FISH POPULATION MONITORING IN FOXY AND BUCK CREEKS SEPTEMBER 1990

Prepared by

DAVID BUSTARD & ASSOCIATES

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 1990. This is the fifth year of population estimates in Foxy Creek and the fourth year in Buck Creek.

Results indicate juvenile rainbow populations remained at high levels in lower Foxy Creek. These levels occurred despite the addition of 15000 hatchery coho to the lower 1 km of Foxy Creek by the Department of Fisheries and Oceans in July 1990. Overall rainbow fry densities were above average in Foxy Creek recovering from the lower levels found in 1989. Rainbow parr densities were below average largely reflecting poor parr numbers at the lower sample site. This lower site was re-located into its former channel in 1990, and instream activities may account for reduced parr levels. Total biomass of rainbow trout at the sample site was the highest since 1984 and levels of 4.4 g/m^2 reflect a very productive system particularly in light of additional species present in the system. Rainbow yearlings were larger than their 1989 cohorts but smaller than the mean parr size for previous years. Juvenile chinook salmon and longnose dace numbers increased substantially over previous levels found in lower Foxy Creek.

Rainbow trout numbers at the sample site located in Buck Creek downstream of Bessemer Creek but above Goosly Lake were the highest recorded to date, reflecting an increase in age 1+ fish at this site. The habitat in this low gradient section of stream is generally poor for juvenile rainbow trout rearing. For the second consecutive year a small number of rainbow fry were also captured at this site. A site located upstream of Bessemer Creek in the vicinity of good spawning habitat continued to have healthy populations of juvenile rainbow parr, with densities slightly higher than the previous three years of sampling. Rainbow fry densities at this site were near the

average for the three previous years. Total rainbow biomass was the highest to date at the site downstream of Bessemer Creek and in the upper Buck Creek site.

Juvenile steelhead population estimates at a site in lower Buck Creek were low compared to past estimates conducted in the area since 1981. Fry densities were lower than the average of the past 9 years and compare to the densities measured during three other years of low recruitment since 1981. It is assumed that the low fry levels reflect the poor adult escapements to the Bulkley River system in 1989-90. Age 1+ steelhead densities were also below average and probably reflect last year's poor fry recruitment in this section of Buck Creek.

Fish sampling at five sites in 1990 continues to provide an index of variation in fish populations found in Buck and Foxy creeks. The population monitoring suggests that Foxy Creek continues to be a very productive rearing stream for juvenile rainbow trout, despite the introduction of a large number of juvenile coho into the system in 1990. Mean biomass estimates of rainbow trout in this creek based on 5 years of sampling are comparable to levels obtained in the best rainbow trout streams in the area. Rainbow trout numbers in upper Buck Creek remain at healthy levels compared to past years, while juvenile steelhead numbers in lower Buck Creek (below Goosly Lake) remain depressed and well below the potential of the system.

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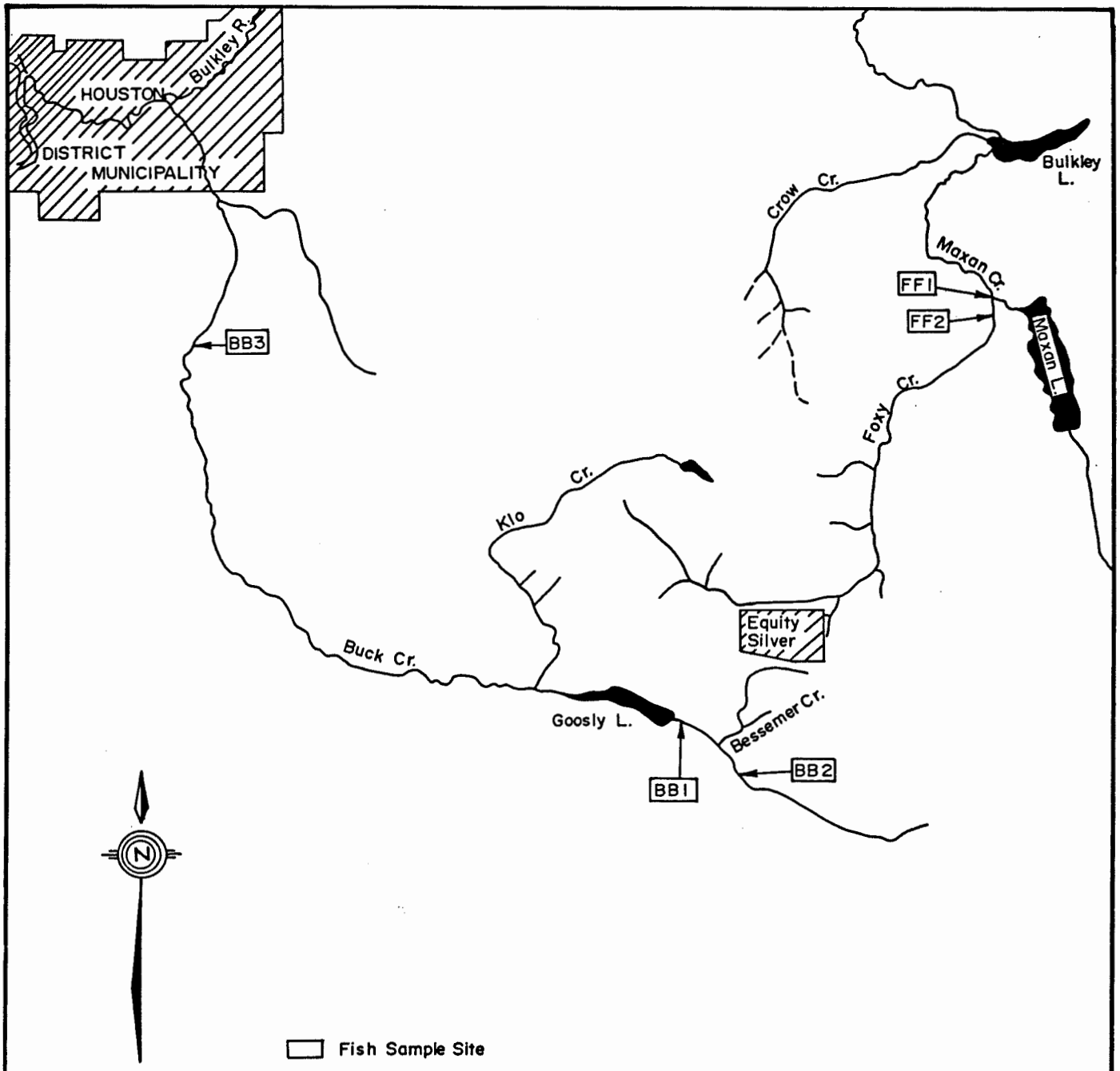
1.0 INTRODUCTION

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 1990 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 1990 studies represent the fifth 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), 1988 (Bustard 1988), and 1989 (Bustard 1989b). 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, presumably as flows decline 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),



DAVID BUSTARD & ASSOCIATES	Location of Fish Sample Sites	FIGURE 1

although this has not been 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 Department of Fisheries and Oceans planted 15,000 hatchery-raised coho salmon (Oncorhynchus kisutch) fry in the lower 1 km of Foxy Creek on July 10, 1990. This is the first outplanting of coho in this area. The fish were planted at the two bridge sites on lower Foxy Creek. One third of the fry were marked with a right ventral clip. Foxy Creek was selected as an outplanting site due to its lower water temperatures relative to other locations upstream of Bulkley Lake. Sites in the lower Bulkley River were not considered for outplanting in an effort to avoid competition with what was expected to be a high recruitment of wild coho fry in the lower river during 1990.

The 1990 studies represent the fourth 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 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 redside 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 29 to September 7, 1990 - a similar time period to all other years of sampling. 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) was re-located into its former channel in 1990. 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 in 1989. Site FF2 remained unchanged from the previous two years. The fish sample sites in Buck Creek have been at the same locations since 1987. 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.

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 523 m^2 or 104 m of stream length in Foxy Creek was sampled (Table 1). This is similar to the total area sampled in 1987 and approximately 20% lower than other years sampled. Flow conditions in Foxy Creek during 1990 were very low and the average channel width at Site FF2 was approximately 2 m narrower than the previous year reflecting these low flows. 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).

Table 1. Catch Composition at Foxy Creek Fish Sample Sites from 1984 to 1990.

SPECIES	1984 NUMBER	1984 %	1987 NUMBER	1987 %	1988 NUMBER	1988 %	1989 NUMBER	1989 %	1990 NUMBER	1990 %
RAINBOW FRY	799	57.2	660	72.7	768	66.3	546	62.8	929	55.8
RAINBOW PARR	593	42.4	202	22.2	319	27.5	315	36.2	246	14.8
CHINOOK	4	0.3	0	0.0	0	0.0	2	0.2	29	1.7
COHO (HATCHERY)	0	0.0	0	0.0	0	0.0	0	0.0	249	15.0
DACE	2	0.1	36	4.0	49	4.2	6	0.7	205	12.3
WHITEFISH	0	0.0	6	0.7	16	1.4	1	0.1	2	0.1
SCULPINS	0	0.0	4	0.4	3	0.3	0	0.0	2	0.1
SUCKERS	0	0.0	0	0.0	4	0.3	0	0.0	3	0.2
TOTAL	1398	100	908	100	1159	100	870	100	1665	100
AREA (m*m)	624		531		659		678		523	
LENGTH (m)	104		104		103		103		104	

The stream bed material at both sites was covered with a thick algal mat much heavier than observed in past years. It is not known whether this heavy algal growth reflects reduced streamflows during the late summer of 1990 or is indicative of some change in nutrient levels in the system.

The sample site at FF1 is more channelized with less cover complexity than in previous years. Most of the debris cover was pushed to the side of the channel when equipment was used to access the area upstream and re-direct the flow into the former channel. Sidechannel habitat was reduced from former levels at this site.

A total of 1665 fish were captured at the two sites in 1990 compared to an average of 1083 fish for the previous four years of sampling (Table 1). The detailed catch results for each site are presented in Appendix 2. Rainbow trout dominated the catch (70.6% of the total). However, for the first year, large numbers of planted coho juveniles were present in lower Foxy (15% of the overall catch). Juvenile chinook numbers were also up at both sites over previous years (1.7% of the catch). Also of interest was the increased catch of longnose dace in the sample sites. Dace numbers increased from comprising 1-4% of the total catch in previous years to over 12% in 1990. A small number of mountain whitefish and longnose suckers were captured and together comprised less than 1% of the sample. Pacific lamprey ammocoetes were present at both sites in lower Foxy Creek.

Table 2 summarizes rainbow trout densities at the two sites for the past five years. Rainbow trout fry (age 0+) densities at Site FF1 were three times the average for the

TABLE 2. Summary of Rainbow Trout Density Estimates in Foxy Creek from 1984 to 1990

SAMPLE SITE	YEAR	DENSITY (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
	1989	0.34	0.55	0.04
	(84-89)	0.55	0.44	0.10
	1990	1.81	0.18	0.01
FF2	1984	1.66	0.86	0.20
	1987	2.03	0.30	0.06
	1988	1.82	0.55	0.07
	1989	1.10	0.34	0.04
	(84-89)	1.65	0.51	0.09
	1990	1.75	0.63	0.03
MEAN	1984	1.27	0.74	0.20
	1987	1.34	0.30	0.08
	1988	1.07	0.40	0.06
	1989	0.72	0.44	0.04
	(84-89)	1.10	0.47	0.10
	1990	1.78	0.40	0.02

previous 4 years of sampling and for the first time comparable to densities at the upper site (FF2). Site FF2 fry densities were close to the average of past years.

In past years fry densities have been nearly 3 times as high at Site FF2 compared to Site FF1. It was assumed these higher densities indicated that FF2 was closer to the fry emergence (and hence spawning) area in lower Foxy Creek and reflected better fry rearing habitat. The heavy algal growth on the streambed may have made the two sites more comparable in terms of potential rearing, offering cover for fry throughout the site.

Total parr numbers sampled in lower Foxy Creek were low compared to previous years. This reflects a sharp drop in rainbow parr numbers at Site FF1. Numbers at Site FF2 were near the mean for previous years (Table 2). The decline in parr numbers at Site FF1 may reflect the stream disturbance that occurred when the channel was re-directed into its original channel. This would have left the old channel dewatered and shifted the flow into a channel that was previously dry. Parr numbers may not have recovered from the disturbance.

Rainbow fry fork lengths were near the average of previous years (Table 3). Age 1+ rainbow parr were, however, on average 3 mm smaller than parr collected during the previous four sample periods but were larger than the 1989 age 1+ parr.

Both rainbow fry and age 1+ parr at Site FF1 were small compared to Site FF2 (Appendix 3 Table 1). The fry were on average 4 mm smaller while parr were 7 mm smaller than at

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	39.2	79.8
1989	37.7	72.7
(84-89)	37.5	77.8
1990	38.0	75.0

Table 4. Summary of Biomass Estimates of Rainbow Trout for the Foxy Creek Sites Combined from 1984 to 1990.

YEAR	BIOMASS ESTIMATES GRAMS/M^2	TOTAL GRAMS FROM TWO SITES
1984	9.6	5977
1987	3.3	1758
1988	3.3	2283
1989	2.5	1700
1990	4.4	2445

the upstream site. Invertebrate production may be reduced at this site due to the channel shifting which has taken place.

At the same time, these comparisons are confounded by the addition of coho during the summer of 1990 in the vicinity of both sites. Sampling results indicate 2.4 coho/lineal m of stream or approximately 2400 coho were present in lower Foxy Creek 2 months after the initial release of 15,000 fish. The average weight of those fish that remained increased from 2.2 grams at the time of release to a mean of 3.8 grams in early September (Appendix 2). Mike O'Neil (Toboggan Creek Hatchery) indicates that some juvenile coho were observed moving down into Maxan Creek shortly after their release into Foxy Creek.

The influence of these additions on rainbow growth rates is subject to speculation. Research has demonstrated that wild coho and rainbow (steelhead) when occurring together tend to segregate into different microhabitats during the summer period (Hartman 1965). Coho prefer the pool areas while juvenile rainbow occupy riffle sites. Glova (1977) found that hatchery coho behavior differs from wild stocks and that introducing hatchery coho into a cutthroat trout system reduced survival of the trout by 40%.

In Foxy Creek, the introduced coho may have forced rainbow parr (closest in size and therefore greatest potential competitors) to occupy smaller and less suitable territories, and resulted in the smaller size observed in 1990. The presence of high numbers of rainbow fry at the two sites suggests that introduced coho were not preying on

the newly-emerging trout fry in the late summer period.

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/m^2) has ranged from 9.6 g/m^2 in 1984 to 2.5 g/m^2 in 1989. The 1990 biomass estimates of 4.4 g/m^2 exceed the 2.5-3.3 g/m^2 estimates for the previous 3 years. If the total grams of rainbow trout produced in the sample sites is estimated (thus correcting for discharge differences between years), the 1990 biomass estimates are higher than those obtained for any year sampled since 1984. This occurred despite the presence of large numbers of juvenile coho (1.8 g/m^2) and increased densities of longnose dace and chinook salmon at the sites in 1990.

Table 5 compares the density and biomass of rainbow fry and parr in Foxy Creek based on the five 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 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. Density estimates for 1990 are not available for these other systems. The mean of Foxy Creek fry densities are in the mid range for these major producers. As well, the parr densities and overall rainbow trout biomass are in the mid to upper end of the range. The fact that rainbow trout biomass remained high after the addition of the hatchery coho suggests that Foxy Creek has a very high capability for fish production that may be under-utilized during most years.

Table 5. Rainbow Trout Densities (fish/m^2) and Biomass (g/m^2) in Foxy Creek Compared to Best Adjacent 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 (84-90)	1.24	0.54	4.6
FOXY (1990)	1.78	0.42	4.4

* From Bustard (1989a)

**From Bustard (1987b)

3.2 Upper Buck Creek

In total, 816 m^2 of Buck Creek upstream of Goosly Lake comprising 149 m of stream margin was sampled in 1990 (Table 6). Habitat characteristics of both sites were little changed from previous years.

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. The 1990

sample site was approximately 5 m longer than previous years. 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, rainbow trout spawners are able to reach this area during high flow periods in the spring.

Similar to the previous two years, over 90% of the 425 fish captured in the two upper Buck Creek sites in 1990 were rainbow trout (Table 6). The remaining portion of the catch was comprised of sculpins (4.7%) and longnose suckers (1.8%). 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 most years. However, for the second year a small number of rainbow fry (5) were captured at this site in 1990. The 1989 catch of 21 fry is the highest at this location to date. Rainbow parr numbers

Table 6. Catch Composition at Upper Buck Creek Fish Sample Sites from 1987 to 1990.

SPECIES	SITE BB1 NUMBER (%) 1987	1988	1989	1990
RAINBOW FRY	1 (1.3)	0 (0.0)	21 (26.6)	5 (4.2)
RAINBOW PARR	37 (48.7)	29 (56.9)	24 (30.4)	86 (72.3)
SUCKERS	13 (17.1)	0 (0.0)	8 (10.1)	8 (6.7)
SCULPINS	25 (32.9)	22 (43.1)	25 (31.6)	20 (16.8)
WHITEFISH	0 (0.0)	0 (0.0)	1 (1.3)	0 (0)
TOTAL	76 (100)	51 (100)	79 (100)	119 (100)
AREA (m*m)	409	394	406	476
LENGTH (m)	66	63	65	71

SPECIES	SITE BB2 NUMBER (%) 1987	1988	1989	1990
RAINBOW FRY	90 (66.2)	130 (61.0)	213 (69.2)	188 (61.4)
RAINBOW PARR	97 (33.8)	83 (39.0)	95 (30.8)	118 (38.6)
SUCKERS	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
SCULPINS	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
WHITEFISH	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL	287 (100)	213 (100)	308 (100)	306 (100)
AREA (m*m)	319	359	343	340
LENGTH (m)	76	77	78	78

(94) at this site were the highest for the four years of record mainly reflecting an increase in age 1+ fish at this location. Parr numbers were more than double the best previous year's results.

Site BB2 provides excellent rainbow trout habitat and the fry and parr numbers indicate healthy populations of juvenile rainbow trout. The fry densities of 0.55 fry/m^2 (Table 7) are close to the mean since 1987.

Parr densities have remained at 0.2 to 0.3 parr/m^2 for the four years of study. The 1990 parr densities were the highest of any of the years of study.

Similar to past years, over 90% of the rainbow parr sampled in upper Buck Creek were age 1+. The low numbers of age 2+ parr in upper Buck Creek suggest that most parr are entering Goosly Lake after a second winter in the stream and prior to sampling in September of their third year.

While rainbow trout fry fork lengths were slightly below the average for past years at Site BB2, age 1+ parr were approximately 7 mm smaller than previous years at this site (Table 8). The average length of parr at Site BB1 was similar to past years.

Rainbow trout biomass was higher at both sites in upper Buck Creek in 1990 compared to previous years (Table 9). Site BB1 in particular, had increased biomass compared to previous years largely reflecting an increase in the numbers of age 1+ parr.

TABLE 7. Summary of Rainbow Trout Density Estimates in Upper Buck Creek from 1987 to 1990.

SAMPLE SITE	YEAR	DENSITY (fish/m^2) 0+	1+	2+
BB1	1987	0.00	0.07	0.02
	1988	0.00	0.06	0.01
	1989	0.05	0.04	0.02
	(1987-89)	0.02	0.06	0.02
	1990	0.01	0.16	0.02
BB2	1987	0.59	0.27	0.03
	1988	0.36	0.23	0.00
	1989	0.62	0.27	0.01
	(1987-89)	0.52	0.26	0.01
	1990	0.55	0.34	0.01

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
(87-89)	44.1	41.0	88.8	78.6
1990	54.8	38.3	89.0	71.0

Table 9. Summary of Biomass Estimates of Rainbow Trout for the Upper Buck Creek Sites from 1987 to 1990.

YEAR	GRAMS/M^2		TOTAL GRAMS FROM SITE	
	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
1990	1.49	2.61	708	888

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 7 years. Based on these previous observations more trout have been present in this section in the past four years than during earlier sampling, and 1990 numbers are the highest to date.

3.3 Lower Buck Creek

Site BB3 sampled in lower Buck Creek was 399 m^2 and comprised 43 m of stream margin (Table 10). Streamflow conditions during sampling were the lowest encountered in the four years of study at this site. Over 70% of the 395 fish estimated within the site were longnose dace (Table 10). Rainbow juveniles (assumed to be the progeny of steelhead trout) comprised approximately 25% of the total sample. This is the lowest proportion reported for the years of sampling. Mountain whitefish and longnose suckers each comprised approximately 2% of the sample.

The total number of rainbow sampled at this site was the lowest for the four years of sampling. Numbers of longnose dace are up and compare to levels estimated in 1987. Biomass estimates for longnose dace of over 3 g/m^2 are also higher than the 0.9 to 1.2 g/m^2 measured during past years.

Rainbow trout density estimates for this location have been collected since 1981 and are summarized in Table 11. Fry densities of 0.14 fry/m^2 are far below average and compare to poor years such as 1982, 1984 and 1988. These low fry levels presumably reflect the poor adult steelhead

Table 10. Catch Composition at the Lower Buck Creek Fish Sample Site in 1990 Compared to Other Years.

SPECIES	1987 NUMBER	1987 %	1988 NUMBER	1988 %	1989 NUMBER	1989 %	1990 NUMBER	1990 %	OTHER YEARS* NUMBER	OTHER YEARS* %
RAINBOW FRY	217	39.7	66	28.6	109	40.1	58	14.7	79	46.5
RAINBOW PARR	49	9.0	39	16.9	67	24.6	40	10.1	24	14.1
DACE	279	51.0	108	46.8	89	32.7	282	71.4	60	35.3
WHITEFISH	2	0.3	15	6.5	3	1.1	7	1.8	4	2.4
SUCKERS	0	0.0	3	1.3	4	1.5	8	2.0	3	1.8
TOTAL	547	100	231	100	272	100	395	100	170	100
AREA (m*m)	413		416		458		399		NA	
LENGTH (m)	44		43		43		43		NA	

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

escapements to the upper Bulkley River system in 1989-90 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/m^2. The age 1+ rainbow densities were also low, and presumably reflect last year's poor fry recruitment in this section of Buck Creek. Age 2+ and older parr numbers were slightly above average for this site.

TABLE 11. Summary of Steelhead Trout Densities at Site BB3 from 1981 to 1990[1].

YEAR	DENSITY (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	0.16	0.07	0.02
1989	0.24	0.12	0.03
Mean	0.53	0.13	0.03
1990	0.14	0.05	0.04

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

Rainbow fry sizes were similar to 1989 and slightly above the mean for the previous 3 years (Table 12). Age 1+ parr were also slightly larger than the average from 1987-89.

Data in Table 13 indicates that despite fewer fish, biomass estimates in the lower Buck Creek site are within the range of previous measurements reflecting larger fish sizes in 1990, especially in the older parr group.

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.

Average steelhead fry densities at Site BB3 in lower Buck Creek were in the mid-range of densities reported for other

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
(1987-89)	49.4	86.0
1990	51.3	87.5

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

Table 13. Summary of Biomass Estimates for Rainbow Trout in Lower Buck Creek (Site BB3) from 1987 to 1990.

YEAR	GRAMS/M^2	TOTAL GRAMS FROM SITE
1987	2.01	830
1988	1.06	441
1989	1.51	692
1990	1.74	694

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	0.49	1981-1990	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 5, 1990.

SAMPLE #	LENGTH (mm)	AGE	WEIGHT (gm)	TOTAL WEIGHT
1a	105		12.5	
1b	71		4.5	25.1
2a	111		14.0	
2b	82		6.1	20.1
3	130		23.5	23.5
4a	100		10.7	
4b	102		10.0	20.7
5	167		44.0	44.0
6a	104		11.3	
6b	92		8.1	19.4
7a	96		9.5	
7b	95		9.9	19.4
8a	97		9.9	
8b	102		10.9	20.8
9a	103		12.0	
9b	98		10.1	22.1
10a	98		9.8	
10b	98		11.1	20.9

COMMENT: These samples were captured by electrofishing. Sample location was site FF2.

TABLE 2. Buck Creek above Bessemer Creek rainbow trout samples collected for metal analyses, September 6, 1990.

SAMPLE #	LENGTH (mm)	AGE	WEIGHT (gm)	TOTAL WEIGHT
1	115		16.2	16.2
2	118		16.7	16.7
3a	86		8.5	
3b	95		9.8	18.3
4a	83		7.2	
4b	90		8.8	16.0
5a	87		7.8	
5b	79		6.2	
5c	82		6.7	20.7
6a	70		7.4	
6b	91		10.9	18.3
7a	88		7.6	
7b	87		7.8	
7c	83		6.7	22.1
8a	84		7.3	
8b	85		6.9	
8c	74		5.0	19.2
9a	79		6.4	
9b	81		6.2	
9c	72		5.4	18.0
10a	78		6.1	
10b	74		6.3	
10c	78		6.2	18.6

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 7, 1990.

SAMPLE #	LENGTH (mm)	AGE	WEIGHT (gm)	TOTAL WEIGHT
1	133		24.9	24.9
2	130		22.5	22.5
3a	105		11.3	
3b	90		9.2	20.5
4a	114		15.3	
4b	94		9.0	24.3
5a	98		10.4	
5b	102		10.0	20.4
6a	98		9.6	
6b	101		11.1	20.7
7a	104		11.3	
7b	95		9.6	20.9
8a	105		10.3	
8b	100		10.1	20.4
9a	100		10.6	
9b	91		8.2	18.8
10a	92		8.8	
10b	93		8.8	17.6

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, 1990.

SAMPLE #	LENGTH (mm)	AGE	WEIGHT (gm)	TOTAL WEIGHT
1	122		22.7	22.7
2a	107		15.2	
2b	85		8.8	24.0
3a	91		10.4	
3b	98		11.7	22.1
4a	86		8.5	
4b	85		9.4	17.9
5a	84		8.7	
5b	82		8.7	17.4
6a	97		11.5	
6b	84		8.4	19.9
7a	165		51.6	51.6
8a	94		10.9	
8b	92		8.9	19.8
9a	109		15.8	
9b	88		9.2	25.0
10a	109		14.5	
10b	89		10.6	25.1

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 1990.

SITE DESCRIPTIONS - SITE FF1 DATE- SEPT 4/90 TEMP. 11.5 C @1100 hr. SLOPE- 1.0%
This site has been relocated back into the original channel after shifting in 1989.
It appears that a cat has run up the creek and pushed all of the debris to the side.
There is a very heavy algal growth on the substrate.
Site starts approximately 10 m upstream from former bridge site.

POPULATION ESTIMATES:

SPECIES	AGE	PASS 1	PASS 2	U1&U2	NUMBER	S.E.	MORTS	N-CORR	N/M*M	N/LIN-M
Rainbow	0+	273	79	352	384.2	10.8	0	384	1.812	7.68
Rainbow	1+	31	6	37	38.4	1.8	0	38	0.181	0.77
Rainbow	2+	2	0	2	2.0	0.0	0	2	0.009	0.04
Chinook	0+	9	2	11	11.6	1.2	0	12	0.055	0.23
Coho	0+	103	12	115	116.6	1.6	0	117	0.550	2.33
LN Dace	all	34	26	60	144.5	107.0	0	145	0.682	2.89
LN Sucker	all	0	0	0	0.0	0.0	0	0	0.000	0.00
P Sculpin	1+	2	0	2	1.0	0.0	0	1	0.005	0.02
M Whitefish	0+	1	1	2	2.0	NA	0	2	0.009	0.04
M Whitefish	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
Lamprey		3	3							
TOTAL								700	3.303	14.005

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m*m)
Rainbow	0+	31-44	35.9	0.946	1.71
Rainbow	1+	57-96	71.3	4.250	0.77
Rainbow	2+	105-108	106.5	12.730	0.12
Chinook	0+	49-63	56.5	3.277	0.18
Coho	0+	45-74	63.4	3.289	1.81
LN Dace	all	30-82	38.8	1.028	0.70
LN Sucker	all	0	0.0		0.00
P Sculpin	1+	63-70	66.5	4.278	0.02
M Whitefish	0+	67-71	69.0	3.890	0.04
M Whitefish	1+	0	0.0		0.00
TOTAL					5.35

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH(cm)	MAXIMUM DEPTH(cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	6.0	5	35	Present	Present	3/20
5	6.1	Debris pushed to edge.				
10	6.2	Estimate flow at 2 cfs.				
15	4.1	DFO has planted 15000 fry in vicinity of this site.				
20	3.5	Entire reach is on creek fan.				
	4.5	Photos 1-3.				
	4.8					
	4.6					
	5.2					
	4.2					

AREA (M*M) 212.0 MARGIN (M) 50.0

SITE DESCRIPTIONS - SITE FF2 DATE-SEPT 5/90 TEMP. 13.5 C @1700 hr Slope 1.5 %
This site is approximately 1 km upstream of Maxan at water sample site.
Same site as 1988 and 1989 sampling.
The site is little changed from 1989 except for heavier algal mat and low flows.
Half of the site has a small sidechannel along the left side. This channel is nearly dry.

POPULATION ESTIMATES:

SPECIES	AGE	PASS 1	PASS 2	U1&U2	NUMBER	S.E.	MORTS	N-CORR	N/M*M	N/LIN-M
Rainbow	0+	262	136	398	544.8	44.8	0	545	1.752	10.09
Rainbow	1+	111	48	159	195.6	16.9	0	196	0.629	3.62
Rainbow	2+	7	2	9	9.8	1.7	0	10	0.032	0.18
Chinook	0+	6	11	17	17.0	NA	0	17	0.055	0.31
Coho	0+	77	32	109	131.8	12.7	0	132	0.424	2.44
LN Dace	all	29	31	60	60.0	NA	0	60	0.193	1.11
LN Sucker	all	3	0	3	3.0	0.0	0	3	0.010	0.06
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								962	3.093	17.813

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m*m)
Rainbow	0+	33-49	40.1	1.17	2.05
Rainbow	1+	58-102	78.7	5.57	3.50
Rainbow	2+	103-167	118.9	17.20	0.54
Chinook	0+	57-72	61.6	3.55	0.19
Coho	0+	57-80	68.2	4.37	1.85
LN Dace	all	49-100	76.3	6.16	1.19
LN Sucker	all	102-142	122.7	25.03	0.24
P Sculpin	1+	0	0.0		0.00
M Whitefish	0+	0	0.0		0.00
M Whitefish	1+	0	0.0		0.00
Lamprey					
TOTAL					9.57

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH(cm)	MAXIMUM DEPTH(cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	5.8	10	90		Present	15/40
5	5.6		This site is 30% pool and 70% riffle.			
10	4.2		Good cover in cobble and debris. Entire bottom covered with thick algal mat.			
15	5.8		Estimate flow of 2 cfs			
20	5.9					
	4.9					
	4.2					
	3.9					
	9.3 Plus others					
	5.8					

AREA (M*M) 311.0 MARGIN (M) 54.0

SITE DESCRIPTIONS - SITE BB1 DATE-SEPT 7/90 TEMP. 11.5 C @ 1100 hr 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*M	N/LIN-M
Rainbow	0+	3	1	4	4.5	1.5	0	5	0.009	0.06
Rainbow	1+	46	18	64	75.6	8.4	0	76	0.159	1.07
Rainbow	2+	4	2	6	8.0	4.9	0	8	0.017	0.11
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	0.017	0.11
LN Sucker	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
P Sculpin	1+	10	5	15	20.0	7.7	0	20	0.042	0.28
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										
TOTAL								116	0.244	1.65

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m*m)
Rainbow	0+	52-59	54.8	2.07	0.02
Rainbow	1+	71-101	89.0	7.71	1.22
Rainbow	2+	102-132	114.0	15.08	0.25
LN Dace	0+	0	0.0		0.00
LN Dace	1+	0	0.0		0.00
LN Sucker	0+	0	0.0		0.00
LN Sucker	1+	0	0.0		0.00
P Sculpin	1+	71-108	85.5	7.75	0.33
M Whitefish	0+	0	0.0		0.00
M Whitefish	1+	0	0.0		0.00
TOTAL					1.824

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH(cm)	MAXIMUM DEPTH(cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	6.5	60	100	Present	Present	Silt/2
5	5.5					
10	6.4		Debris and log cover throughout			
15	3.0		Free-flowing section.			
20	10.0		Beaver activity in the lower end			
	7.3		Estimate 2-3 cfs.			
	9.8					
	6.8					
	5.4					
	6.7					

AREA (M*M) 475.5 MARGIN (M) 70.5

SITE DESCRIPTIONS - SITE BB2 DATE-SEPT 6/90 TEMP. 11 C 1730 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	U1&U2	NUMBER	S.E.	MORTS	N-CORR	N/M*M	N/LIN-M
Rainbow	0+	107	46	153	187.7	16.4	0	188	0.552	2.41
Rainbow	1+	89	20	109	114.8	3.9	0	115	0.338	1.47
Rainbow	2+	2	0	2	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								305	0.898	3.916

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m*m)
Rainbow	0+	33-44	38.3	1.39	0.77
Rainbow	1+	54-95	71.0	5.05	1.70
Rainbow	2+	115-118	116.5	16.02	0.14
LN Dace	0+	0	0.0		0.00
LN Dace	1+	0	0.0		0.00
LN Sucker	0+	0	0.0		0.00
LN Sucker	1+	0	0.0		0.00
P Sculpin	1+	0	0.0		0.00
M Whitefish	0+	0	0.0		0.00
M Whitefish	1+	0	0.0		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	5.9	20	100			3/7
5	4.9		Spawning gravel throughout			
10	4.8		Lots of debris and overhanging banks			
15	5.3		Bank instability below road.			
20	5.0		Flows are low - estimate 2-3 cfs.			

Plus 10 others

	4.4		
AREA (M*M)	340.1	MARGIN (M)	78.0

SITE DESCRIPTIONS - SITE BB3 DATE- AUG 29/90 TEMP. 14.5 C @ 1300 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 identical to 1989 site.
Estimate site is 80 % riffle and 20 % glide.
Flows are clear and low.

POPULATION ESTIMATES:

SPECIES	AGE	PASS 1	PASS 2	U1&U2	NUMBER	S.E.	MORTS	N-CORR	N/M*M	N/LIN-M
Rainbow	0+	34	14	48	57.8	8.2	0	58	0.145	1.34
Rainbow	1+	18	3	21	21.6	1.1	0	22	0.054	0.50
Rainbow	2+	6	4	10	18.0	19.0	0	18	0.045	0.42
LN Dace	1+	121	69	190	281.6	42.6	0	282	0.706	6.55
LN Sucker	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Sucker	1+	5	2	7	8.3	2.9	0	8	0.021	0.19
P Sculpin	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
M Whitefish	0+	2	1	3	4.0	3.5	0	4	0.010	0.09
M Whitefish	1+	0	3	3	3.0	3.0	0	3	0.008	0.07
Lamprey		7	4							
TOTAL								394	0.989	9.17

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m*m)
Rainbow	0+	35-63	51.3	2.23	0.32
Rainbow	1+	78-98	87.5	9.24	0.50
Rainbow	2+	107-165	118.7	20.29	0.92
LN Dace	1+	35-101	62.4	4.55	3.21
LN Sucker	0+	0	0.0		0.00
LN Sucker	1+	62-187	101.7	15.27	0.32
P Sculpin	1+	0	0.0		0.00
M Whitefish	0+	65-75	71.0	5.55	0.06
M Whitefish	1+	174-273	217.3	114.90	0.86
TOTAL					6.191

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH(cm)	MAXIMUM DEPTH(cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	10.7					20/35
5	10.7					
10	10.1					
15	9.4					
20	9.3					
	9.4					
	7.6					
	7.0					
	9.3					

Mainly cobble cover
Limited debris.
Marked at top and bottom with orange ribbon.
Unstable banks at high flows
Gravel bar development and debris downstream
Lower flows than in 1989.

AREA (M*M) 398.8 MARGIN (M) 43.0

Appendix 3: Summary of Rainbow Trout Length and Age Data from 1984 to 1990.

APPENDIX 3 TABLE 1. Summary of Rainbow Trout Length and Age Data for Foxy Creek, 1984 to 1990.

SITE	AGE	RAINBOW 0+ 1984	1987	1988	1989	1990	MEAN
SITE FF1	n	269	201	92	90	384	207
	%	51.1	62.4	50.8	36.6	90.6	58.3
	fl(mm)	33.9	40.2	40.5	38.4	35.9	37.8
SITE FF2	n	530	459	676	456	545	533
	%	61.2	85.0	74.6	74.1	72.6	73.5
	fl(mm)	34.7	37.4	38.0	38.6	40.1	37.8
TOTAL	n	799	660	768	546	929	740
	%	56.2	73.7	62.7	55.4	81.6	65.9
	fl(mm)	34.3	38.8	39.2	38.5	38.0	37.8

		RAINBOW 1+ 1984	1987	1988	1989	1990	MEAN
SITE FF1	n	193	93	75	145	38	108.8
	%	36.7	28.9	41.4	58.9	9.0	35.0
	fl(mm)	77.2	79.6	79.5	70.5	71.3	75.6
SITE FF2	n	273	67	204	141	196	176
	%	31.5	12.4	22.5	22.9	26.1	23.1
	fl(mm)	78.0	82.3	80.0	74.9	78.7	78.8
TOTAL	n	466	160	279	286	234	285
	%	34.1	20.6	32.0	40.9	17.5	29.0
	fl(mm)	77.6	81.0	79.8	72.7	75.0	77.2

		RAINBOW 2+ 1984	1987	1988	1989	1990	MEAN
SITE FF1	n	64	28	14	11	2	24
	%	12.2	8.7	7.7	4.5	0.5	6.7
	fl(mm)	120.5	115.9	118.3	119.0	106.5	116.0
SITE FF2	n	63	14	26	18	10	26
	%	7.3	2.6	2.9	2.9	1.3	3.4
	fl(mm)	119.5	106.6	109.9	111.4	118.9	113.3
TOTAL	n	127	42	40	29	12	50
	%	9.7	5.6	5.3	3.7	0.9	5.1
	fl(mm)	120.0	111.3	114.1	115.2	112.7	114.7

APPENDIX 3 TABLE 2. Summary of Rainbow Trout Length and Age Data for Buck Creek, 1987 to 1990.

SITE	AGE	RAINBOW 0+ 1987	1988	1989	1990	MEAN
SITE BB1	n	1	0	21	5	6.8
	%	2.6	0.0	46.7	5.6	13.7
	fl(mm)			44.1	54.8	49.5
SITE BB2	n	190	130	213	188	180
	%	50.8	61.0	69.2	61.4	60.6
	fl(mm)	43.9	39.0	40.1	38.3	40.3
SITE BB3	n	217	66	109	58	113
	%	81.6	62.9	61.9	59.2	66.4
	fl(mm)	47.8	48.7	51.7	51.3	49.9

		RAINBOW 1+ 1987	1988	1989	1990	MEAN
SITE BB1	n	28	24	16	76	36
	%	73.7	82.8	35.6	85.4	69.3
	fl(mm)	89.1	92.2	85.1	89.0	88.9
SITE BB2	n	87	83	92	115	94
	%	23.3	39.0	29.9	37.6	32.4
	fl(mm)	80.4	79.7	75.6	71.0	76.7
SITE BB3	n	33	29	55	22	35
	%	12.4	27.6	31.3	22.4	23.4
	fl(mm)	89.0	84.1	84.9	87.5	86.4

		RAINBOW 2+ 1987	1988	1989	1990	MEAN
SITE BB1	n	9	5	8	8	8
	%	23.7	17.2	17.8	9.0	16.9
	fl(mm)	102.6	117.2	102.1	114.0	109.0
SITE BB2	n	10	0	3	3	4
	%	2.7	0.0	1.0	1.0	1.2
	fl(mm)	116.8		104.3	116.5	112.5
SITE BB3	n	16	10	12	18	14
	%	6.0	9.5	6.8	18.4	10.2
	fl(mm)	106.0	120.5	112.1	118.7	114.3

Appendix 4: Biomass Estimates for Rainbow Trout from Foxy and Buck Creeks from 1984 to 1990.

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

SITE	YEAR	GRAMS/M*M 0+	1+	2+	TOTAL
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
	1990	1.71	0.77	0.12	2.60
	MEAN	0.60	1.80	1.50	3.90
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
	1990	2.05	3.50	0.54	6.09
	MEAN	1.07	2.88	1.38	5.33
MEAN	1984	0.81	4.56	4.19	9.56
	1987	0.67	1.50	1.15	3.32
	1988	0.48	1.95	0.91	3.33
	1989	0.34	1.54	0.65	2.53
	1990	1.88	2.14	0.33	4.35
	MEAN	0.84	2.34	1.44	4.62

SITE	YEAR	TOTAL GRAMS FROM SITE 0+	1+	2+	TOTAL
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
	1990	362.5	163.2	25.4	551.2
	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
	1990	637.6	1088.5	167.9	1894.0
	MEAN	266.0	897.1	516.5	1679.6
MEAN	1984	254.6	1427.9	1306.0	2988.5
	1987	167.8	394.5	317.0	879.3
	1988	171.3	670.7	300.0	1141.9
	1989	128.7	506.4	215.3	850.4
	1990	500.0	625.9	96.7	1222.6
	MEAN	180.6	749.9	534.6	1465.0

* NOTE - MEAN biomass estimates have been revised for all years prior to 1990 due to an error in determining means for the combined estimates

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

SITE	YEAR	GRAMS/M*M 0+	1+	2+	TOTAL
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
	1990	0.02	1.22	0.25	1.49
	MEAN	0.02	0.62	0.23	0.87
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
	1990	0.77	1.70	0.14	2.61
	MEAN	0.48	1.32	0.18	1.97
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
	1990	0.32	0.50	0.92	1.74
	MEAN	0.36	0.64	0.58	1.58

SITE	YEAR	TOTAL GRAMS FROM SITE 0+	1+	2+	TOTAL
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
	1990	9.5	580.1	118.9	708.5
	MEAN	6.8	167.8	91.4	376.6
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
	1990	261.9	578.2	47.6	887.7
	MEAN	126.4	401.9	60.3	663.4
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
	1990	127.6	199.4	366.9	693.9
	MEAN	159.7	294.1	200.1	663.9