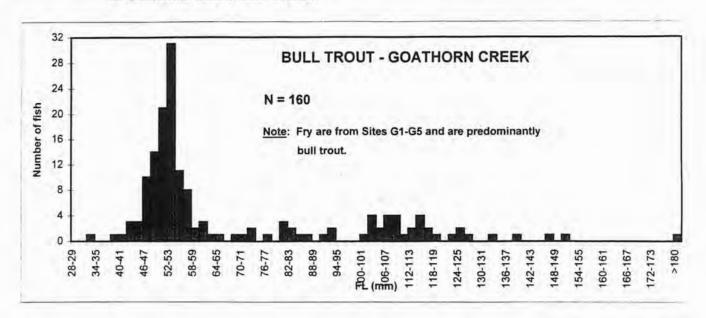
Appendix 9 Figure 1. Juvenile steelhead length-frequency distributions in Goathorn and Tenas creeks and the Telkwa River, September and October 1997.

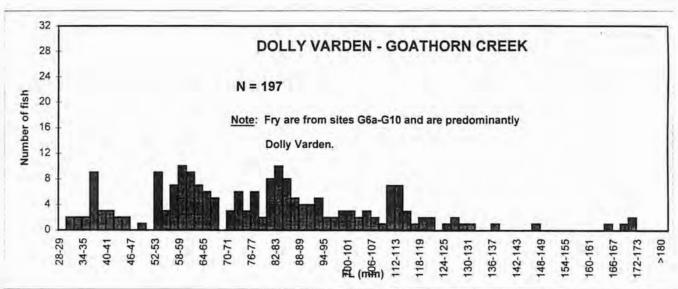


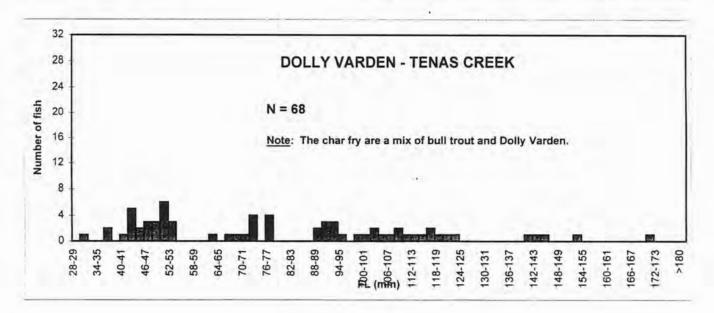




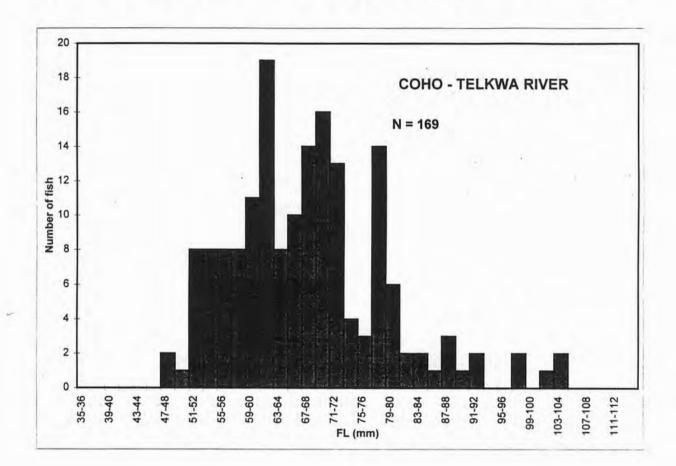
Appendix 9 Figure 2. Juvenile bull trout and Dolly Varden length-frequency distributions in Goathorn and Tenas creeks.







Appendix 9 Figure 3. Juvenile coho length-frequency distribution in the Telkwa River.



Appendix 10 Table 1. Summary of juvenile salmonid density and biomass estimates at sample sites in Goathorn Creek, 1997.

Site Fish/100m^2								
		Steelhead			· Bull trout	Dolly Varden	Total	
	0+	1+	>=2+	0+	>=1+	>=1+	_	
G1	25	0.3	3.5	0.9	0.5	0.2	30.4	
							25.3	
							10.2	
G4	8.5	0	1.1				19.1	
G5	3	. 0	0.8	ļ			12.0	
G6a	0	0	0.6	0.6	2.7	3.6	7.5	
G7	0	0	0	6.9	0.3	16.6	23.8	
G8	0	0	2.2	10.8	0	20.5	33.5	
G9	0	0	0	3.2	0	19.8	23.0	
G10	0	0	0	1.2	1.2	15.6	18.0	
F1	21.6	0	0	0	0	10.8	32.4	
F5	0	0	0	7.0	0	11.0	18.0	
							!	
Site	<u> </u>		Biomass					
			_				Total	
							95.6	
							78.9	
							54.1	
							72.6	
					-1		50.7	
G6a	0	0	8.1	nr	27.3	102.8	138.2	
							I =	
G7	0	0	0	3.5	1.2	74.9	79.6	
G8	0	0	42.5	19.4	0	21.5	83.4	
G8 G9	0	0	42.5 0	19.4 1.9	0	21.5 222.3		
G8 G9 G10	0 0 0	0	42.5	19.4	0	21.5	83.4	
G8 G9	0	0	42.5 0	19.4 1.9	0	21.5 222.3	83.4 224.2	
•	G5 G6a G7 G8 G9 G10 F1 F5 Site	O+	Steelhead 0+ 1+ G1 25 0.3 G2 20.5 0.6 G3 3.3 0 G4 8.5 0 G5 3 0 G6a 0 0 G7 0 0 G8 0 0 G9 0 0 G10 0 0 F1 21.6 0 F5 0 0 Steelhead 0+ 1+ G1 17.5 2.2 G2 10.3 3.2 G3 2.9 0 G4 5.9 0 G5 2.1 0	Steelhead 0+ 1+ >=2+ G1 25 0.3 3.5 G2 20.5 0.6 2.6 G3 3.3 0 1.6 G4 8.5 0 1.1 G5 3 0 0.8 G6a 0 0 0.6 G7 0 0 0 G8 0 0 2.2 G9 0 0 0 G10 0 0 0 F1 21.6 0 0 F5 0 0 0 Site Biomass Steelhead 0+ 1+ >=2+ G1 17.5 2.2 53.3 G2 10.3 3.2 44.7 G3 2.9 0 26.2 G4 5.9 0 23.7 G5 2.1 0 11.9	Steelhead Char 0+ 1+ >=2+ 0+ G1 25 0.3 3.5 0.9 G2 20.5 0.6 2.6 0.5 G3 3.3 0 1.6 3.6 G4 8.5 0 1.1 6.7 G5 3 0 0.8 4.8 G6a 0 0 0.6 0.6 G7 0 0 0 6.9 G8 0 0 2.2 10.8 G9 0 0 0 3.2 G10 0 0 0 3.2 F1 21.6 0 0 0 0 F5 0 0 0 7.0 0 Steelhead Char 61 17.5 2.2 53.3 1.2 G2 10.3 3.2 44.7 0.6 G3	Steelhead Char Bull trout 0+ 1+ >=2+ 0+ >=1+ G1 25 0.3 3.5 0.9 0.5 G2 20.5 0.6 2.6 0.5 1 G3 3.3 0 1.6 3.6 1.3 G4 8.5 0 1.1 6.7 2.1 G5 3 0 0.8 4.8 2.1 G6a 0 0 0.6 0.6 2.7 G7 0 0 0.6 0.6 2.7 G7 0 0 0 0.3 0	Steelhead Char Bull trout Dolly Varden 0+ 1+ >=2+ 0+ >=1+ >=1+ G1 25 0.3 3.5 0.9 0.5 0.2 G2 20.5 0.6 2.6 0.5 1 0.1 G3 3.3 0 1.6 3.6 1.3 0.4 G4 8.5 0 1.1 6.7 2.1 0.7 G5 3 0 0.8 4.8 2.1 1.3 G6a 0 0 0.6 0.6 2.7 3.6 G7 0 0 0.6 0.6 2.7 3.6 G8 0 0 2.2 10.8 0 20.5 G9 0 0 0 3.2 0 19.8 G10 0 0 0 1.2 1.2 15.6 F1 21.6 0 0 0 0 10.8 <	

Appendix 10 Table 2. Summary of juvenile salmonid density and biomass estimates at sample sites in Tenas Creek, 1997.

Reach	Site	Fish/100m^2									
			Steelhead	Char		Bull trout	Dolly Varden	Total			
		0+	1+	>=2+	0+	>=1+	>=1+				
	T1	265	10	39	1	3	0	318			
1	T2	102	20	10	1	2	3	138			
Ī	T4	106	7	23	3	0	2	141			
2	Т3	25	0	2	12	0	20	59			
3	T6	8	2	4	9	0	17	40			
East Fork -1	T5	0	0	0	9	1	2	12			

Reach	Site	Biomass grams/100m^2									
			Steelhead		Char	Bull trout	Dolly Varden	Total			
		0+	1+	>=2+	0+	>=1+	>=1+				
1	T1	28.7	10.4	93.9	0.1	7.0	0.0	140.1			
1	T2	19.4	39.1	44.6	0.3	8.5	13.7	125.6			
1	T4	20.7	11.8	133.3	1.1	0.0	2.2	169.1			
2	Т3	4.0	0.0	27.1	4.6	0.0	87.8	123.5			
3	Т6	3.1	19.2	44.8	6.8	0.0	193.7	267.6			
East Fork -1	T5	0.0	0.0	0.0	6.0	58.1	29.7	93.8			

Appendix 11 Table 1. Summary of bull trout redd and spawner obervations in Goathorn and Tenas creeks.

Stream Section	Distance	# of Spawners	Redds	Comments
	Surveyed (m)	Observed		
GOATHORN				
Lower Goathorn Creek from Telkwa River to Cabinet Creek.	10500	7	3	Most redds and bull trout spawners
			- -	observed from 8.5 to 10.5 km upstream.
		The state of the board of the state of the s		Single redd in lower system.
				7
Goathorn Creek upstream from Cabinet Creek	4400	0	0	Suspect no access beyond 435 m debris jam.
Cabinet Creek to Webster Creek	3800	7	1	Fish mainly moving upstream throughout this
				section.
Cabinet Creek upstream from Webster Creek	1400	0	0	Appears mainly DV use of this section.
				No bull trout spawning potential identified.
Webster Creek upstream from Cabinet.	6700	2	- 2	Spawning identified 3.8 to 4.2 km upstream.
		The second secon		Difficult observations due to debris.
				Suspect more spawning and holding fish may
				use this section.
Lower Four Creek	1350	0	0	Suspect no access beyond road culvert at
				150 m. Probably too small for bull trout.
TENAS CREEK				
Tenas confluence with Goathorn up to East-West Fork.	13300	7	7	6 of 7 redds and all BT spawners observed in
Tellas confluence with Goathorn up to East-West Pork.	13300			the upper 1500 m of this section.
		A BANK COMPANY OF THE PROPERTY OF		
Upper Tenas Creek - left or West Fork	2100	3	5	Fish observed to 1.2 km upstream.
Upper Tenas Creek - right or East Fork.	1300	0	0	Bull trout fry in juvenile site suggests
				spawning upstream in this stream.

Location (m)	Obs	servations		Habitat Comments		
	Fish BT Area (m*m)					
		Redds				
Survey Dates:	Sept 3- 5/97	i	1			
Survey Crew:	JH/KP & RD/GM					
Survey section:	Lower Tenas from East	st/West Fork	confluence dov	vnstream.		
0	2 DV		8	Temp = 7-12 C; TDS = 100 uS.		
25	1 BT (45 cm)	1		Potential redd site where fish obs started		
	1 21 (13 4111)	<u> </u>	•	Total rodd site where his oos. Started		
125				Large eroding cutbank at this location.		
				Large croaning catolain at any location.		
200	2 BT (pair)		24	Fish on Redd (#T3a)		
200	Z DT (pan)			risii oli Redu (#13a)		
334	DV (20om)					
334	DV (20cm)					
431	1 DT (50)			D-11 15-00 "T1		
431	1 BT (50 cm)	1		Redd - 1.5x0,9 m -#T4		
				Photo B2-8		
500	2 BT (35 & 50 cm)	<u> </u>		Redd - 1.5x0.7 - #T3		
	1 DV (17 cm)					
542		1		Redd - 1x1m - #T2		
700	1 DV		2	Start of RD/GM		
820				Gauging station - water quality site.		
880	1 DV					
		7				
970	1 BT (45 cm)			Moving u/s in riffle.		
1075				Periphyton sample site		
1115	Uid fish just u/s	1		Redd - 1.4x0.4 - #T5		
1300			3	Evidence of some digging in this area.		
1325	2 DV		2			
1430		1	4	Redd - not complete - #T6		
1620		-	8			
1020						
1760				Debris jam and clay bank on right side.		
1700				Debits jain and clay bank on right side.		
1900			4	Unstable clay bank in this section.		
1800			4	Olistavic Clay valik ili this section.		

Location (m)	Obse	rvations		Habitat Comments		
- · · · ·	Fish	BT	Area (m*m)			
		Redds				
Survey Dates:	Sept 3- 5/97	. '				
1900			13			
2200			10			
2300				Boulder and cobble bed material starts.		
			<u> </u>			
2460			6.5	Unstable bank		
2660				Unstable bank - right side.		
2500						
2780				2 m x 0.5 m high bedrock chute.		
				Not a barrier for larger fish.		
2960				Unstable bank on right side.		
2900				Olistable balk oil right side.		
3462				Large unstable bank on right side.		
3402				Large unstable bank on right side.		
3540	Fry obs.		-			
	1 1 0 0 0 1					
3600	Fry obs.			Beaver dam restriction.		
	-					
3900				Unstable clay bank - right side. Photo B2-1		
4100	Fry obs in side chan.			Mainly boulder and cobble with limited spawning.		
4165	1 DV (15 cm)			Maturing fish		
				Single channel - width 2-4 m with high banks.		
4200	Fry and juvenile obs.					
4400	1 DV spawner (15 cm)			Wider valley flat through here.		
.,				Some potential spawning in here.		
4516	1 DV (10)		-			
4516	1 DV (10 cm)					
4710				Unetable boule on wisher side		
4710				Unstable bank on right side.		
4890	1 DV (15 cm)					
1070	1 5 4 (13 0111)					
5560				Beaver pond on right side - 0.6 m beaver dam		
	-			on pond outlet. No access.		
				Po Owner: 110 appendi		
5680				Clay bank right side.		
				, ,		
6000	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			Unstable bank on right side. Photo B2-2		

Location (m)	Obse	rvations		Habitat Comments	
	Fish	BT Area (m*m)			
		Redds			
Survey Dates:	Sept 3- 5/97				
6400	More trout fry and			Some good spanwing potential in this section.	
	some juveniles.				
7296	Fry and juveniles			Unstable bank on right side. Photo B2-3	
	observed.				
7475				Large unstable bank.	
7888				Large unstable bank. Photo B2-4.	
8785	Fewer trout fry				
9636	Trout fry obs. as well				
	as 1 DV (15 cm)				
10140				Unstable silt bank.	
10506				Lower spawning potential. Steeper with some	
				boulders through this section.	
11990				Power line crossing.	
12330				Large slump on right bank.	
12406		1		Redd - 1.0x0.6 m	
12960	1 unspawned pink			Dead female - fairly fresh.	
13400				Confluence with Goathorn Creek	
TOTAL	7	7	84.5	Note - spawning area not recorded in lower	
				10 km of Tenas Creek.	

Location (m)	Obs	servations		Habitat Comments
· · · · · · · · · · · · · · · · · · ·	Fish	BT	Area (m*m)	
		Redds		
Survey Dates:	Sept 5/97			
Survey Crew:	ЈН/КР			
Survey section:	Upper Tenas - West	or left fork		
0				Channel Width - 4-5 m
				Temp = 7 C; $pH = 7.4$; $TDS = 110 \text{ uS}$
				Estimate 4 cfs
148		1	7	WT#1 - completed
	Sthd fry abundant			
471	Steelhead redd	<u> </u>		Channel excavated to main creek channel for
	and stranded fry	-		fry to exit.
588	1 DV (20 cm)			
	Sthd fry present			
618		1		WT#2 - completed (Photo A2-12)
873	1 BT spawner	1	13	WT#3 - completed; small male obs (35 cm)
				Some potential area for DV spawning.
1164		1	10	WT#4 - Redd 1.3x1.2 m
1264	2 BT spawners	1		Spawners est. 50 cm fl. (Photo A2-13&14)
		ļ		Paired and just starting to spawn.
1283	Fry obs.			Trib on left - some potential DV spawning.
				8% in lower section.
1000 1600				
1300-1600			3	Series of unstable debris jams - passable.
1600-2074	None observed		2	Channel confined with passable debris jams.
,				Angular bed material with low spawning potential.
				1 31
2074				Gradient steepens to 5% or more with little
				potential spawning habitat.
TOTAL	3	5	35	

Location (m)	Obs	ervations		Habitat Comments
	· Fish	BT Area (m*m)		
		Redds		
Survey Dates:	Sept 5/97			
Survey Crew:	KP			
Survey section:	Upper Tenas - right for	rk. Note - 0	m starts at conf	fluence of two forks.
50			-	1.3 m debris drop may be barrier at these flows.
140				Unstable bank.
600				1 m debris drop. Not a barrier.
				·
650				Small trib on right; Ch width = 2 m.
1000	Low densities of fry		14	1.2 m high debris drop.
	& two juveniles obs.			
1150	through this section			Unstable bank.
1300			1	End of survey
				Channel is dominated by steep boulder habitat
				and debris jams with a few low gradient sections.
				Small pockets of potential bull trout spawning.
				Since bull trout fry were captured at index site
				in the lower end of this reach - some spawning
				must occur in this system.
,				

Location (m)	Obs	ervations		Habitat Comments		
	Fish BT Area (m*m)					
		Redds				
Survey Dates:	September 2-4/97					
Survey Crew:	JH/GM					
Survey section:	Goathorn Creek upstre	am from Te	lkwa River to C	Cabinet Creek.		
0				Telkwa River confluence.		
				Temp = 12C @ 1600 hr; TDS = 110 uS.		
741		1		1.0x1.5 m GH#1. (Large redd - pink?)		
				·		
1132	Fry abundant		44	Road crossing		
	Parr in pools					
2782			63	Good potential spawning in this section.		
				Photo A2-1		
4822	Fry abundant		48	Seepage at base of gully with high fry densities.		
6472				Upper bridge crossing.		
6680			28			
7741			36	3 old redds (sp. unknown); possibly 1 new redd.		
8612	1BT (45-50 cm)			No redd		
8812	1BT(45 cm)			No redd		
8842	1BT (50 cm) female	1	60			
8878 & 9176				Unstable banks - 50-60 m long.		
9557		11		1.4 x 0.9 m GH#3. Completed		
				W145		
9609	1BT (50 cm)			Moving upstream.		
	1777/15 50					
9720	1BT(45-50 cm)		35	Moving upstream		
10005	op#(60.55			D 11 CTV/2 X		
10237	2BT(50-55 cm)	1		Redd GH#2. In progress under fallen spruce.		
10.400						
10492			15	Confluence of upper Goathorn and Cabinet Ck.		
			-	Temp = 10.5 C@1700 hr		
				TDS=90 uS.		
TOTAL	7 DT		220	,		
TOTAL	7 BT	3	329			

Location (m)	Ot	servations		Habitat Comments				
	Fish BT Area (m			·				
		Redds						
Survey Dates:	September 3/97							
Survey Crew:	JH/GM							
Survey section:	Goathorn Creek upstr	ream from Ca	binet confluenc	e.				
0	1DV (20cm)	_		Confluence with Cabinet Creek.				
0	1DV (20cm)			Confluence with Cabinet Creek.				
435	1 DV		20	Massive debris jam at 435 m.				
				Impassable at these flows.				
1453	8 DV (15-20 cm)		18	December Johnie imm				
1433	8 DV (13-20 cm)		18	Passable debris jam.				
1630	Fry obs few			50 m long debris jam with sediment wedge.				
				3 m high and subsurface flows at this point.				
				Photo A2-11.				
2460	3DV (14-16 cm)			35 m long eroding bank - 20 m high.				
2400	3DV (14-10 CIII)	_		Blowdown along slump.				
				Blowdown along similp.				
2950				2 m drop over massive debris jam.				
				Impassable to fish.				
3186			-	Reach boundary.				
				Canyon section with bedrock and large boulders.				
				Lower 500 m is accessible.				
200								
3655	655			2 m high by 10 m long cascade. Barrier to fish				
				migration.				
3670				1.5 m chute. Photo A2-10.				
3730-4240	2DV (14 cm)		10	Series of small rock chutes.				
4240			-	1.7 m drop. Permanent migration barrier.				
·								
4370	1DV (16 cm)			Starting point of surveys.				
			·	This site is located approx. 500 m below 5 m				
				falls; 200 m u/s of trib entering on left.				
		_		Temp = 7.5 C; TDS = 60 uS.				
				10mp = 7.5 C, 1155 = 00 us.				
Summary:	435 m accessible BT; 10 m ² of potential spawning habitat in this section.							
	Massive debris jams	limit access u	pstream. Lots o	f instability in this section.				

Location (m)	Ol	oservations		Habitat Comments			
	Fish BT Area (m*m)						
		Redds					
Survey Dates:	September 3/97						
Survey Crew:	JH/GM						
Survey section:	Cabinet Creek from	Goathorn con	fluence upstrear	n.			
			· · · · · · · · · · · · · · · · · · ·				
0				Goathorn Creek confluence.			
875	1BT (45-50 cm)		23	Fish moving upstream.			
			1				
1000	1BT(50 cm)		58	Fish moving upstream.			
1523		-		Extensive gravel wedge - channel breakout.			
				Photo A2-8.			
	· · · · · · · · · · · · · · · · · · ·		 				
1800	2BT (50-55 cm)	—	15	Moving upstream in cobble riffle habitat.			
2661	2BT (50-55 cm)	1	-	Pair of fish holding on cobbly tailout. Female			
	(000000)		-	is digging redd in large bed material.			
				is aree in target on turner and			
2744-3162		-	44	Generally poor quality habitat in this section.			
2711 5102			<u> </u>	Conoraily poor quality hactae in and section.			
3162	1BT (50 cm)	-	 	Fish moving upstream.			
3102	TBT (50 cm)			I ish moving upstream.			
3700			<u> </u>	DV spawning areas available in sidechannels.			
3700	3DV (15-18 cm)		-	Suitable for DV spawning @ confluence			
	3D V (13 10 cm)	-		Cabinet Creek = 8 C; TDS = 70 uS.			
				Cability Creek – 8 C, 1D3 – 70 us.			
3793				U/s from Webster confluence.			
3773		 		Repeated sequence of debris jams/steps.			
		-		Photo -A2-7.			
				1 Hoto -A2-7.			
4117	 			0.9 m debris jam; 7% gradient.			
4117				Suitable spawning for DV in gravel pockets			
		_		associated with debris.			
		_					
			-	Photo A2-6.			
4215			-	Duides ansasing of symmon Cabinet Courts in			
4215	-	_	· ·	Bridge crossing of upper Cabinet. Sample site.			
4215 4592	2DV (14 19)	-		Debris ion 40.5 m. complete and information			
4215-4583	3DV (14-18 cm)	1	<u> </u>	Debris jam <0.5 m; some bed material for BT.			
4500 5114			 	0.5.10			
4583-5114				0.5-1.0 m debris jams. Limited spawning for BT			
		_	ļ	Photo A2-5			
TOTAL	7	1	140	14% gradient; 1.5 m debris jam.			
<u> </u>			1	Cabinet Creek = 8 C; TDS=90 uS.			
Note: 5 of 7 bul	l trout were observed r	noving upstre	am in riffles - s	urveys slightly early.			

Location (m)	Ot	oservations		Habitat Comments			
· · · · · · · · · · · · · · · · · · ·	Fish BT Area (m*m)						
		Redds					
				·			
Survey Dates:	September 4/97						
Survey Crew:	RD/GM						
Survey section:	Webster Ck confluen	ice with Cabin	net Creek upstre	am.			
235			3	Temp = 7 C in afternoon			
297·			1.5	Unstable bank on left.			
1210	ļ			Davidson describe			
1210				Boulder and rapids			
1615		-	1.5				
1013			1.3				
2075				LOD/boulders and rapids			
2073	<u> </u>			LOD/bounders and rapids			
2170	-		-	Large trib on left side at this location.			
				Slope = 12%; channel width = 3-4 m.			
				Boulder/cobble with lots of debris. Some			
				potential fish use in lower end. No BT spawning			
				potential in lower section.			
2540				Small very steep trib on left side.			
				0.9 m wide.			
2575				Large boulders/riffles and LOD in this section.			
2860			2.5	2 m high debris jam. Not an access problem.			
2910			2.5				
			•				
3560				Boulder and rapids			
262							
3625			5				
2020	2.77 (40.50			T			
3820	2 BT (40-50 cm)	1	9	Tagged 44 cm female - #10150 - short orange			
				Fish mostly spent. Photo B2-6&7			
				F11010 D2-0& /			
3860			2	Some sections of good gravel with lots of LOD			
2000		-		cover. High velocity.			
		-	-	To the talenty.			
3960			4				
4179		1		Redd - 0.65x0.95 m			
		<u> </u>					
4360			5	Small sidechannel			

Location (m)	(Observations		Habitat Comments		
`	Fish	BT	Area (m*m)			
		Redds				
4935			7	Some good spawning habitat but high velocity.		
5078			5			
5335				Lots of debris and some spawning in pool outlet		
				Photo B2-5		
5621			7	Start of best spawning habitat.		
5685			1.5	Reach break - some potential spawning.		
5995				Boulder scree slopes in here.		
				Boulder and cobble riffle areas.		
6295			7	Low quality spawning habitat.		
6375				Cobble and boulder habitat - unstable debris		
				drops.		
6735				Steep boulder section.		
				Temp = 5C in AM; pH 7.4.		
TOTAL	2		63.5	Helicopter drop-off.		

Appendix 12 Table 1. Minnow trap results from lower Hubert Creek, August 12-14, 1997.

Trap#	Location	Water	Coho		Steelhead	Chinook	Longnose	Longnose
	Mark of the Market Analis Maketing Scientific Co. St. Co. St. C. C. C. C. C. C. C. C. C. C. C. C. C.	Туре	0+	1+	in A Brahmin was was abstraction of the V	0+	Dace	Sucker
1	20 m above Bulkley R.	Pool	0	0		0	0	
2	50 m above Bulkley R.	Pool	0	0		9	0	
3	100 m above Bulkley R.	Pool	0	0	1	3	0	1
4	150 m above Bulkley R.	Pool	1	0	1	16	0	
5	160 m above Bulkley R.	Pool	0	Ō		7	0	
6	200 m above Bulkley R.	Pool	0	0		0	0	
7	240 m above Bulkley R.	Pool	0	Ö	2	0	0	
8	260 m above Bulkley R.	Ponded	0	0		1	9	
9	310 m above Bulkley R.	Pool	0	1		1	. 1	
10	350 m above Bulkley R.	Glide	0	1	1	5	0	1
11	40 m below CN Rail culverts	Ponded	1	0		0	0	
12	Pool at culverts	Pool	0	0		2	0	
13	Pond below lower road	Ponded	0	0		0	0	
. 14	25 m above lower culvert	Ponded	0	0		0	0	
15	100 m above lower culvert	Ponded	0	0		0	0	
16	150 m above lower culvert	Ponded	0	0		0	0	
17	190 m above lower culvert	Ponded	0	0	***************************************	0	31	
18	215 m above lower culvert	Ponded	0	0		0	27	1
19~	260 m below powerline	Ponded		0	1	0	36	
20	210 m below powerline	Ponded	0	0		0	2	AL
21	190 m below powerline	Ponded	0	1	***************************************	0	9	
22	155 m below powerline	Pool	0	0		0	8	2
23	110 m below powerline	Pool	2	0	1		1	
24	at powerline	Glide	0	ō		<u></u>	0	
25	10 m below upper road	Glide	0	0		0	0	
26	25 m below upper road	Glide	0	0		0	0	
27	35 m below upper road	Glide	0	0		<u> </u>	0	
28	5 m above upper road	Ponded	0	0		0	<u> </u>	1
29	5 m above upper road	Ponded	0	0		<u>ö</u>	j	· · · · · · · · · · · · · · ·
30	~30 m above upper road	Pool	0	1		Ŏ	i	
31	~40 m above upper road	Ponded	0	·i		<u>0</u>		
32-36	200 m above upper road	Ponded		0	0		··· · · · · · · · · · · · · · · · · ·	
37-56	1000 m above upper road	Ponded	0	0	<u></u>	0	- ö	0
3,230	1000 in above apper road	1 Ollucu						
	TOTAL		4	3	7	46	129	6
	CPUE		0.07	0.09	0.13	0.82	2.30	0.11
	CIOL	THE PARTY OF THE P	0.07	0.07	0.13	0.62	2.30	0.11

Appendix 13 Figure 1. Tyee Test Fishery Index of Skeena steelhead run strength for period of record highlighting years prior to Telkwa juvenile assessments.

