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FISH POPULATION MONITORING IN
FOXY AND BUCK CREEKS
SEPTEMBER 1989

Prepared by

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for

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SUMMARY

Sampling at fish index sites was conducted at five locations in Foxy and Buck creeks for Equity Silver Mines Ltd. during September 1989. This is the fourth year of population estimates in Foxy Creek and the third year in Buck Creek.

Results indicate juvenile rainbow populations remained at high levels in lower Foxy Creek compared to the best rainbow trout streams in adjacent areas. However, rainbow fry densities were lower than previous years at both sites. Rainbow parr densities were similar to 1987 and 1988, but remained well below levels of 1984. Total biomass of rainbow trout at the sample sites was the lowest of the four years of sampling. Rainbow yearlings were considerably smaller than fish captured in previous years, but a similar pattern was noted in the control site in upper Buck Creek suggesting that this is a result of poor growing conditions during the early portion of the summer. The lower site on Foxy Creek was moved to a new location due to a shift in the stream channel at the old site which left it dry. A small number of chinook salmon juveniles were present in Foxy Creek for the first time since 1984.

The sample site located in Buck Creek downstream of Bessemer Creek but above Goosly Lake continued to have low rainbow trout abundance. The habitat in this low gradient section of stream is generally poor for juvenile rainbow trout rearing. A small sample of rainbow fry was captured at this lower site for the first time. A site located upstream of Bessemer Creek in the vicinity of good spawning habitat had healthy populations of juvenile rainbow parr, with densities very similar to the previous two years of sampling. Rainbow fry densities were approximately double the level of 1988 and similar to 1987 levels. Total biomass of rainbow trout has declined at the site

downstream of Bessemer Creek and was in the mid-range of previous estimates for the upper site. Juvenile steelhead population estimates at a site in lower Buck Creek were comparable to past estimates conducted in the area since 1981. Fry densities were lower than the average of the past 8 years, but fall well within the range of previous estimates. Low fry levels presumably reflect the poor adult escapements to the Bulkley River system in 1988-89 resulting in poor fry recruitment to Buck Creek. Parr densities were average compared to previous sampling at this site indicating good survival from last year's low fry levels. Juvenile steelhead densities at the index site in lower Buck Creek are within the mid-range of estimates from other productive steelhead streams in the Bulkley watershed.

Fish sampling at five sites in 1989 continues to provide an index of variation in fish populations found in Buck and Foxy creeks. The population monitoring suggests that some reduction in rainbow trout production may be occurring in Foxy Creek - but that present production levels remain within the range of the best rainbow trout streams in the area. The earliest estimates for this system were unusually high. Buck Creek sampling suggests that fish numbers at index sites are typical of the levels found during past sampling.

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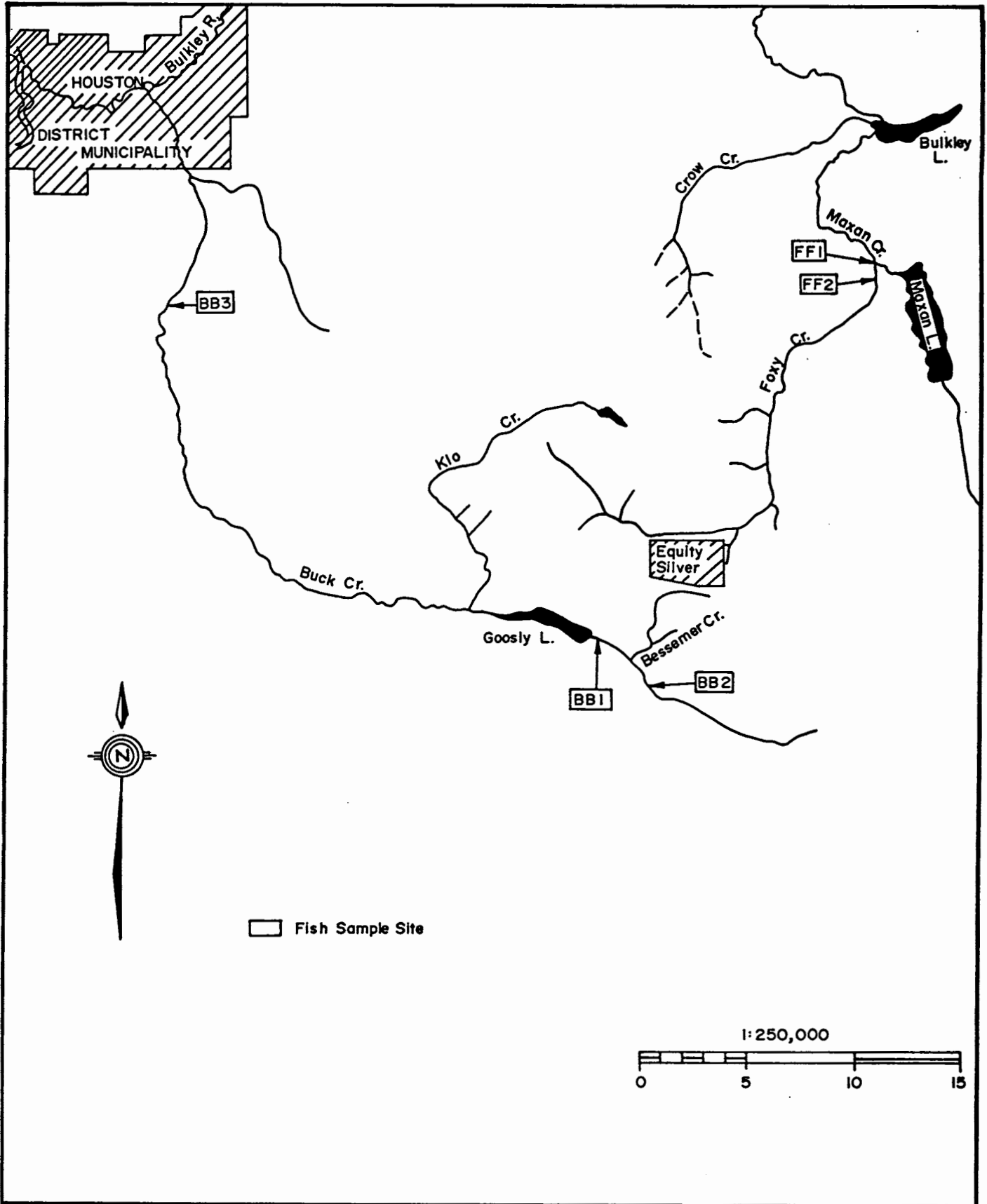
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1.0 INTRODUCTION

Field studies assessing fish populations were undertaken in Foxy and Buck creeks, two small streams located in north central British Columbia near Houston (Figure 1). These studies were conducted during early September 1989 for Equity Silver Mines Ltd. This work was undertaken as part of a monitoring program of fish populations in the vicinity of the mine operation and was done in conjunction with an ongoing program to collect fish for analyses of metal content in tissues.

The 1989 studies represent the fourth year of detailed fish population assessments in Foxy Creek. Previous fish sampling has been conducted in Foxy Creek during 1984 (Bustard 1984), 1987 (Bustard 1987a), and 1988 (Bustard 1988). These previous studies have demonstrated that high numbers of juvenile rainbow trout (Oncorhynchus mykiss), and limited numbers of chinook salmon (Oncorhynchus tshawytscha), Dolly Varden char (Salvelinus malma), longnose dace (Rhinichthys cataractae), mountain whitefish (Prosopium williamsoni), and prickly sculpins (Cottus apser) are present in Foxy Creek during some years. Rainbow trout are present to a canyon section 10 to 12 km upstream from Maxan Creek, and are most numerous in the lower 3 km gravel fan section of the creek (Bustard 1984).

Based on the low number of rainbow trout older than age 1+ sampled during the late summer period at locations in lower Foxy Creek, it is probable that most rainbow remain in the stream for two and sometimes three winters. These fish then move downstream, primarily during the spring period and with declining flows during the early summer. It is assumed that juvenile rainbow trout in Foxy Creek are the progeny of resident rainbow trout (possibly from Maxan Lake) and are not steelhead trout (Oncorhynchus mykiss), although this has not been



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Location of Fish Sample Sites

FIGURE

1

verified. The presence of juvenile chinook salmon in lower Foxy Creek indicates that steelhead would have no difficulty gaining access to lower Foxy Creek during the spring high-flow period.

The 1989 studies represent the third year that fish population monitoring has been conducted in Buck Creek for Equity Silver Mines Ltd. Fish sampling in lower Buck Creek had been undertaken at a number of sites between 1981 and 1986 as part of a steelhead stock monitoring program by the Ministry of Environment (for most recent summary see Tredger (1987)). Approximately 30 km of Buck Creek is accessible to steelhead trout. The lower end of Buck Creek also receives limited use by chinook and coho (Oncorhynchus kisutch) salmon. As well longnose dace, longnose suckers (Catostomus catostomus), and mountain whitefish are present in the lower creek. Fish population estimates were conducted for the first time in 1987 at two fish sample sites in Buck Creek upstream of Goosly Lake (Figure 1). These sites had previously been fish collection areas for subsequent tissue metal analyses. Rainbow trout, longnose suckers, prickly sculpins, and redbside shiners (Richardsonius balteatus) are present in upper Buck Creek (Bustard 1987a, Bustard 1988). Juvenile rainbow trout in this section are presumed to be the progeny of Goosly Lake fish. No resident adults are present in the sample sites during the fall sample period.

2.0 METHODS

Field studies were conducted by a crew of two from August 28 to September 8, 1989. Access to four of the five sites sampled was by vehicle. Site BB1 in Buck Creek just upstream of Goosly Lake, was accessed by boat.

The detailed fish sample site on lower Foxy Creek (Site FF1 in Figure 1) had to be re-located to a new location in 1989. Foxy Creek had shifted course in this section of the fan and had cut a new channel approximately 50 m south of the original channel which was left dry. Site FF2, approximately 1 km upstream on Foxy Creek, was located in the same location as 1988 (immediately downstream of the original site). Channel shifts at the original location had reduced the flow in the former channel to the extent that the site was no longer comparable to conditions during previous years. The fish sample sites in Buck Creek were at the same locations as in 1987 and 1988. One site was located approximately 200 m upstream of Goosly Lake (below the Bessemer Creek confluence) and a second site was located approximately 1.5 km upstream, above the Bessemer Creek confluence with Buck Creek. The lower site on Buck Creek corresponds to Site 3 of the Ministry of Environment steelhead index sites (Tredger 1987).

The sample sites were blocked with stopnets at their upstream and downstream ends and sampled using a gas-powered Coffelt electroshocker. Fish captured were anaesthetized, measured to the nearest millimeter and returned to the stream at the end of sampling. A maximum of 30 fry were measured at any site. The two-step removal method (Seber and LeCren 1967) was used to estimate fish populations.

Sample site areas were calculated from measurements of length and a series of width measurements made at 5-m intervals along the site. As well, water depths (maximum and mean), water temperature, substrate and cover characteristics were recorded at the sites.

Ten 20-gram samples of rainbow trout were retained at all of the

sites except Site FF1 for tissue analyses of heavy metals. Scales for aging were removed from these fish. Weights were collected from these rainbow as well as from a sample of rainbow fry and other species captured in order to calculate biomass estimates at the sites. All habitat data was recorded on DFO/MOE Stream Survey forms.

Each sample collected for metal analyses was placed in a separate bag, frozen and shipped to ASL Laboratories for metal analyses. The length, weight and age characteristics of these fish are presented in Appendix 1. The results of the heavy metal analyses were returned directly to Equity Silver Mines Ltd. and are not presented in this report.

3.0 RESULTS AND DISCUSSION

3.1 Foxy Creek

A total of 678 m² or 103 m of stream length in Foxy Creek was sampled (Table 1). This is very similar to the total area sampled in 1984 and 1988 and more than 20% higher than in 1987. Flow conditions in Foxy Creek during 1989 were higher than in 1988 and the average channel width at Site FF2 was approximately 1 m wider than the previous year. The new sample site at FF1 is more incised and narrower than the former site which had a number of side channels. The two sample sites combined comprise nearly 3.5% of the total habitat in the main fish-producing section of Foxy Creek (lower 3 km).

A total of 870 fish were captured at the two sites in 1989 compared to an average of 1155 fish for the three years of

Table 1. Catch Composition at Foxy Creek Fish Sample Sites from 1984 to 1989.

SPECIES	1984		1987		1988		1989	
	NUMBER	%	NUMBER	%	NUMBER	%	NUMBER	%
RAINBOW FRY	799	57.2	660	72.7	768	66.3	546	62.8
RAINBOW PARR	593	42.4	202	22.2	319	27.5	315	36.2
CHINOOK	4	0.3	0	0.0	0	0.0	2	0.2
DACE	2	0.1	36	4.0	49	4.2	6	0.7
WHITEFISH	0	0.0	6	0.7	16	1.4	1	0.1
SCULPINS	0	0.0	4	0.4	3	0.3	0	0.0
SUCKERS	0	0.0	0	0.0	4	0.3	0	0.0
TOTAL	1398	100	908	100	1159	100	870	100
AREA (m*m)	624		531		659		678	
LENGTH (m)	104		104		103		103	

sampling (Table 1). The detailed catch results for each site are presented in Appendix 2. Rainbow trout dominated the catch (99% of the total). The remaining catch consisted of longnose dace (0.7%), juvenile chinook salmon (0.2%), and mountain whitefish (0.1%). No longnose suckers or prickly sculpins were captured in 1989. This is the first time since 1984 that juvenile chinook were present in the sample. A small number of Pacific lamprey ammocoetes have been captured in lower Foxy Creek.

Table 2 summarizes rainbow trout densities at the two sites for the past four years. Rainbow trout fry (age 0+) densities at Site FF1 were approximately one-half of the average for the previous 3 years of sampling, but similar to the 1988 estimates. Site FF2 fry densities were also lower than average.

Similar to other years, fry densities were nearly 3 times as high at Site FF2 compared to Site FF1. These higher densities, suggests that Site FF2 is closer to the fry emergence (and hence spawning) area in lower Foxy Creek. Site FF2 also possesses more cobble habitat preferred by rearing fry. The channel in the vicinity of FF1 shifted course during the high flow period in the spring. This would have had a disruptive influence on fry recruitment and rearing in this section. The new channel has less side channels and shallow riffle areas and is not as suitable as the original channel for fry rearing.

Total parr numbers sampled in lower Foxy Creek were similar to those obtained in 1988, higher than 1987, and well below the levels of 1984 (Table 1). The results in Table 2 indicate that densities of parr at Site FF2 were slightly

TABLE 2. Summary of Rainbow Trout Density Estimates in Foxy Creek from 1984 to 1989.

SAMPLE SITE	YEAR	<u>DENSITY</u> (fish/m ²)		
		0+	1+	2+
FF1	1984	0.88	0.63	0.21
	1987	0.66	0.30	0.09
	1988	0.32	0.26	0.05
	(84-88)	<u>0.62</u>	<u>0.40</u>	<u>0.12</u>
	1989	0.34	0.55	0.04
FF2	1984	1.66	0.86	0.20
	1987	2.03	0.30	0.06
	1988	1.82	0.55	0.07
	(84-88)	<u>1.84</u>	<u>0.57</u>	<u>0.11</u>
	1989	1.10	0.34	0.04
MEAN	1984	1.27	0.74	0.20
	1987	1.34	0.30	0.08
	1988	1.07	0.40	0.06
	(84-88)	<u>1.23</u>	<u>0.48</u>	<u>0.11</u>
	1989	0.72	0.44	0.04

declined from 19.1 g/m² in 1984 to 5.0 g/m² in 1989. Levels have been in the 5-7 g/m² range for the past 3 years. If the total grams of rainbow trout produced in the sample site is estimated (thus correcting for discharge differences between years), the 1989 biomass estimates are near those obtained in 1987, lower than the 1988 estimates, and remain at approximately one-third of the 1984 levels.

Table 5 compares the density and biomass of rainbow fry and parr in Foxy Creek based on the four years of measurements to density and biomass information collected in the best similar-sized rainbow tributaries to Babine Lake (Duncan and Morrison Trib creeks) and Francois Lake (Nithi River and

Table 5. Rainbow Trout Densities (fish/m²) and Biomass (g/m²) in Foxy Creek Compared to Adjacent Best Rainbow Trout Rearing Streams.

SYSTEM	FRY DENSITIES	PARR DENSITIES	BIOMASS
DUNCAN*	1.96	0.40	6.0
MORRISON TRIB*	1.47	0.67	5.1
NITHI**	2.41	0.37	5.8
RAMSAY**	1.34	0.12	3.1
UNCHA**	0.92	0.03	2.2
FOXY (84-89)	1.10	0.57	9.4
FOXY (1989)	0.72	0.48	5.0

* From Bustard (1989)

**From Bustard (1987b)

Ramsay and Uncha creeks). It should be noted that the Nithi River is a very productive rainbow trout stream that experienced low summer flows during the period of measurement in 1987 - leading to high densities of fry. Foxy Creek fry densities are at the lower end of the range for these major producers. However, the parr densities and overall rainbow trout biomass (5-7 g/m²) tend to be in the higher end of the range, despite the obvious decline from the 1984 levels. The 1984 Foxy Creek biomass estimates of 19 g/m² are unusually high.

3.2 Upper Buck Creek

In total, 749 m² of Buck Creek upstream of Goosly Lake comprising 143 m of stream margin was sampled in 1989 (Table 6). The lower site (BB1) was located approximately 200 m upstream of Goosly Lake in a low-gradient section of the stream impounded behind beaver dams. The site sampled was the first free-flowing stretch encountered in the creek upstream of the lake. Results from fish sampling during previous years to collect fish tissue for metal analyses indicated that Buck Creek below this point is not used for rearing by rainbow trout.

The upper site was located in a slightly higher gradient (0.7%) section of Buck Creek possessing excellent spawning gravels, a good diversity of pool and riffle habitat, and abundant debris and bank cover. A number of large beaver dams including one at the road culvert located approximately 1 km upstream of the lake restrict access from Goosly Lake during most periods of the year. However, some rainbow trout spawners are able to reach this area during high flow periods in the spring.

Table 6. Catch Composition at Upper Buck Creek Fish Sample Sites from 1987 to 1989.

SPECIES	SITE BBI NUMBER (%)			SITE BB2 NUMBER (%)		
	1987	1988	1989	1987	1988	1989
RAINBOW FRY	1 (1.3)	0 (0.0)	21 (26.6)	190 (66.2)	130 (61.0)	213 (69.2)
RAINBOW PARR	37 (48.7)	29 (56.9)	24 (30.4)	97 (33.8)	83 (39.0)	95 (30.8)
SUCKERS	13 (17.1)	0 (0.0)	8 (10.1)	0 (0.0)	0 (0.0)	0 (0.0)
SCULPINS	25 (32.9)	22 (43.1)	25 (31.6)	0 (0.0)	0 (0.0)	0 (0.0)
WHITEFISH	0 (0.0)	0 (0.0)	1 (1.3)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL	76 (100)	51 (100)	79 (100)	287 (100)	213 (100)	308 (100)
AREA (m*m)	409	394	406	319	359	343
LENGTH (m)	66	63	65	76	77	78

above table

Similar to the previous two years, over 90% of the 387 fish captured in the two upper Buck Creek sites in 1989 were rainbow trout (Table 6). The remaining portion of the catch was comprised of sculpins (6.4%), longnose suckers (2.1%) and a single mountain whitefish (0.3%). This is the first whitefish captured during surveys in upper Buck Creek. Rainbow trout were the only species present at Site BB2, the uppermost of the two sites (Table 6). Detailed catch results and habitat descriptions for the two sites are presented in Appendix 2.

The low gradient ponded areas in the vicinity of Site BB1 do not offer suitable rainbow trout spawning or fry rearing habitat - and this has been reflected in the nearly complete absence of fry in this section during past years of sampling. Interestingly, the 21 rainbow fry captured in the 1989 sample is the highest fry catch at this location to date. Rainbow parr numbers at this site were slightly lower than previous years. The low catches generally reflect poor rearing habitat for rainbow trout.

Site BB2 provides excellent rainbow trout habitat and the fry and parr numbers indicate healthy populations of juvenile rainbow trout. The fry densities of 0.6 fry/m² (Table 7) are similar to 1987 and up from 1988. Some of the variability in fry recruitment may be a reflection of fewer spawners reaching this site due to increased difficulty passing beaver dams at downstream locations during some years.

Parr densities have remained at a healthy 0.2 to 0.3 parr/m² for the three years of study. The 1989 parr densities suggest that there was excellent survival from a

TABLE 7. Summary of Rainbow Trout Density Estimates in Upper Buck Creek from 1987 to 1989.

SAMPLE SITE	<u>DENSITY (fish/m²)</u>								
	<u>0+</u>			<u>1+</u>			<u>2+</u>		
	1987	1988	1989	1987	1988	1989	1987	1988	1989
BB1	0.00	0.00	0.05	0.07	0.06	0.04	0.02	0.01	0.02
BB2	0.59	0.36	0.62	0.27	0.23	0.27	0.03	0.00	0.01

relatively low fry year in 1988. The levels are in the low end of the range of parr densities obtained for the most productive resident rainbow streams reported in Table 5.

Similar to 1988, over 90% of the rainbow parr sampled in upper Buck Creek were age 1+. All of the remaining were age 2+. Presumably most rainbow trout in upper Buck creek move down into Goosly Lake after rearing several years in this stream. Sampling during 1987 resulted in a higher proportion of age 2+ parr (13%) compared to 1988 and 1989 samples (Appendix 3 Table 2).

While rainbow trout fry fork lengths were similar to past years at Site BB2, age 1+ parr were approximately 5 mm smaller than previous years at both sites (Table 8). This is similar to a pattern of smaller parr in Foxy Creek in 1989 (Table 3). The rainbow trout at Site BB2 are in the "control" section of Buck Creek unaffected by any aspects of the mine operation, suggesting that poorer growth rates in the age 1+ fish is probably related to climatic factors

Table 8. Summary of Rainbow Trout Age 0+ and Age 1+ Fork Lengths (mm) for the Two Upper Buck Creek Sample Sites.

YEAR	AGE 0+		AGE 1+	
	BB1	BB2	BB1	BB2
1987	NM	43.9	89.1	80.4
1988	NM	39.0	92.2	79.7
1989	44.1	40.1	85.1	75.6
	\bar{x} 41		78	

affecting growth conditions in these streams during the period prior to fry emergence.

While rainbow trout biomass was lower at Site BB1 in 1989 compared to previous years (Table 9), total biomass increased at Site BB2 compared to 1988 levels. The biomass levels at this site are lower than the 1987 estimates, largely due to a reduction in the age 2+ parr component (Appendix 3 Table 2).

Prior to 1987, it was difficult to obtain an adequate sample of rainbow trout for tissue analyses at Site BB1. This suggests that rainbow trout populations have been sparse in this section of the stream for at least 6 years. Based on these previous observations more trout have been present in this section in the past three years than during earlier sampling.

Table 9. Summary of Biomass Estimates of Rainbow Trout for the Upper Buck Creek Sites from 1987 to 1989.

YEAR	<u>GRAMS/M²</u>		<u>TOTAL GRAMS FROM SITE</u>	
	BB1	BB2	BB1	BB2
1987	0.77	2.35	315	750
1988	0.70	1.32	276	474
1989	0.51	1.58	207	542

3.3 Lower Buck Creek

Site BB3 sampled in lower Buck Creek was 458 m² and comprised 43 m of stream margin. Higher streamflows resulted in more surface area for the same length of stream in 1989 compared to previous years (Table 10). Nearly 65% of the 272 fish estimated within the site were rainbow trout (Table 10). These fish are assumed to be the progeny of steelhead trout known to spawn in lower Buck Creek (Tredger 1982). Longnose dace comprised 33% of the estimated population with mountain whitefish and longnose suckers each comprising between 1-2% of the total sample.

The total number of fish sampled at this site was half of the 1987 estimate, but was higher than the number estimated in 1988. Numbers of longnose dace are well down from the 1987 levels of nearly 300 fish, although biomass of longnose dace has remained between 0.9 and 1.2 g/m² for the past 3 years.

TABLE 10. Catch Composition at the Lower Buck Creek Fish Sample Site in 1989 Compared to Other Years.

SPECIES	1987	1988	1989	OTHER YEARS ¹
	NUMBER (%)	NUMBER (%)	NUMBER (%)	NUMBER (%)
RAINBOW FRY	217 (39.7)	66 (28.6)	109 (40.1)	79 (46.5)
RAINBOW PARR	49 (9.0)	39 (16.9)	67 (24.6)	24 (14.1)
DACE	279 (51.0)	108 (46.8)	89 (32.7)	60 (35.3)
WHITEFISH	2 (0.3)	15 (6.5)	3 (1.1)	4 (2.4)
SUCKERS	0 (0.0)	3 (1.3)	4 (1.5)	3 (1.7)
TOTAL	547	231	272	170
AREA (m ²)	413	416	458	NA
LENGTH (m)	44	43	43	NA

¹Based on a combination of catch data for 1982, 1983, and 1986 (Tredger 1987). Summary reports for 1984 and 1985 did not include catch data.

Rainbow trout density estimates for this location have been collected since 1981 and are summarized in Table 11. Fry densities of over 0.2 fry/m² were less than one-half of the average for the past 8 years, but do exceed the density estimates for 3 of these years. These low fry levels presumably reflect the poor adult steelhead escapements to the upper Bulkley River system in 1988-89 resulting in a lower fry seeding of Buck Creek than during a year of high escapements. The highest fry densities at this site occurred in 1985 with levels of 1.85 fry/m². Both the age 1+ and age 2+ rainbow densities were average when compared to previous years

TABLE 11. Summary of Steelhead Trout Densities at Site BB3 from 1981 to 1989¹.

YEAR	<u>DENSITY</u> (fish/m ²)		
	0+	1+	2+
1981	0.63	0.03	0.01
1982	0.14	0.05	0.01
1983	0.35	0.02	0.01
1984	0.13	0.14	0.05
1985	1.85	0.32	0.09
1986	0.77	0.31	0.01
1987	0.53	0.08	0.04
1988	<u>0.16</u>	<u>0.07</u>	<u>0.02</u>
Mean	0.57	0.13	0.03
1989	0.24	0.12	0.03

¹Data from 1981 to 1986 from Tredger (1987).

(Table 11). The age 1+ parr densities were very high considering the poor 1988 fry recruitment, indicating good survival from fry to parr in this section of stream in 1988-89.

Rainbow fry were on average 3 mm larger than fry captured in the previous two years, while age 1+ parr were similar to 1988 but smaller than 1987 fish (Table 12). More detailed information describing fish lengths is presented in Appendix 3 Table 2.

Rainbow trout biomass estimates for the past 3 years indicate that total biomass at Site BB3 is up considerably compared to

Table 12. Summary of Rainbow Trout Age 0+ and Age 1+ Fork Lengths (mm) for Lower Buck Creek (Site BB3).

YEAR	AGE 0+	AGE 1+
1987	47.8	89.0
1988	48.7	84.1
1989	51.7	84.9
	X 49.4	X 86

the previous year (Table 13). This reflects an increase in both the age 0+ and age 1+ component. A more detailed breakdown of biomass calculations is presented in Appendix 4 Table 2.

It should be noted that the site established in 1987 encompasses the same stream section sampled by Tredger (1987) previous to this date. However, the new site is considerably larger and therefore more representative of this section of Buck Creek than the earlier site.

Table 13. Summary of Biomass Estimates for Rainbow Trout from Lower Buck Creek (Site BB3) from 1987 to 1989.

YEAR	GRAMS/M ²	TOTAL GRAMS FROM SITE
1987	2.01	830
1988	1.06	441
1989	1.51	692

Average steelhead fry densities at Site BB3 in lower Buck Creek were in the mid-range of densities reported for other known good steelhead trout rearing streams (Table 14). The average fry densities at index sites in Owen and McQuarrie creeks are higher than this site on Buck Creek. At the same time, average fry densities for Buck (3 sites combined), Lamprey, and Tenas creeks, and the mainstem Morice River are lower. Comparable data on these other steelhead streams has not been collected during the past three years.

Table 14. Steelhead Fry Densities in Lower Buck Creek Compared to Other Bulkley River Steelhead Streams.

STREAM	FRY/M ²	YEARS	DATA SOURCE
LAMPREY CREEK (3 sites)	0.53	1980-1986	(Tredger 1987)
OWEN CREEK (5 sites)	1.08	1980-1986	"
MAINSTEM MORICE (4 sites)	0.27	1980-1986	"
MCQUARRIE CREEK (1 site)	1.18	1981-1986	"
TENAS CREEK (3 sites)	0.46	1983-1985	(Bustard 1985)
BUCK CREEK (3 sites)	0.44	1981-1986	(Tredger 1987)
SITE BB3 - LOWER BUCK	0.53	1981-1989	This study

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**Appendix 1: Detailed Information Describing Rainbow Trout
Collected for Analyses of Tissue.**

TABLE 1. Foxy Creek Rainbow Trout Samples Collected for Metal Analyses of Tissue, September 6, 1989.

SAMPLE #	LENGTH (mm)	AGE	WEIGHT (gm)	TOTAL WEIGHT
1a	117	2+	15.5	
1b	96	2+	9.6	25.1
2	137	2+	25.3	25.3
3	114	2+	17.2	17.2
4	118	2+	16.2	16.2
5a	110	2+	12.0	
5b	97	1+	9.0	21.0
6	130	2+	25.2	25.2
7	123	2+	17.5	17.5
8a	110	2+	13.7	
8b	90	1+	7.6	21.3
9	118	2+	16.5	16.5
10a	110	2+	12.8	
10b	81	1+	5.5	18.3

COMMENT: These samples were captured by electrofishing (250 v).
Sample location was site FF2.

TABLE 2. Buck Creek Above Bessemer Creek Rainbow Trout Samples Collected for Metal Analyses, September 7, 1989.

SAMPLE #	LENGTH (mm)	AGE	WEIGHT (gm)	TOTAL WEIGHT
1a	105	2+	12.6	
1b	80	1+	4.6	17.2
2a	94	1+	7.6	
2b	108	2+	10.4	18.0
3a	100	2+	9.8	
3b	94	1+	7.8	17.6
4a	80	1+	4.4	
4b	85	1+	6.3	
4c	90	1+	7.2	17.9
5a	78	-	4.0	
5b	82	-	4.6	
5c	76	-	3.9	
5d	80	-	4.7	17.2
6a	79	-	4.0	
6b	84	-	5.7	
6c	77	-	4.2	
6d	79	-	4.3	18.2
7a	84	-	6.1	
7b	73	-	3.9	
7c	80	-	4.8	
7d	73	-	3.7	18.5
8a	82	-	5.0	
8b	74	-	3.6	
8c	75	-	3.8	
8d	75	-	3.9	16.3
9a	76	-	4.7	
9b	85	-	6.0	
9c	78	-	4.1	
9d	75	-	3.8	18.6
10a	70	-	2.9	
10b	77	-	4.3	
10c	74	-	3.5	
10d	79	-	4.5	
10e	73	-	3.6	18.8

COMMENT: These samples were captured by electrofishing at a site located approximately 1.2 km above Bessemer confluence.

TABLE 3. Buck Creek Below Bessemer Creek Rainbow Trout Samples
 Collected for Metal Analyses of Tissues, September 8, 1989.

SAMPLE #	LENGTH (mm)	AGE	WEIGHT (gm)	TOTAL WEIGHT
1a	96	2+	7.6	
1b	108	2+	12.0	19.6
2a	95	1+	8.6	
2b	101	2+	10.9	19.5
3a	86	1+	6.5	
3b	97	1+	9.7	16.2
4a	100	1+	10.9	
4b	92	1+	8.0	18.9
5a	93	1+	8.5	
5b	98	1+	9.4	17.9
6a	101	1+	9.7	
6b	93	1+	8.8	18.5
7a	96	-	8.0	
7b	92	-	8.0	16.0
8a	92	-	7.4	
8b	98	-	9.8	17.2
9a	93	-	8.2	
9b	91	-	8.0	16.2
10a	91	-	7.9	
10b	94	-	8.5	16.4

COMMENT: These samples were captured by electrofishing at a site located approximately 150-250 m upstream of Goosly Lake.

TABLE 4. Buck Creek Below Goosly Lake Rainbow Trout (Steelhead) Samples Collected for Metal Analyses, August 29, 1989.

SAMPLE #	LENGTH (mm)	AGE	WEIGHT (gm)	TOTAL WEIGHT
1a	132	2+	22.1	22.1
2a	117	2+	13.6	
2b	83	1+	6.6	20.2
3a	112	2+	12.6	
3b	88	1+	7.2	19.8
4a	97	2+	10.1	
4b	99	2+	9.7	19.8
5a	95	2+	10.9	
5b	92	2+	7.4	18.3
6a	108	2+	12.3	
6b	95	2+	10.1	22.4
7a	91	1+	8.0	
7b	93	1+	9.2	17.2
8a	95	1+	8.6	
8b	91	1+	8.1	16.7
9	130	2+	25.1	25.1
10a	80	1+	5.9	
10b	96	1+	10.1	16.0

COMMENT: These samples were captured by electrofishing at a site located approximately 200 m downstream of the 1st bridge crossing on Buck Flats

Appendix 2: Site Descriptions and Detailed Results of Fish
Sampling in Foxy and Buck Creeks, September
1989.

SITE DESCRIPTIONS - SITE FF1 DATE- SEPT 5/89 TEMP. 10 C @1200 hr. SLOPE- 1.0%

This site had to be relocated in 1989. The streamflow is now all down the right channel and through the road culvert. Old channel is dry.

The channel is unstable and has gravel over a layer of fine silt. Foot sinks into gravel and mud when walking in channel. Approx 100 m of stream re-routed.

POPULATION ESTIMATES:

SPECIES	AGE	PASS 1	PASS 2	U1&U2	NUMBER	S.E.	MORTS	N-CORR	N/M ² M	N/LIN-M
Rainbow	0+	67	17	84	89.8	4.2	0	90	0.339	1.83
Rainbow	1+	51	33	84	144.5	47.6	0	145	0.546	2.95
Rainbow	2+	8	2	10	10.7	1.4	0	11	0.040	0.22
Chinook	0+	2	0	2	2.0	0.0	0	2	0.008	0.04
LN Dace	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Sucker	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Sucker	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
P Sculpin	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
M Whitefish	0+	1	0	1	1.0	0.0	0	1	0.004	0.02
M Whitefish	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
Lamprey		11	4							
TOTAL								248	0.937	5.060

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m ² m)
Rainbow	0+	31-48	38.4	0.464	0.16
Rainbow	1+	56-89	70.5	3.207	1.75
Rainbow	2+	105-140	119.0	17.030	0.69
Chinook	0+	64-69	66.5	0.426	0.00
LN Dace	1+	0	0.0	0.000	0.00
LN Sucker	0+	0	0.0	0.000	0.00
LN Sucker	1+	0	0.0	0.000	0.00
P Sculpin	1+	0	0.0	0.000	0.00
M Whitefish	0+	75	75.0	4.169	0.02
M Whitefish	1+	0	0.0	0.000	0.00
TOTAL					2.61

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH(cm)	MAXIMUM DEPTH(cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	5.7	5	35	Present	Present	/5
5	6.8			Good debris cover throughout		
10	3.2			Estimate flow of 7-10 cfs		
15	5.5			Alder cover along edge and in creek.		
20	4.6			Unstable banks due to recent channel shifting.		
	6.3			Entire reach is on creek fan.		
	4.4			Photos 1-3.		
	6.8					
	5.8					

5.4
 AREA (M²M) 264.6 MARGIN (M) 49.0

SITE DESCRIPTIONS - SITE FF2 DATE-SEPT 6/89 TEMP. 11 C @1500 hr Slope 1.5 %

This site is approximately 1 km upstream of Maxan at water sample site.

Same site as 1988 sampling.

There are 6 new trees in site (blowdown) - otherwise site little changed.

Half of the site has a small sidechannel along the left side.

POPULATION ESTIMATES:

SPECIES	AGE	PASS 1	PASS 2	U1&U2	NUMBER	S.E.	MORTS	N-CORR	N/M*M	N/LIN-M
Rainbow	0+	232	114	346	456.1	35.3	0	456	1.103	8.45
Rainbow	1+	87	33	120	140.2	10.8	1	141	0.341	2.61
Rainbow	2+	12	4	16	18.0	3.0	0	18	0.044	0.33
LN Dace	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Dace	1+	3	3	6	6.0	0.0	0	6	0.015	0.11
LN Sucker	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Sucker	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
P Sculpin	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
M Whitefish	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
M Whitefish	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
Lamprey		0	3							
TOTAL								621	1.503	11.506

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m ² m)
Rainbow	0+	31-48	38.6	0.471	0.52
Rainbow	1+	61-95	74.9	3.890	1.33
Rainbow	2+	96-137	111.4	13.780	0.60
LN Dace	0+	0	0.0	0.000	0.00
LN Dace	1+	65-105	78.3	4.989	0.07
LN Sucker	0+	0	0.0	0.000	0.00
LN Sucker	1+	0	0.0	0.000	0.00
P Sculpin	1+	0	0.0	0.000	0.00
M Whitefish	0+	0	0.0	0.000	0.00
M Whitefish	1+	0	0.0	0.000	0.00
Lamprey					
TOTAL				2.52	

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH(cm)	MAXIMUM DEPTH(cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	6.5	10	90		Present	15/40
5	6.5			This site is 30% pool and 70% riffle.		
10	8.4			Good cover in cobble and debris. Heavy algae growth.		
15	8.4			Photo 4, 5 and 6		
20	8.0			Most fish using cobble substrate for cover.		
	9.5					
	7.3					
	6.7					
	7.6					

7.7
 AREA (M*M) 413.4 MARGIN (M) 54.0

SITE DESCRIPTIONS - SITE BBI DATE-SEPT 8/89 TEMP. 9 C @1300hr SLOPE- 0.2%
 This site on Buck Creek is located 300 m upstream of Goosly Lake.
 This is the first section of the creek upstream of the lake with flowing riffles.
 Estimate this site is 95% pool and 5% riffle.
 Beaver dams above and below this point.

POPULATION ESTIMATES:

SPECIES	AGE	PASS 1	PASS 2	U1&U2	NUMBER	S.E.	MORTS	N-CORR	N/M ² M	N/LIN-M
Rainbow	0+	10	11	21	21.0	0.0	0	21	0.052	0.32
Rainbow	1+	14	2	16	16.3	0.8	0	16	0.040	0.25
Rainbow	2+	4	4	8	8.0	0.0	0	8	0.020	0.12
LN Dace	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Dace	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Sucker	0+	0	0	0	0.0	0.0	0	8	0.020	0.12
LN Sucker	1+	1	0	1	0.0	0.0	0	0	0.000	0.00
P Sculpin	1+	23	2	25	25.2	0.0	0	25	0.062	0.39
M Whitefish	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
M Whitefish	1+	1	0	1	1.0	0.0	0	1	0.002	0.02
Lamprey										
TOTAL								80	0.196	1.22

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m ² m)
Rainbow	0+	39-51	44.1	0.871	0.05
Rainbow	1+	86-97	85.1	6.209	0.25
Rainbow	2+	98-111	102.1	10.720	0.21
LN Dace	0+	0	0.0	0.000	0.00
LN Dace	1+	0	0.0	0.000	0.00
LN Sucker	0+	0	0.0	0.000	0.00
LN Sucker	1+	79	79.0	4.898	0.00
P Sculpin	1+	40-101	65.6	3.062	0.19
M Whitefish	0+	0	0.0	0.000	0.00
M Whitefish	1+	0	0.0	0.000	0.00
TOTAL					0.696

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH(cm)	MAXIMUM DEPTH(cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	5.5	60	100	Present	Present	Silt/2
5	6.9					
10	3.5					
15	5.4					
20	6.5					
	10.0					
	5.4					
	6.6					
	6.3					

6.3
 AREA (M²M) 406.3 MARGIN (M) 65.0

SITE DESCRIPTIONS - SITE BB2 DATE-SEPT 7/89 TEMP. 10 C 1530 SLOPE- 0.7%

This site on Buck Creek is located approximately 1 km upstream of the road crossing above Goosly Lake.

This section of the creek has good spawning potential in gravel riffles.

Estimate this site is 80% pool and 20% riffle.

Virtually unchanged channel since last year.

POPULATION ESTIMATES:

SPECIES	AGE	PASS 1	PASS 2	UI&U2	NUMBER	S.E.	MORTS	N-CORR	N/M ² M	N/LIN-M
Rainbow	0+	123	52	175	213.1	16.8	0	213	0.621	2.73
Rainbow	1+	67	18	85	91.6	4.6	0	92	0.267	1.17
Rainbow	2+	3	0	3	3.0	0.0	0	3	0.009	0.04
LN Dace	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Dace	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Sucker	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Sucker	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
P Sculpin	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
M Whitefish	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
M Whitefish	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
TOTAL								308	0.897	3.945

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m ² m)
Rainbow	0+	33-49	40.1	0.659	0.41
Rainbow	1+	59-88	75.6	4.055	1.08
Rainbow	2+	100-108	104.3	10.190	0.09
LN Dace	0+	0	0.0	0.000	0.00
LN Dace	1+	0	0.0	0.000	0.00
LN Sucker	0+	0	0.0	0.000	0.00
LN Sucker	1+	0	0.0	0.000	0.00
P Sculpin	1+	0	0.0	0.000	0.00
M Whitefish	0+	0	0.0	0.000	0.00
M Whitefish	1+	0	0.0	0.000	0.00
TOTAL					1.58

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH(cm)	MAXIMUM DEPTH(cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	3.4	20	100			3/7
5	4.5			Spawning gravel throughout		
10	4.7			Lots of debris and overhanging banks		
15	4.8			Bank instability below road.		
20	3.7			Flows slightly lower than last year.		

Plus others

	4.4		
AREA (M ² M)	343.2	MARGIN (M)	78.0

APPENDIX 3 TABLE 1. Summary of Rainbow Trout Length and Age Data for Foxy Creek, 1984 to 1989.

SITE	AGE	RAINBOW 0+				MEAN
		1984	1987	1988	1989	
SITE FF1	n	269	201	92	90	163
	%	51.1	62.4	50.8	36.6	50.2
	f1(mm)	33.9	40.2	40.5	38.4	38.3
SITE FF2	n	530	459	676	456	530
	%	61.2	85.0	74.6	74.1	73.7
	f1(mm)	34.7	37.4	38.0	38.6	37.2
TOTAL	n	799	660	768	546	693
	%	56.2	73.7	62.7	55.4	62.0
	f1(mm)	34.3	38.8	39.2	38.5	37.7

		RAINBOW 1+				MEAN
		1984	1987	1988	1989	
SITE FF1	n	193	93	75	145	127
	%	36.7	28.9	41.4	58.9	41.5
	f1(mm)	77.2	79.6	79.5	70.5	76.7
SITE FF2	n	273	67	204	141	171
	%	31.5	12.4	22.5	22.9	22.3
	f1(mm)	78.0	82.3	80.0	74.9	78.8
TOTAL	n	466	160	279	286	298
	%	34.1	20.6	32.0	40.9	31.9
	f1(mm)	77.6	81.0	79.8	72.7	77.8

		RAINBOW 2+				MEAN
		1984	1987	1988	1989	
SITE FF1	n	64	28	14	11	29
	%	12.2	8.7	7.7	4.5	8.3
	f1(mm)	120.5	115.9	118.3	119	118.4
SITE FF2	n	63	14	26	18	30
	%	7.3	2.6	2.9	2.9	3.9
	f1(mm)	119.5	106.6	109.9	111.4	111.9
TOTAL	n	127	42	40	29	60
	%	9.7	5.6	5.3	3.7	6.1
	f1(mm)	120.0	111.3	114.1	115.2	115.1

APPENDIX 3 TABLE 2. Summary of Rainbow Trout Length and Age Data for Buck Creek, 1987 to 1989.

SITE	AGE	RAINBOW 0+			MEAN
		1987	1988	1989	
SITE BB1	n	1	0	21	7
	%	0.2	0.0	11.6	3.9
	f1(mm)			44.1	44.1
SITE BB2	n	190	130	213	178
	%	21.9	24.1	23.5	23.2
	f1(mm)	43.9	39.0	40.1	41.0
SITE BB3	n	217	66	109	131
	%	11.1	12.0	17.6	13.6
	f1(mm)	47.8	48.7	51.7	49.4
		RAINBOW 1+			MEAN
		1987	1988	1989	
SITE BB1	n	28	24	16	23
	%	5.3	7.5	8.8	7.2
	f1(mm)	89.1	92.2	85.1	88.8
SITE BB2	n	87	83	92	87
	%	10.0	15.4	10.2	11.9
	f1(mm)	80.4	79.7	75.6	78.6
SITE BB3	n	33	29	55	39
	%	7.7	11.4	9.5	9.5
	f1(mm)	89.0	84.1	84.9	86.0
		RAINBOW 2+			MEAN
		1987	1988	1989	
SITE BB1	n	9	5	8	7
	%	1.7	1.6	4.4	2.6
	f1(mm)	102.6	117.2	102.1	107.3
SITE BB2	n	10	0	3	4
	%	1.2	0.0	0.3	0.5
	f1(mm)	116.8		104.3	110.6
SITE BB3	n	16	10	12	13
	%	1.4	0.8	2.4	1.5
	f1(mm)	106.0	120.5	112.1	112.9

Appendix 4: Biomass Estimates for Rainbow Trout from
Foxy and Buck Creeks from 1984 to 1989.

APPENDIX 4 TABLE 1. Biomass Summary of Rainbow Trout in Foxy Creek.
FILE = BIOMASS

SITE	YEAR	GRAMS/M*M			TOTAL
		0+	1+	2+	
FF1	1984	0.54	3.82	4.37	8.73
	1987	0.41	1.40	1.47	3.28
	1988	0.17	1.24	0.86	2.27
	1989	0.16	1.75	0.69	2.60
	MEAN	0.32	2.05	1.85	4.22
FF2	1984	1.08	5.30	4.01	10.39
	1987	0.93	1.60	0.82	3.35
	1988	0.79	2.65	0.95	4.39
	1989	0.52	1.33	0.60	2.45
	MEAN	0.83	2.72	1.60	5.15
COMBINED	1984	1.62	9.12	8.38	19.12
	1987	1.34	3.00	2.29	6.63
	1988	0.96	3.89	1.81	6.66
	1989	0.68	3.08	1.29	5.05
	MEAN	1.15	4.77	3.44	9.37

SITE	YEAR	TOTAL GRAMS FROM SITE			TOTAL
		0+	1+	2+	
FF1	1984	164.7	1165.1	1332.9	2662.7
	1987	125.1	427.0	448.4	1000.4
	1988	48.7	355.5	246.6	650.8
	1989	42.3	463.1	182.6	688.0
	MEAN	95.2	602.7	552.6	1250.5
FF2	1984	344.5	1690.7	1279.2	3314.4
	1987	210.5	362.1	185.6	758.1
	1988	293.9	985.8	353.4	1633.1
	1989	215.0	549.8	248.0	1012.8
	MEAN	266.0	897.1	516.5	1679.6
COMBINED	1984	509.2	2855.8	2612.0	5977.1
	1987	335.5	789.1	633.9	1758.5
	1988	342.6	1341.3	600.0	2283.9
	1989	257.3	1012.9	430.6	1700.8
	MEAN	361.2	1499.8	1069.1	2930.1

* NOTE - Biomass estimates for 1988 have been revised from those reported in Bustard (1988) based on a modification to the regression equation used to calculate mean weights.

APPENDIX 4 TABLE 2. Biomass Summary of Rainbow Trout in Buck Creek.
 FILE = BIOMASS1

SITE	YEAR	GRAMS/M*M			TOTAL
		0+	1+	2+	
BB1	1987	0.00	0.52	0.25	0.77
	1988	0.00	0.48	0.22	0.70
	1989	0.05	0.25	0.21	0.51
	MEAN	0.02	0.42	0.23	0.66
BB2	1987	0.50	1.38	0.47	2.35
	1988	0.22	1.10	0.00	1.32
	1989	0.41	1.08	0.09	1.58
	MEAN	0.38	1.19	0.19	1.75
BB3	1987	0.56	0.84	0.61	2.01
	1988	0.20	0.44	0.42	1.06
	1989	0.36	0.77	0.38	1.51
	MEAN	0.37	0.68	0.47	1.53
SITE	YEAR	TOTAL GRAMS FROM SITE			TOTAL
		0+	1+	2+	
BB1	1987	0.0	212.8	102.3	315.1
	1988	0.0	189.0	86.6	275.7
	1989	20.3	101.6	85.3	207.2
	MEAN	6.8	167.8	91.4	266.0
BB2	1987	159.6	440.5	150.0	750.1
	1988	78.9	394.7	0.0	473.6
	1989	140.7	370.7	30.9	542.3
	MEAN	126.4	401.9	60.3	588.7
BB3	1987	231.1	346.7	251.7	829.5
	1988	83.1	182.9	174.6	440.6
	1989	164.9	352.7	174.0	691.6
	MEAN	159.7	294.1	200.1	653.9

* NOTE - Biomass estimates for 1988 have been revised from those reported in Bustard (1988) based on a modification to the regression equation used to calculate mean weights.

SITE DESCRIPTIONS - SITE BB3 DATE- AUG 28/89 TEMP. 13 C @ 1130 hr SLOPE- 1.5%

This site is located on Buck Creek 150 m downstream of the 1st bridge crossing on Buck Flats Rd. The site was moved 20 m upstream to enable sampling with stopnets.

Estimate site is 80 % riffle and 20 % glide.

A small spruce has collapsed from right bank into site.

Flows are highest of 3 years of surveys.

POPULATION ESTIMATES:

SPECIES	AGE	PASS 1	PASS 2	UI&U2	NUMBER	S.E.	MORTS	N-CORR	N/M ² M	N/LIN-M
Rainbow	0+	50	27	77	108.7	22.4	0	109	0.237	2.53
Rainbow	1+	21	13	34	55.1	24.9	0	55	0.120	1.28
Rainbow	2+	6	3	9	12.0	6.0	0	12	0.026	0.28
LN Dace	0+	0	1	1	0.0	0.0	0	0	0.000	0.00
LN Dace	1+	48	22	70	88.6	13.1	0	89	0.194	2.06
LN Sucker	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Sucker	1+	2	2	4	4.0	0.0	0	4	0.009	0.09
P Sculpin	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
M Whitefish	0+	1	2	3	3.0	0.0	0	3	0.007	0.07
M Whitefish	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
Lamprey		0	3							
TOTAL								271	0.593	6.31

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m ² m)
Rainbow	0+	42-60	51.7	1.496	0.36
Rainbow	1+	63-95	84.9	6.368	0.77
Rainbow	2+	96-132	112.1	14.360	0.38
LN Dace	0+	0	0.0	0.000	0.00
LN Dace	1+	52-103	76.9	4.732	0.92
LN Sucker	0+	0	0.0	0.000	0.00
LN Sucker	1+	79-89	84.7	6.295	0.05
P Sculpin	1+	0	0.0	0.000	0.00
M Whitefish	0+	65-73	69.7	3.327	0.02
M Whitefish	1+	0	0.0	0.000	0.00
TOTAL					2.490

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH (cm)	MAXIMUM DEPTH (cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	12.1	40	70			20/35
5	11.7					
10	11.0			Mainly cobble cover		
15	10.7			Limited debris.		
20	10.0			Marked at top and bottom with orange ribbon.		
	10.5			Unstable banks at high flows		
	9.9			Gravel bar development and debris downstream		
	9.3			R2 #5		
				Flow 50+ cfs after heavy rains.		

10.7
 AREA (M²M) 458.0 MARGIN (M) 43.0

Appendix 3: Summary of Rainbow Trout Length and Age Data
from 1984 to 1989.

above average levels (0.6 parr/m² compared to an average of 0.5 parr/m²). Parr densities at Site FF2 were lower than average (0.4 parr/m² compared to an average of 0.7 parr/m²). The reasons for lower parr numbers in Site FF2 are unknown. This site had good fry recruitment from 1988, and offered more cover within the site than in the previous sampling period. At the same time, the higher parr numbers in Site FF1 come as a surprise since the site had undergone extensive shifting including dewatering of the old channel. Presumably fish from upstream areas moved into the new channel section during the course of the summer.

Rainbow fry fork lengths were near the average of previous years (Table 3). Age 1+ rainbow parr were, however, on average 7 mm smaller than parr collected during the previous three sample periods. The 1988 fry were the largest recorded, suggesting that unfavourable growth conditions were present in Foxy Creek during the summer of 1989. A similar pattern of smaller age 1+ parr was noted in upper Buck Creek samples (Table 8). Age 1+ parr at Site FF1 were particularly small (average fork length 70.5 mm (Appendix 3 Table 1). The channel at Site FF1 was extremely unstable, and was comprised of gravel over a thick layer of fine silts. This may have resulted in poor invertebrate production and reduced growth rates of fish utilizing this section of stream. There is not sufficient water temperature data for Foxy Creek to compare temperature differences during the summer growing period for the years of study.

Biomass estimates for the two Foxy Creek sites are presented in Appendix 4 Table 1 and summarized in Table 4. The total biomass of rainbow trout (grams/m²) has

Table 3. Summary of Rainbow Trout Age 0+ and Age 1+ Fork Lengths (mm) Combined for the Two Foxy Creek Sample Sites.

YEAR	FORK LENGTHS	
	AGE 0+	AGE 1+
1984	34.3	77.6
1987	38.8	81.0
1988	<u>39.2</u>	<u>79.8</u>
(84-88)	37.4	79.5
1989	37.7	72.7

Table 4. Summary of Biomass Estimates of Rainbow Trout for the Foxy Creek Sites Combined from 1984 to 1989.

YEAR	BIOMASS ESTIMATES	
	GRAMS/M ²	TOTAL GRAMS FROM SITE
1984	19.1	5977
1987	6.6	1758
1988	6.7	2283
1989	5.0	1700