FISH POPULATION MONITORING IN FOXY AND BUCK CREEKS SEPTEMBER 1988

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 1988. This is the third year of population estimates in Foxy Creek and the second year in Buck Creek.

Results indicate very high juvenile rainbow populations continue to utilize lower Foxy Creek. Rainbow fry numbers were slightly lower than previous years, largely due to reduced numbers at the lower of two sites. Rainbow parr numbers increased in 1988 compared to 1987, but remained well below levels of 1984. Moving the upper Foxy Creek index site to a new location has made sampling more comparable to conditions present during 1984 than in 1987. Some habitat changes noted at the lower site in Foxy Creek may account for lower parr numbers at this site. Fish population estimates continue to indicate that Foxy Creek rainbow trout densities are high compared to other productive rainbow trout streams in the area.

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 unsuitable for juvenile rainbow trout rearing. A site located upstream of Bessemer Creek in the vicinity of good spawning habitat had healthy populations of juvenile rainbow parr. Rainbow fry numbers were lower in 1988 than 1987, possibly reflecting increased access difficulty past beaver dams for rainbow spawners moving upstream from Goosly Lake.

Juvenile steelhead population estimates at a site in lower Buck Creek were comparable to past estimates conducted in the area since 1981. Both fry and parr 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 1987-88 resulting in low fry seeding of Buck Creek. 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 1988 continues to provide an index of variation in fish populations found in Buck and Foxy creeks. This systematic monitoring program should help detect any major shifts in fish numbers that might occur over time in these watersheds.

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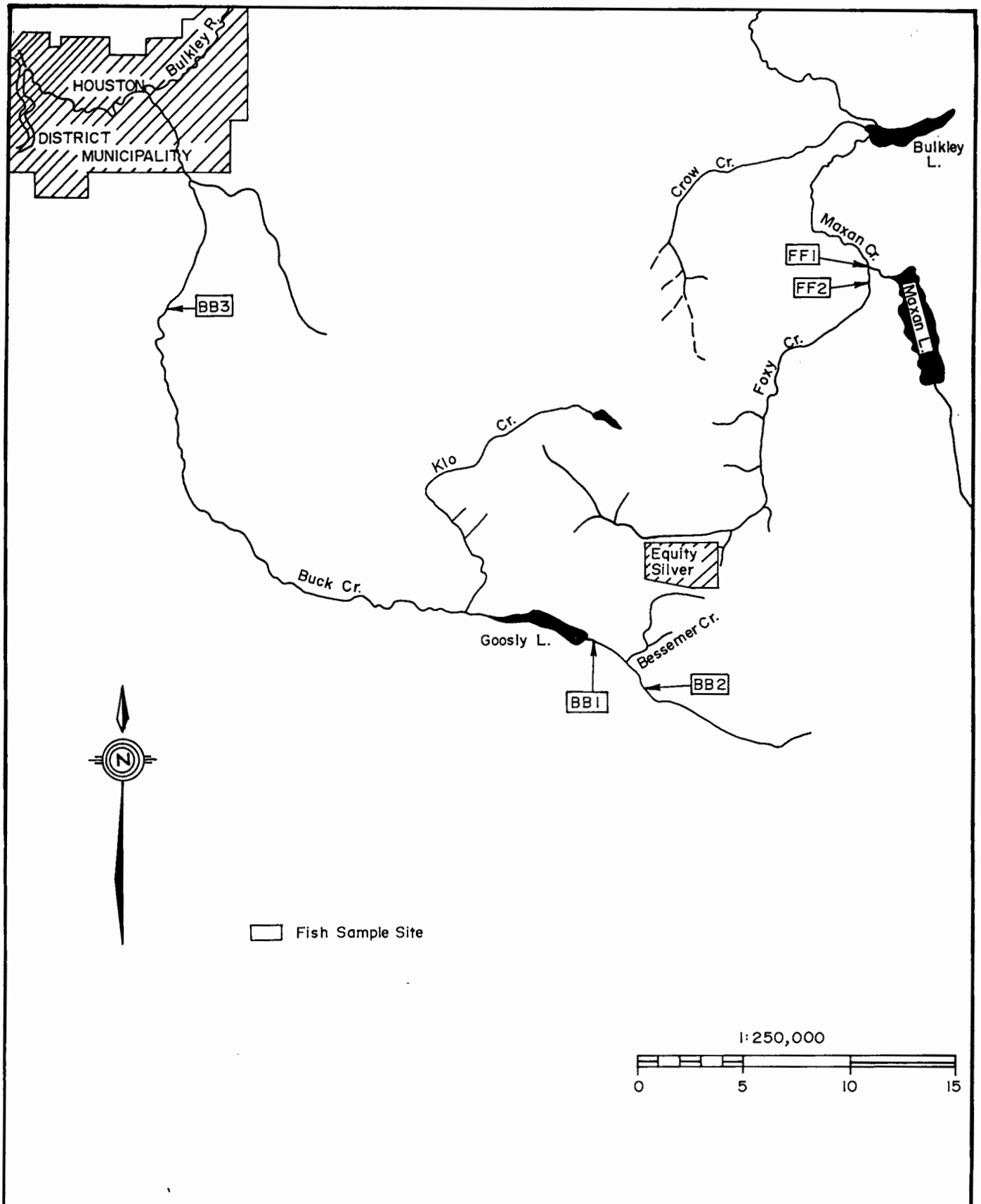
1.0 INTRODUCTION

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 1988 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 1988 studies represent the third year of detailed fish population assessments in Foxy Creek. Previous fish sampling has been conducted in Foxy Creek during 1984 (Bustard 1984) and 1987 (Bustard 1987a). These previous studies have demonstrated that high numbers of juvenile rainbow trout (Salmo gairdneri), and limited numbers of chinook salmon (Onchorhynchus 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 of the creek (Bustard 1984). 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, although this has not been verified.

The 1988 studies represent the second year that fish population monitoring has been conducted in Buck Creek for Equity Silver Mines Ltd. Fish sampling in lower Buck Creek has been undertaken at a number of sites between 1981 and 1986 as part of a steelhead (Salmo gairdneri) stock monitoring program by the Ministry of Environment (for most recent summary see Tredger



DAVID BUSTARD & ASSOCIATES	Location of Fish Sample Sites	FIGURE 1

(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 (Onchorhynchus 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 collection areas fish for tissue metal analyses. Rainbow trout, longnose suckers, prickly sculpins, and redside shiners (Richardsonius balteatus) are present in upper Buck Creek (Bustard 1987a). 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 September 1 to 9, 1988. 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 established at the same location as in previous years. Site FF2 located approximately 1 km upstream on Foxy Creek was moved immediately downstream of the former site. Channel shifts in the upper 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 detailed sites in Buck Creek were at the same locations as in 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 of 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 anaethetized, 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 samples. Weights were collected from these rainbow as well as from a sample of rainbow fry and other species sampled for 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 659 m^2 or 103 m of stream length in Foxy Creek was sampled. The sample sites comprise approximately 3.5% of the main fish-producing section of Foxy Creek (lower 3 km). This represents approximately 25% more surface area than in these sample sites in 1987 and is similar to the total area sampled in 1984 (Table 1). The increased surface area largely reflects the movement of Site FF2 to a new location due to channel changes at this upstream location as well as slightly higher flow conditions in Foxy Creek during 1988.

A total of 1159 fish were captured at the two sites in 1988 compared to 1398 and 908 fish in the same area in 1984 and 1987 respectively (Table 1). The detailed catch results for each site are presented in Appendix 2. Similar to 1987, nearly 94% of the fish captured were rainbow trout. The remaining catch consisted of longnose dace (4.2%), prickly sculpins (0.3%), mountain whitefish (1.4%), and longnose suckers (0.3%). This is the first year that suckers have been sampled in lower Foxy Creek. As in 1987, no juvenile chinook were captured at either site. A small number of Pacific lamprey ammocoetes have been present each year.

Table 2 summarizes rainbow trout densities at the two sites for the past three years. As well, a summary of the length and age data for rainbow trout is presented in Appendix 3 (Table 1). Rainbow trout fry (age 0+) densities were lower than previous years at Site FF1 but average at Site FF2.

TABLE 1. Catch Composition at Foxy Creek Fish Sample Sites from 1984 to 1988.

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

As in other years, densities were nearly 3 times as high at Site FF2 compared to Site FF1. These higher densities, in conjunction with a typically smaller fry size at the upper site (Appendix 3), suggests that Site FF2 is closer to the fry emergence (and hence spawning) area in lower Foxy. Site FF2 also possesses more cobble habitat preferred by rearing fry.

Total parr numbers sampled in lower Foxy Creek increased in 1988 compared to 1987, but remained well below the levels of 1984 (Table 1). The results in Table 2 indicate that densities of parr at Site FF1 were slightly lower than 1987 levels (0.3 parr/m^2 compared to 0.4 parr/m^2), while densities at Site FF2 were considerably higher in 1988

TABLE 2. Summary of Rainbow Trout Density Estimates in Foxy Creek from 1984 to 1988.

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
	MEAN	0.62	0.40	0.12
FF2	1984	1.66	0.86	0.20
	1987	2.03	0.30	0.06
	1988	1.82	0.55	0.07
	MEAN	1.84	0.57	0.11

compared to 1987 (0.6 parr/m^2 compared to less than 0.4 parr/m^2). Some of the changes in parr densities may reflect changes in habitat at the two sites. For example, it was noted that there was less deep pool habitat at Site FF1 than in 1987, possibly leading to the lower parr densities. At the same time, shifting Site FF2 downstream slightly resulted in more deeper and faster water areas in the site - making it more comparable to conditions present in 1984 than in 1987.

Densities of larger parr (age 2+) have remained at levels less than one-half of those recorded in 1984. Less than 1% of the parr sample is comprised of age 3+ or older fish for the three years of sampling.

Rainbow fry and age 1+ parr average lengths were similar to 1987 lengths and larger than their 1984 counterparts (Appendix 3, Table 1). This suggests that conditions in 1984 may have been quite cool, leading to poor growth and later fry emergence.

Table 3 compares the density of rainbow fry and parr in Foxy Creek based on the three years of measurements to density information collected during 1987 from five resident rainbow trout tributaries on nearby Francois Lake (Bustard 1987b). Fry densities in Foxy Creek exceeded three of the five tributaries. 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. Rainbow trout parr densities exceeded all of the Francois Lake tributaries including the Nithi River indicating that Foxy Creek rainbow trout densities are high compared to other productive rainbow streams.

TABLE 3. Rainbow Trout Densities (Fish/m^2) in Foxy Creek Compared to Adjacent Resident Rainbow Streams.

SYSTEM	FRY DENSITIES	PARR DENSITIES
ALLIN (1 site)	0.20	0.11
RAMSAY (2 sites)	1.34	0.12
PARROTT (3 sites)	0.32	0.23
NITHI (5 sites)	2.41	0.37
UNCHA (3 sites)	0.92	0.03
FOXY (3-year mean)	1.23	0.60

3.2 Upper Buck Creek

In total, 753 m^2 of Buck Creek upstream of Goosly Lake comprising 140 m of stream margin was sampled in 1988. This was slightly less than the area sampled in 1987 (Table 4).

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 for tissue sampling for metal analyses indicated that the stream below this point is not used 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 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 1987, over 90% of the 264 fish captured in the two upper Buck Creek sites in 1988 were rainbow trout. The remaining portion of the catch was comprised of sculpins. Longnose suckers have been noted in the lower site for the previous 4 years and comprised 17% of the catch at the lower site during the 1987 sample. However, none were sampled in 1988. Rainbow trout were the only species present at site BB2, the uppermost of the two sites (Table 4). Detailed catch results and habitat descriptions for the two sites are presented in Appendix 2 and a summary of length and age data is presented in Appendix 3 (Table 2).

TABLE 4. Catch Composition at Upper Buck Creek Fish Sample Sites in 1987 and 1988.

SPECIES	SITE BB1 NUMBER (%)		SITE BB2 NUMBER (%)	
	1987	1988	1987	1988
RAINBOW FRY	1 (1.3)	0 (0)	190 (66.2)	130 (61.0)
RAINBOW PARR	37 (48.7)	29 (56.9)	97 (33.8)	83 (39.0)
SUCKERS	13 (17.1)	0 (0)	0 (0)	0 (0)
SCULPINS	25 (32.9)	22 (43.1)	0 (0)	0 (0)
TOTAL	76	51	287	213
AREA (m^2)	409	394	319	359
LENGTH (m)	66	63	76	77

The low gradient ponded areas in the vicinity of site BB1 do not offer suitable rainbow trout spawning or fry rearing habitat - and this is reflected in the nearly complete absence of fry in this section during the two years of sampling. Rainbow parr numbers at this site were slightly lower than 1987, and 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 0.4 fry/m^2 (Table 5) are down from the 0.6 fry/m^2 level of 1987, but are comparable to the lower Foxy Creek site which were also down in 1988. The poorer fry recruitment may reflect less spawners reaching this site due to increased difficulty passing beaver dams at downstream locations.

Parr densities remain healthy at 0.2 parr/m^2 compared to 0.3 parr/m^2 in 1987. The high parr numbers suggest good survival from the high fry densities reported at this site in 1987, and the levels compare favourably to those found in other resident rainbow streams shown in Table 3.

Approximately 94% of the 112 rainbow parr sampled in upper Buck Creek were age 1+. Of the remainder, 5% were age 2+ and 1% age 3+. 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 the 1988 results. The biggest change was at the upper site (BB2) where no older parr were captured.

TABLE 5. Summary of Rainbow Trout Density Estimates in Upper Buck Creek.

	DENSITY (fish m^2)					
SAMPLE	0+		1+		2+	
SITE	1987	1988	1987	1988	1987	1988
BB1	0.00	0.00	0.07	0.06	0.02	0.01
BB2	0.59	0.36	0.27	0.23	0.03	0.00

The sampling conducted in upper Buck Creek during the past two years is the first quantitative sampling undertaken in this section of stream, so no direct comparisons to earlier years can be made. In the past, it has been difficult to

obtain an adequate sample of rainbow trout for tissue analyses at site BB1 suggesting that rainbow trout populations have been sparse in this section of the stream for at least 5 years. Based on these previous observations more trout have been present in this section in the past two years than during earlier sampling.

3.3 Lower Buck Creek

Site BB3 sampled in lower Buck Creek was 416 m^2 and comprised 43 m of stream margin. This is almost identical to the 1987 sample site area (Table 6). Approximately 46% of the 231 fish estimated within the site were rainbow trout (Table 6). These fish are assumed to be the progeny of steelhead trout known to spawn in lower Buck Creek (Tredger 1982). Longnose dace comprised 47% of the estimated population with mountain whitefish (6%) and longnose suckers comprising approximately 6% of the total.

The total numbers of fish sampled at this site was less than half of the 1987 estimate. The major difference between 1987 and 1988 catches was a sharp drop in rainbow fry numbers and the absence of longnose dace fry in the sample. As well, mountain whitefish numbers were higher than during previous years. It is interesting to note that despite the lower numbers, the total biomass estimates at this site were similar in 1987 (3.3 g/m^2) compared to 1988 (3.1 g/m^2).

Rainbow trout density estimates for this location have been collected since 1981 and are summarized in Table 7. Fry densities of just under 0.2 fry/m^2 were considerably lower than the average for the past 8 years and are similar to the

TABLE 6. Catch Composition at the Lower Buck Creek Fish Sample Site in 1988 Compared to Other Years.

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

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

levels of 1982 and 1984 - the lowest on record. These low fry levels presumably reflect the poor adult steelhead escapements to the Bulkley system in 1987-88 resulting in a low fry seeding of the creek. The highest fry densities at this site occurred in 1985 at 1.85 fry/m^2. Both the age 1+ and age 2+ rainbow densities were also lower than average but fall within the range of previous measurements (Table 7).

It should be noted that the site sampled in 1987 and 1988 encompassed the same area sampled by Tredger (1987). However, the new site was considerably larger and is presumably more

TABLE 7. Summary of Steelhead Trout Densities at Site BB3 from 1981 to 1988[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
Mean	0.57	0.13	0.03

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

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 known good steelhead trout rearing streams (Table 8). 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 two years.

TABLE 8. Steelhead Fry Densities in Lower Buck Creek Compared to Other Bulkley River Steelhead Streams.

STREAM	FRY/M^2	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	0.57	1981-1988 (Table 7)

4.0 LITERATURE CITED

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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 2, 1988.

SAMPLE #	LENGTH (mm)	AGE	WEIGHT (gm)	TOTAL WEIGHT
1	128	2+	27.7	27.7
2	128	2+	23.7	23.7
3	126	2+	20.0	20.0
4	118	2+	18.7	18.7
5a	113	2+	14.4	
5b	83	1+	6.0	20.4
6a	110	2+	13.8	
6b	98	1+	8.1	21.9
7a	117	2+	14.6	
7b	97	1+	9.1	23.7
8a	106	2+	11.4	
8b	98	2+	9.9	21.3
9a	101	2+	10.6	
9b	99	2+	10.0	20.6
10a	105	2+	12.2	
10b	98	1+	9.3	21.5

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 8, 1988.

SAMPLE #	LENGTH (mm)	AGE	WEIGHT (gm)	TOTAL WEIGHT
1a	87	1+	6.5	
1b	91	1+	7.5	
1c	90	1+	8.1	22.1
2a	75	1+	4.3	
2b	80	1+	6.0	
2c	78	1+	4.7	
2d	73	1+	3.8	18.8
3a	84	1+	6.0	
3b	93	1+	7.7	
3c	82	1+	5.4	19.1
4a	87	1+	6.3	
4b	86	1+	6.7	
4c	75	1+	4.2	17.2
5a	84	1+	6.4	
5b	73	1+	4.3	
5c	81	1+	5.3	
5d	78	1+	5.1	21.1
6a	79	1+	5.6	
6b	82	1+	5.7	
6c	77	1+	4.5	
6d	80	1+	5.7	21.5
7a	78	1+	4.3	
7b	84	1+	6.2	
7c	85	1+	7.3	17.8
8a	82	1+	6.0	
8b	74	1+	5.1	
8c	75	1+	5.9	
8d	69	1+	3.2	20.2
9a	82	1+	7.3	
9b	77	1+	4.9	
9c	75	1+	4.8	
9d	76	1+	4.9	21.9
10a	76	1+	4.9	
10b	71	1+	4.4	
10c	82	1+	7.1	
10d	67	1+	3.8	20.2

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 9, 1988.

SAMPLE #	LENGTH (mm)	AGE	WEIGHT (gm)	TOTAL WEIGHT
1	148	3+	32.0	32.0
2a	90	1+	8.3	
2b	90	1+	6.8	15.1
3	111	2+	16.0	16.0
4a	111	2+	12.5	
4b	90	1+	7.0	19.5
5a	97	1+	8.9	
5b	102	1+	9.9	18.8
6a	103	1+	10.0	
6b	93	1+	7.5	17.5
7a	106	2+	11.6	
7b	90	1+	8.0	19.6
8a	95	1+	8.1	
8b	93	1+	7.9	16.0
9a	88	1+	7.2	
9b	88	1+	6.0	
9c	85	1+	5.5	18.7
10a	102	1+	10.4	
10b	101	1+	10.0	20.4

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, September 1, 1988.

SAMPLE #	LENGTH (mm)	AGE	WEIGHT (gm)	TOTAL WEIGHT
1a	100	2+	11.0	
1b	107	2+	13.2	24.2
2	122	2+	18.6	18.6
3	147	3+	36.3	36.3
4	120	2+	18.6	18.6
5	121	2+	19.5	19.5
6a	90	1+	8.7	
6b	110	2+	14.4	23.1
7a	98	1+	9.6	
7b	88	1+	6.9	
7c	81	1+	5.9	22.4
8	148	3+	35.0	35.0
9a	110	2+	14.6	
9b	77	1+	4.5	19.1
10a	88	1+	7.4	
10b	85	1+	7.0	
10c	87	1+	7.3	21.7

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 1988.

SITE DESCRIPTIONS - SITE FF1 DATE- SEPT6/88 TEMP. 10 C @1530 hr. SLOPE- 1.5%
This site starts approx. 10 m upstream of Maxan bridge in the channel closest to Maxan Lake.
This is a complex site - the upper portion of the site splits into 4 channels.
Estimate 60% pool and 40% riffle. There has been some channel shifting
and pool infilling.

POPULATION ESTIMATES:

SPECIES	AGE	PASS 1	PASS 2	U1&U2	NUMBER	S.E.	MORTS	N-CORR	N/M*M	N/LIN-M
Rainbow	0+	71	16	87	91.7	3.5	0	92	0.320	1.89
Rainbow	1+	60	12	72	75.0	2.7	0	75	0.262	1.55
Rainbow	2+	12	2	14	14.4	0.9	0	14	0.050	0.30
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+	1	0	1	1.0	0.0	0	1	0.003	0.02
M Whitefish	0+	1	1	2	2.0	0.0	0	2	0.007	0.04
M Whitefish	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
Lamprey		0	0							
TOTAL									0.642	3.795

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m*m)
Rainbow	0+	32-52	40.5	0.9	0.27
Rainbow	1+	62-98	79.5	6.1	1.60
Rainbow	2+	104-148	118.3	18.3	0.92
LN Dace	0+	0	0.0	0.0	0.00
LN Dace	1+	0	0.0	0.0	0.00
LN Sucker	0+	0	0.0	0.0	0.00
LN Sucker	1+	0	0.0	0.0	0.00
P Sculpin	1+	68	68.0	4.0	0.01
M Whitefish	0+	68-84	76.0	5.1	0.04
M Whitefish	1+	0	0.0	0.0	0.00
TOTAL					2.84

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH(cm)	MAXIMUM DEPTH(cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	5.8		80			10/35
5	5.0		Good debris cover throughout			
10	5.5		Estimate flow of 7-10 cfs			
15	6.0		Parr over 100 mm very fat			
20	9.3		Isolated pool on the edge - fry only.			
	8.0		Bridge to be rebuilt upstream in site?			
	5.6					
	3.5					
	4.5					
	5.9					

AREA (M*M) 286.7 MARGIN (M) 48.5

SITE DESCRIPTIONS - SITE FF2 DATE-SEPT 7/88 TEMP. 10 C @1445 hr Slope 1.5 %
This site is approximately 1 km upstream of Maxan at water sample site.
The old sample site ahs changed aln all of the flow is in the secondary channel.
A new site was set up with the top end 10 m downstream of the old site.
The new site is similar to old site - two pools with debris cover and cobble substrate.
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+	339	169	508	676.0	44.7	0	676	1.817	12.52
Rainbow	1+	126	48	174	203.5	13.1	0	204	0.547	3.77
Rainbow	2+	25	1	26	26.0	0.2	0	26	0.070	0.48
LN Dace	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Dace	1+	7	6	13	49.0	151.4	0	49	0.132	0.91
LN Sucker	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Sucker	1+	2	1	3	4.0	3.5	0	4	0.011	0.07
P Sculpin	1+	2	0	2	2.0	0.0	0	2	0.005	0.04
M Whitefish	0+	10	3	13	14.3	2.2	0	14	0.038	0.26
M Whitefish	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
Lamprey		1	0							
TOTAL									2.621	18.053

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m*m)
Rainbow	0+	27-45	38.0	0.6	1.09
Rainbow	1+	55-98	80.0	6.1	3.34
Rainbow	2+	100-126	109.9	14.6	1.02
LN Dace	0+	0	0.0	0.0	0.00
LN Dace	1+	70-104	77.7	6.0	0.79
LN Sucker	0+	0	0.0	0.0	0.00
LN Sucker	1+	95-102	99.7	10.0	0.11
P Sculpin	1+	91-93	92.0	9.9	0.05
M Whitefish	0+	73-91	79.9	6.3	0.24
M Whitefish	1+	0	0.0	0.0	0.00
Lamprey					
TOTAL					6.64

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH(cm)	MAXIMUM DEPTH(cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	11.5	25	80			15/40
5	6.9					
10	4.3					
15	5.2					
20	9.2					
	8.8					
	7.3					
	4.9					
	3.9					
	6.9					

This site is 50% pool and 50% ruiffle.
Good cover in cobble and debris. Heavy algae growth.
Marked with orange ribbon.
Photo 17 and 18 (Prints)

AREA (M*M) 372.0 MARGIN (M) 54.0

SITE DESCRIPTIONS - SITE BB1 DATE-SEPT 9/88 TEMP. 8 C @1400hr 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.

POPULATION ESTIMATES:

SPECIES	AGE	PASS 1	PASS 2	U1&U2	NUMBER	S.E.	MORTS	N-CORR	N/M*M	N/LIN-M
Rainbow	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
Rainbow	1+	12	6	18	24.0	8.5	0	24	0.061	0.38
Rainbow	2+	4	1	5	5.3	1.0	0	5	0.014	0.08
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+	14	5	19	21.8	0.0	0	22	0.055	0.35
M Whitefish	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
M Whitefish	1+	0	1	1	0.0	0.0	0	0	0.000	0.00
Lamprey										
TOTAL									0.130	0.81

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m*m)
Rainbow	0+	NM	0.0	0.0	0.00
Rainbow	1+	84-103	92.2	7.4	0.45
Rainbow	2+	106-148	117.2	17.5	0.24
LN Dace	0+	0	0.0	0.0	0.00
LN Dace	1+	0	0.0	0.0	0.00
LN Sucker	0+	0	0.0	0.0	0.00
LN Sucker	1+	0	0.0	0.0	0.00
P Sculpin	1+	55-103	77.4	6.3	0.35
M Whitefish	0+	0	0.0	0.0	0.00
M Whitefish	1+	200	200.0	101.0	0.00
TOTAL					1.037

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH(cm)	MAXIMUM DEPTH(cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	5.5	60	100			Silt/2
5	6.9					
10	3.5		Debris and log cover throughout			
15	5.4		Heavy brown algal growth			
20	6.5		Overhanging banks present			
	10.0		Beaver activity in the lower end			
	5.4		Estimate 5 cfs			
	6.6					
	6.3					
	6.3					

AREA (M*M) 393.8 MARGIN (M) 63.0

SITE DESCRIPTIONS - SITE BB2 DATE-SEPT 8/88 TEMP. 7 C 2 1545. 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.

POPULATION ESTIMATES:

SPECIES	AGE	PASS 1	PASS 2	U1&U2	NUMBER	S.E.	MORTS	N-CORR	N/M*M	N/LIN-M
Rainbow	0+	36	26	62	129.6	73.7	0	130	0.361	1.68
Rainbow	1+	57	18	75	83.3	5.8	0	83	0.232	1.08
Rainbow	2+	0	0	0	0.0	0.0	0	0	0.000	0.00
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									0.593	2.765

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m*m)
Rainbow	0+	29-44	39.0	0.7	0.25
Rainbow	1+	69-93	79.7	6.1	1.42
Rainbow	2+	0	0.0	0.0	0.00
LN Dace	0+	0	0.0	0.0	0.00
LN Dace	1+	0	0.0	0.0	0.00
LN Sucker	0+	0	0.0	0.0	0.00
LN Sucker	1+	0	0.0	0.0	0.00
P Sculpin	1+	0	0.0	0.0	0.00
M Whitefish	0+	0	0.0	0.0	0.00
M Whitefish	1+	0	0.0	0.0	0.00
TOTAL					1.67

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH(cm)	MAXIMUM DEPTH(cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	7.8	20	100			3/7
5	5.5		Spawning gravel throughout			
10	4.7		Lots of debris and overhanging banks			
15	3.4		Bank instability			
20	2.3		Algae in backwater areas			
Plus others	5.7		Estimate 3-4 cfs flow			
	5.5					
	6.8					
	3.2					
	4.7					
AREA (M*M)	358.8	MARGIN (M)	77.0			

SITE DESCRIPTIONS - SITE BB3 DATE- SEPT 1/88 TEMP. 15 C @ 1700 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 is marked with blue ribbon and orange paint.
Estimate site is 80 % riffle and 20 % glide.

POPULATION ESTIMATES:

SPECIES	AGE	PASS 1	PASS 2	U1&U2	NUMBER	S.E.	MORTS	N-CORR	N/M*M	N/LIN-M
Rainbow	0+	27	16	43	66.3	23.4	0	66	0.159	1.54
Rainbow	1+	18	7	25	29.5	5.2	0	29	0.071	0.68
Rainbow	2+	7	2	9	9.8	1.7	0	10	0.024	0.23
LN Dace	0+	0	1	1	0.0	0.0	0	0	0.000	0.00
LN Dace	1+	52	27	79	108.2	20.0	0	108	0.260	2.52
LN Sucker	0+	0	0	0	0.0	0.0	0	0	0.000	0.00
LN Sucker	1+	1	2	3	3.0	0.0	0	3	0.007	0.07
P Sculpin	1+	0	0	0	0.0	0.0	0	0	0.000	0.00
M Whitefish	0+	0	2	2	2.0	0.0	0	2	0.005	0.05
M Whitefish	1+	10	2	12	12.5	0.0	0	13	0.030	0.29
Lamprey		10	0							
TOTAL									0.556	5.38

LENGTH/WEIGHT DATA:

SPECIES	AGE	FL-RANGE (mm)	MEAN FL (mm)	MEAN WEIGHT (g)	BIOMASS (g/m*m)
Rainbow	0+	42-56	48.7	1.6	0.26
Rainbow	1+	68-98	84.1	7.1	0.50
Rainbow	2+	100-148	120.5	20.8	0.49
LN Dace	0+	1	29.5	0.1	0.00
LN Dace	1+	38-103	66.2	4.0	1.04
LN Sucker	0+	0	0.0	0.0	0.00
LN Sucker	1+	128-142	135.0	22.7	0.16
P Sculpin	1+	0	0.0	0.0	0.00
M Whitefish	0+	69-72	70.4	3.4	0.02
M Whitefish	1+	117-128	123.2	19.5	0.59
TOTAL					3.056

SITE MEASUREMENTS:

LOCATION (m)	WIDTH (m)	MEAN DEPTH(cm)	MAXIMUM DEPTH(cm)	BANK COVER	DEBRIS COVER	D50/D90 (cm)
0	8.7					20/35
5	8.8					
10	10.5		Mainly cobble cover			
15	11.0		No debris			
20	9.8		Lots of attached algae			
	9.2		Unstable banks at high flows			
			Gravel bar development and debris downstream			
			Photo 16 (Prints)			
			Flow 25-35 cfs			
	9.7					

AREA (M*M) 415.7 MARGIN (M) 43.0

Appendix 3: Summary of Rainbow Trout Length and Age Data from 1984 to 1988.

TABLE 1. Summary of Rainbow Trout Length and Age Data for Foxy Creek.

SITE	AGE	RAINBOW 0+ 1984	1987	1988	MEAN
SITE FF1	n	269	201	92	187
	%	51.1	62.4	50.8	54.8
	fl(mm)	33.9	40.2	40.5	38.2
SITE FF2	n	530	459	676	555
	%	61.2	85.0	74.6	73.6
	fl(mm)	34.7	37.4	38.0	36.7
TOTAL	n	799	660	768	742
	%	56.2	73.7	62.7	64.2
	fl(mm)	34.3	38.8	39.2	37.4

		RAINBOW 1+ 1984	1987	1988	MEAN
SITE FF1	n	193	93	75	120
	%	36.7	28.9	41.4	35.7
	fl(mm)	77.2	79.6	79.5	78.8
SITE FF2	n	273	67	204	181
	%	31.5	12.4	22.5	22.1
	fl(mm)	78.0	82.3	80.0	80.1
TOTAL	n	466	160	279	302
	%	34.1	20.6	32.0	28.9
	fl(mm)	77.6	81.0	79.8	79.4

		RAINBOW 2+ 1984	1987	1988	MEAN
SITE FF1	n	64	28	14	35
	%	12.2	8.7	7.7	9.5
	fl(mm)	120.5	115.9	118.3	118.2
SITE FF2	n	63	14	26	34
	%	7.3	2.6	2.9	4.2
	fl(mm)	119.5	106.6	109.9	112.0
TOTAL	n	127	42	40	70
	%	9.7	5.6	5.3	6.9
	fl(mm)	120.0	111.3	114.1	115.1

TABLE 2. Summary of Rainbow Trout Length and Age Data for Buck Creek.

SITE	AGE	RAINBOW 0+ BB1	BB2	BB3
1987	n	1	190	217
	%	2.6	66.2	81.6
	fl(mm)	_	43.9	47.8
1988	n	0	130	66
	%	0.0	61.0	62.9
	fl(mm)	0.0	39.0	48.7
MEAN	n	1	320	283
	%	1.3	63.6	72.2
	fl(mm)	-	41.5	48.3

		RAINBOW 1+ BB1	BB2	BB3
1987	n	28	87	33
	%	73.7	30.3	12.4
	fl(mm)	89.1	80.4	89.0
1988	n	24	83	29
	%	82.8	39.0	27.6
	fl(mm)	92.2	79.7	84.1
MEAN	n	52	170	62
	%	78.2	34.6	20.0
	fl(mm)	90.7	80.1	86.6

		RAINBOW 2+ BB1	BB2	BB3
1987	n	9	10	16
	%	23.7	3.5	6.0
	fl(mm)	102.6	116.8	106.0
1988	n	5	0	10
	%	17.2	0.0	9.5
	fl(mm)	117.2	-	120.5
MEAN	n	14	10	26
	%	20.5	1.7	7.8
	fl(mm)	109.9	58.4	113.3