Upper Bulkley River and Toboggan Creek Overwintering Study 2000-2001

prepared by

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Executive Summary

An overwintering study was conducted over three winters (November 1998 to March 2001) in the Upper Bulkley and Toboggan Creek watersheds in north-central British Columbia. The study area includes the lower portion of the Upper Bulkley watershed upstream of the confluence of the Morice and Bulkley rivers near Houston, B.C. to Richfield Creek, and the portion of Toboggan Creek from the Toboggan Creek hatchery to Toboggan Lake. This study focused on establishing indicators of overwintering habitat quality, particularly cover, and determining physical and biological factors which may influence overwintering habitat quality in the Upper Bulkley and Toboggan Creek watersheds by sampling a variety of habitat types. Fish densities (CPUE), fork length, and condition factor data were collected when possible, allowing for comparisons of fish densities, size and condition over time and between sites. This report focuses primarily on the analysis of data collected in the third year of the study (November 2000 to March 2001), and includes a cursory summary and comparison of data collected over the three years of the overwintering study.

Coho contributed 43.5% of the total catch (total catch = 1522 fish) at sites sampled during the overwintering study, and was the main species at Toboggan Creek sites. No coho were captured in Upper Bulkley side channel sites sampled, while coho were present in one of the two side channels sampled in Toboggan Creek. The side channels sampled in the Upper Bulkley had low cover and no substrate cover, were relatively shallow, and had low dissolved oxygen concentrations. Coho densities at Toboggan Creek sites are likely higher than at Upper Bulkley sites due to notable higher escapements of spawners in the parent generations to this comparatively productive system. Coho CPUE declined drastically between December and February at Toboggan Creek sites, while the gradual decline in coho CPUE at Upper Bulkley sites was not significant. The decline of coho CPUE, particularly at Toboggan Creek sites, is speculated to be due to emigration or mortality related to high densities in this system. Fork length did not change significantly over the winter at most sites, but condition factor declined significantly during the winter, and especially between February and March. Within sites sampled in the Upper Bulkley, coho were commonly captured in tributary sites with cobble pool habitat and some organic cover, rather than in mainstem sites, or side channel sites. In Toboggan Creek, coho CPUE was high in mainstem and side channel sites, all of which offered cobble substrate, and coho CPUE was highest at a mainstem site which offered both substrate and organic cover. Coho were commonly captured in cobble pool (>50 cm deep) habitat with some organic cover in each of the three years of the overwintering study, and also likely utilize side channel and off channel habitat that provide good cover, and adequate water quality throughout the winter.

Rainbow trout contributed 43.5% of the total catch (total catch = 1522 fish) at sites sampled during the overwintering study, and rainbow trout CPUE did not differ significantly between Upper Bulkley and Toboggan Creek sites. Rainbow trout were not captured in Upper Bulkley side channel sites, or in Toboggan Lake, both of which had low overall CPUE, and appeared to offer generally poor overwintering habitat due to poor cover, and low concentrations of dissolved oxygen. Rainbow trout CPUE declined gradually over the winter, but this decline is not statitistically significant except in Upper Bulkley tributary sites. Fork length did not differ significantly over the winter, but condition factor decreased significantly, particularly at the end

of winter (between February and March). Rainbow trout were commonly captured in Toboggan Creek mainstem and side channel sites, as well as Upper Bulkley mainstem and tributary sites, particularly at sites with pools offering substrate cover in the form of cobble, rip rap or boulders. Higher rainbow trout CPUE at sites offering pool habitat with substrate cover was noted during all three years of the overwintering study.

The third most common species captured was chinook, which accounted for 10.9% of the total catch (total catch = 1522 fish), but was only captured in Upper Bulkley tributary and mainstem sites. As with coho and rainbow trout, chinook were not captured in Upper Bulkley side channel sites, which appeared to be unsuitable for any salmonid overwintering. The lack of chinook from Toboggan Creek is consistent with historic records on the distribution of the species in the Skeena watershed. Chinook condition factor declined significantly over the winter, similar to trends in condition factor for both rainbow trout and coho. Chinook were captured at all mainstem sites, and were also common in Buck Creek and Richfield Creek, two of the larger tributaries to the Upper Bulkley.

Other species captured during the study include Dolly Varden, cutthroat trout, longnose dace, suckers and peamouth chub. Of these species, Dolly Varden was only captured in the Toboggan Creek system, and the other four species were only captured in the Upper Bulkley system, with non-salmonid species predominating catches at the three Upper Bulkley side channel sites. Capture rates of these species was low, and total numbers of fish captured were insufficient for data analysis.

During the three years of the overwintering study, cobble pools greater than 50 cm deep with sufficient flow to maintain water quality (particularly dissolved oxygen) throughout the winter were found to be most suitable for overwintering of rainbow trout and coho. Among cobble pool sites, coho capture rates were generally higher at sites, with organic cover (e.g. large or small organic debris). Rainbow trout and chinook were frequently captured in tributary and mainstem sites, while coho appear to be more common at tributary sites, particularly in the Upper Bulkley. In all three years of the study, coho CPUE was significantly higher at Toboggan Creek at the onset of winter, and this is likely due to higher numbers of spawners resulting in greater seeding of available spawning habitat. Coho CPUE declined drastically at the beginning of winter at Toboggan Creek in all three years of the study, while decreases in coho CPUE at Upper Bulkley sites are not significant. The more rapid decline of coho CPUE at Toboggan Creek to levels that are not statistically different from Upper Bulkley CPUE is speculated to be due to emigration or mortality, both of which indicate that winter has a significant influence on coho capture rates and potentially distribution. The results of this three year study support that overwintering habitat is important since it appears to play a role in limiting fish production in interior streams.

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Acknowledgements

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1.0 INTRODUCTION

During this three - year study in the Upper Bulkley River watershed, overwintering habitat was assessed as a potential limiting factor to fish production. The Upper Bulkley River watershed is utilized by several species of pacific salmon (coho, chinook, sockeye, pink salmon), which have been in decline (Houston Chapter of the Steelhead Society of B.C. 1990, BCCF 1997, 1998, Holtby and Finnegan 1998). Declines in salmon stocks are generally attributed to over-exploitation of the stocks, decreased ocean or freshwater survival or a combination of these (Hillborn and Walters 1992, Walters 1995, Slaney *et al.* 1996, Slaney and Zaldokas 1997, Bradford and Irvine 2000). Decreased survival of juveniles in freshwater is often attributed to habitat degradation (National Research Council 1992, Johnston and Slaney 1996, Slaney and Zaldokas 1997, BCCF 1998). Winter survival has been considered to be one potential bottleneck in salmonid production in several systems (Bustard and Narver 1975, Swales *et al.* 1986, Dolloff 1987, Koning and Keeley 1997) since winter is generally a more stressful time for fish with resultant starvation, energy loss, declines in fish health and survival (Bustard and Narver 1975, Dolloff 1987, Cagnelli and Gross 1997).

The long term objectives of the Upper Bulkley overwintering studies are to:

- determine changes in species abundance and densities during the winter,
- document changes in weight, length and condition of species at sites examined,
- identify potential factors which may determine overwintering habitat quality,
- identify potential restoration or habitat enhancement techniques that may improve overwintering habitat quality and/or quantity, and
- present results in a format suitable for use in public education and awareness.

This report documents the results of the overwintering study from November 2000 to April 2001, and summarizes the results obtained during all three years of the overwintering study. The Appendices, which accompany this report, are bound separately in Volume 2. A report that will document the overall state of the Upper Bulkley watershed, and will analyse the results of the overwintering study in the context of other studies conducted in the upper Bulkley watershed, has been proposed (Donas pers. comm.).

2.0 STUDY AREA

The Bulkley River is a major tributary to the Skeena River, located in north-central British Columbia (Figure 1). The Bulkley River drains into the Skeena River near the village of Hazelton, B.C.. However, the main portion of this study area is within the lower portion of what is known as the upper Bulkley River or the little Bulkley River (i.e. the portion of the Bulkley River upstream of the Morice River confluence, near Houston, B.C.). Toboggan Creek drains into the Bulkley River near Smithers (downstream of Houston), but was included in this study as an index stream due to relatively high juvenile coho densities, and more extensive background knowledge on coho escapement (O'Neill pers. comm.) and smolt production (SKR 1995,1996,1997,1998,1999, 2000a).

2.1 UPPER BULKLEY RIVER

The upper Bulkley watershed drains an area of approximately 2400 km^2 from the Nechako Plateau to its confluence with the much larger Morice River. Elevations of the upper Bulkley River vary from 1640 m in the headwaters on the Nechako Plateau to 570 m at the confluence with the Morice River just west of the village of Houston. The Bulkley River is classified as a Class II water and offers exceptional angling experience (B.C. Environment 2000). Coho (*Oncorhynchus kisutch*), chinook (*O. tsawytscha*), sockeye (*O. nerka*), pink (*O. gorbusha*), rainbow trout and steelhead (*O. mykiss*), cutthroat trout (*O. clarki*), Dolly Varden (*Salvelinus malma*), bull trout (*S. confluentus*), lake trout (*S. namyacush*), mountain whitefish (*Prosopium williamsoni*), burbot (*Lota lota*), lake chub (*Couesius plumbeus*), longnose dace (*Rhinichthys cataractae*), longnose sucker (*Catostomus catostomus*), and redside shiner (*Richardsonius balteatus*) have been reported in the drainage (FISS). The upper Bulkley watershed is characterized by a low abundance of lakes, and a low gradient, meandering mainstem (BCCF 1997). Tributaries are generally moderate to steep gradient systems, many of which are lake headed (Tredger 1982, BCCF 1997). The upper Bulkley River drainage is characterized by a variety of land use activities, namely forestry, mining, agriculture and urbanization (BCCF 1997, 1998, Remington 2000, SKR in prep.). In fact, the upper Bulkley watershed is one of the oldest settlement areas in the area (Morice reprinted in 1978, Hols 1999). An adult migration fence has been operated annually on the upper Bulkley River at the community of Houston since 1987 (Houston Chapter of the Steelhead Society of B.C. 1990, Tamblyn 2000). Smolt releases to the Upper Bulkley began in 1989 (1987 brood year) (Holtby *et al.* 1999). Relatively small numbers of juvenile coho are released into the upper Bulkley watershed on an annual basis, primarily through the "salmonids in the classroom" program (Donas pers. comm.), but a significant number of juvenile coho have been released into Buck Creek (the largest tributary to the upper Bulkley system) since 1998 (MacKay 1999, SKR 2000b, Tamblyn 2000).

2.2 TOBOGGAN CREEK

Toboggan Creek drains into the lower Bulkley River approximately 19 km northwest of the town of Smithers, B.C. Toboggan Creek drains an area of 111.6 km^2 from its headwaters (elevation 1500 m) to its confluence with the Bulkley River (elevation 430 m). The Toboggan Creek drainage is a productive, glacial system influenced somewhat by land use activities, primarily agriculture and forestry (Gibson 1997, Remington and Donas 1999). Toboggan Creek is a relatively unique drainage within the Bulkley watershed since the Toboggan Creek coho stock has been augmented since 1988. Coho smolts are released from the Toboggan Creek hatchery on an annual basis (O'Neill pers. comm.). In addition, an adult counting fence has been utilized for detailed enumeration of coho and steelhead spawners since 1989. Coho smolt enumeration projects have been conducted on Toboggan Creek since 1995 (SKR 1995, 1996, 1997, 1998, 1999, 2000a). Toboggan Creek was chosen for comparison to the upper Bulkley drainage, due to the relatively high abundance of coho and the long term studies (e.g. adult and smolt enumeration) conducted in this system.

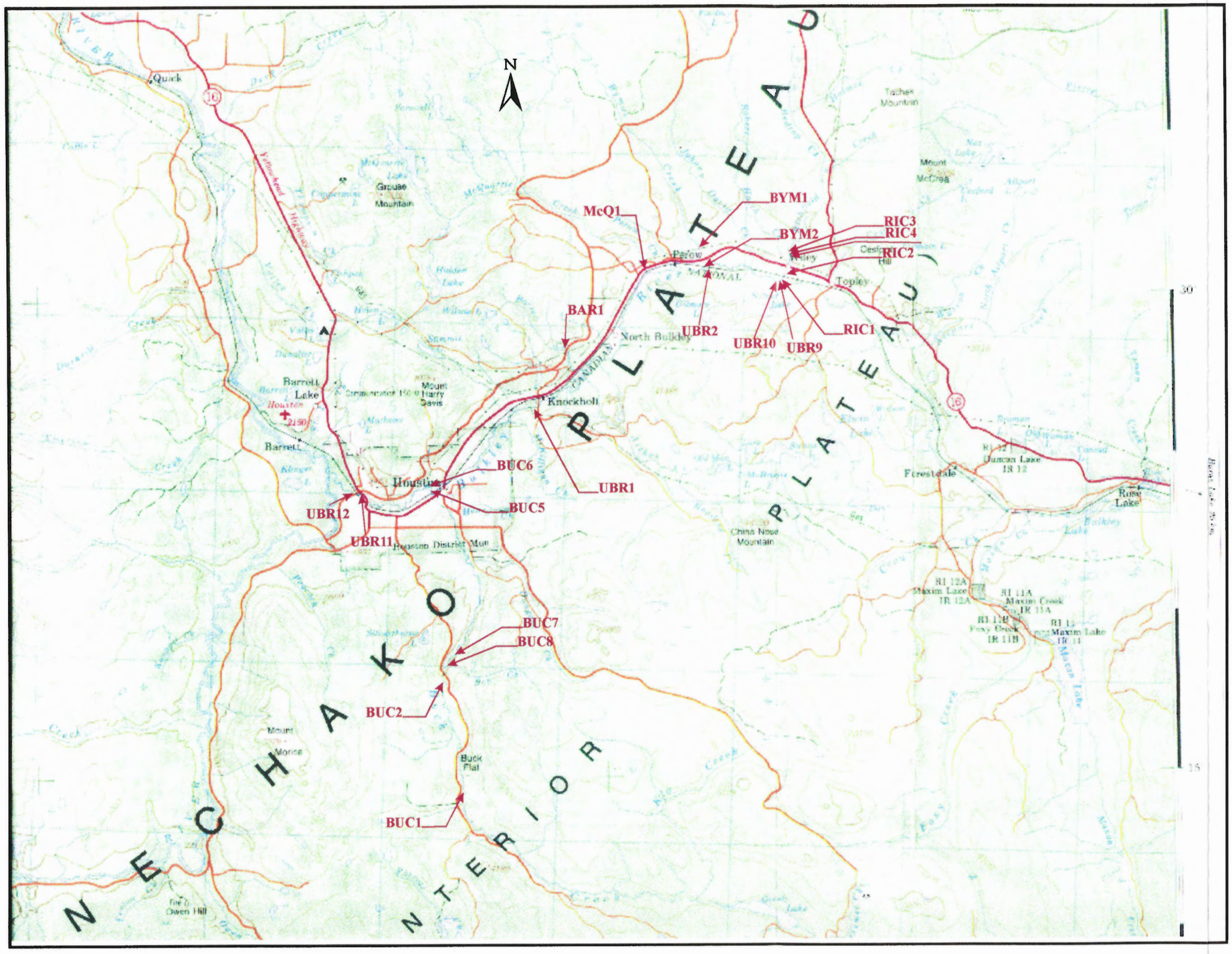

Figure 1.
Locations
of sites sampled
in the

Upper Bulkley Watershed
during the Upper Bulkley Overwintering Study

conducted

November 2000
to
March 2001

(Mission and Toboggan creek sites
are not shown on the map)

Sample Sites

BUC Buck Creek
BAR Barren Creek
BYM Byman Creek
McQ McQuarrie Creek
RIC Richfield Creek
UBR Upper Bulkley River

1:200,000 Scale excerpt
from
1:250,000 Scale NTS Map 93L

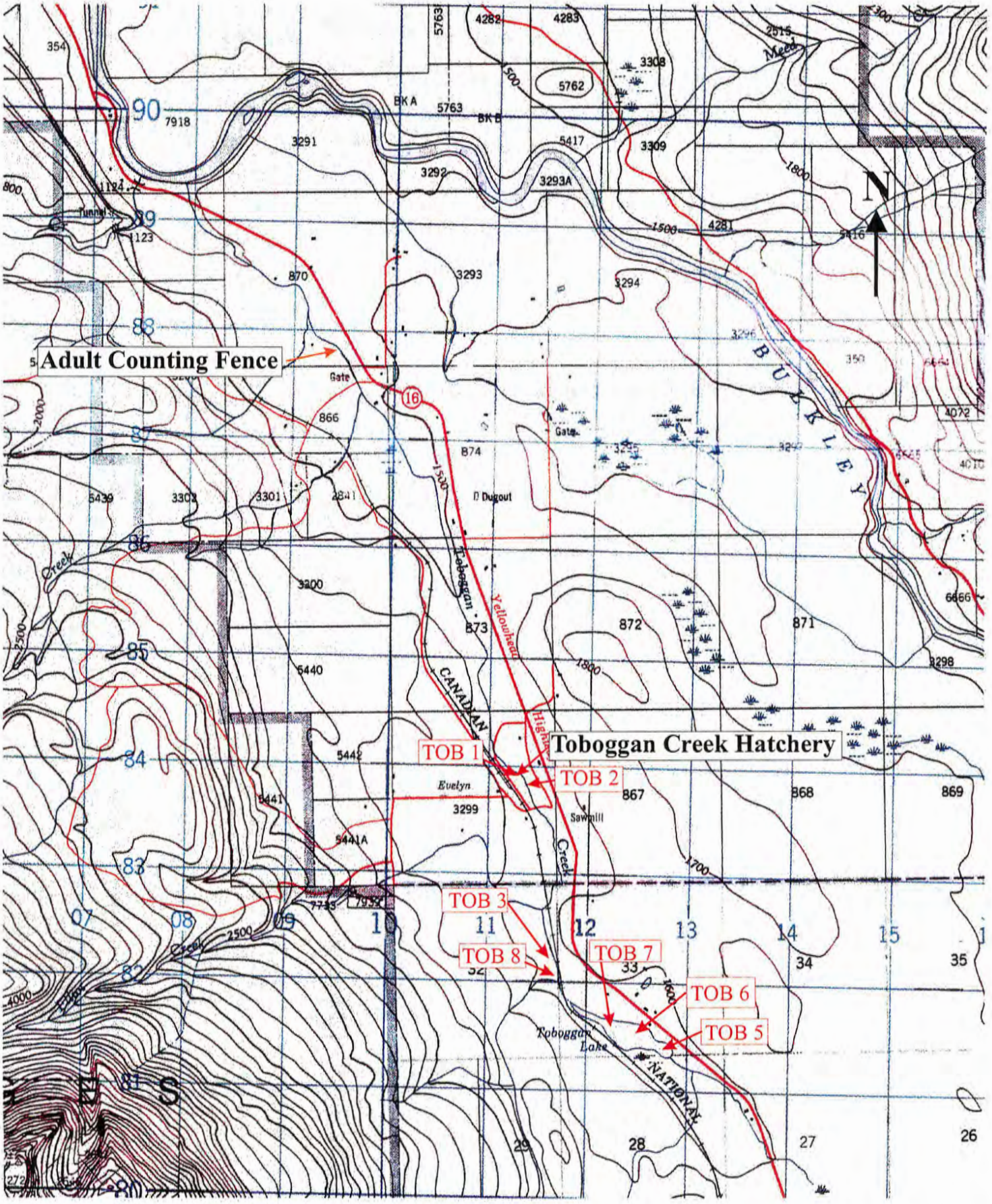

Figure 2. Locations of sites sampled in the Toboggan Creek watershed between November 2000 and March 2001 (approx. Scale = 1:50,000).

3.0 MATERIALS AND METHODS

3.1 HABITAT ASSESSMENT

Sites to be sampled in the winter of 2000/2001 were selected based on diversity of in-stream cover elements, accessibility of sites to salmonids, and ease of access during winter sampling. Sampling focused on pools habitat with a variety in-stream cover elements such as cutbanks, small woody debris (SWD), large woody debris (LWD), cobble substrate, boulders or boulder clusters and sites with no habitat complexity. Sample site locations are illustrated in Figures 1and 2, and summarized in Table 1. All sites located on the mainstem Upper Bulkley River, Barren Creek, Byman Creek, Buck Creek, McQuarrie, and Richfield Creek are drained by the Upper Bulkley River watershed, and are found within the portion of the watershed accessible to salmonids (downstream of falls). Sites in Toboggan Creek (near Smithers) and Mission Creek (near Hazelton) are not located in the Upper Bulkley watershed, but were sampled for continuity with the previous two years of the study (Donas and Saimoto 1999, 2000). Data for the Mission Creek sites are summarized in a seperate report (Saimoto in prep.). Several of the sites from the 1998/1999 and/or the 1999/2000 overwintering study were sampled in the winter of 2000/2001 (Table 1), but some sites were deleted others were added.

3.1.1 Fall Assessments

Fall assessments included an evaluation of physical characteristics at each site. These assessments were conducted in November, using a data form designed for the project (Appendix 1). In-stream cover was documented in detail for most sites (Table 2). Fall assessments were not conducted at two of the upper Bulkley mainstem sites (UBR 1 and UBR 2), the two Toboggan Lake sites (TOB 5 and TOB 6), the site at the outlet of Toboggan Lake which was only sampled in March 2001 (TOB 7), and the Toboggan Creek side channel sites (TOB 8). Fall assessments were completed at all other sites (25 of 31 sites).

Fall assessment data between sites in the Upper Bulkley watershed and sites in Toboggan Creek were compared statistically where numeric data was available. These data include surface area, wetted width, mean and maximum wetted depth, percent pool, glide, riffle and edge habitat. A Kolmogornov-Smirnoff test was used to assess normality of the data, and where the data was normally distributed, a student's t-test was used to compare means between sites in the Upper Bulkley and Toboggan Creek. Pooled variances were used in cases where the variances were not statistically different between the two samples.

Table 1. Site description and sampling times during the upper Bulkley River overwintering study, November 2000 to April 2001.

	Site #	Location	Habitat	Surface Area	Dates (00/01)
Upper Bulkley River	UBR 1+	just downstream of McKilligan Road crossing	Cobble pool	fall assessment not conducted	December - March
	UBR 2*	at confluence with Byman Creek	LWD, cobble pool		December - March
	UBR 9	20 m downstream of confluence with Richfield Creek	SWD pool	234 m^2	December - March
	UBR 10	50 m downstream of confluence with Richfield Creek	SWD pool	103 m^2	December - March
	UBR 11	just downstream of North Road bridge crossing	Rip Rap pool	76 m^2	December - March
	UBR 12	60 m downstream of CNR crossing west of Houston	cobble, boulder pool	67.7 m^2	December - March
	SID 1	downstream of HYW 16 rest area between Houston and Topley	side channel	240 m^2	December - March
	SID 2	just downstream of Bill Watson's driveway	side channel	104 m^2	December - March
	SID 3	about 300 m downstream of SID 2, at HWY 16 crossing	side channel	156 m^2	December - March
Richfield	RIC 1+	250 m upstream of Bulkley River, downstream of CNR	SWD, cobble, pool	72 m^2	December - March
	RIC 2	50 m upstream of CNR crossing	cobble, SWD, veg.	72 m^2	December - March
	RIC 3	400 m upstream of highway crossing	Cobble, pool	96.3 m^2	December - March
	RIC 4+	about 50 m downstream of RIC 3	boulder, cobble pool	112 m^2	December - March
	RIC 5	15 m downstream of RIC 4	cobble, SWD	149 m^2	December - March
McQuarrie	McQ 1+*	just downstream of hwy 16, upstream of CNR crossing	moderate cobble pool	50.4 m^2	December - March
Byman	BYM 1+	downstream side of highway 16 crossing	culvert pool, cobble	146 m^2	December - March
	BYM 2+	just downstream of CNR crossing, 750 m u/s of Bulkley River	SWD, boulder, cobble	52.8 m^2	December - March
	BYM 3+	150 m downstream of CNR crossing; d/s of Perrow Cr.	Cobble pool	82 m^2	December - March
Barren	BAR 1+*	Hwy 16 east of Houston, just across from Craker Rd.	culvert pool, cobble	16 m^2	December - March
Buck	BUC 1+	2 km upstream of second Bridge	boulder, cobble glide	135 m^2	December - March
	BUC 2+	100 m upstream of first bridge	LWD, SWD, cobble	188 m^2	December - March
	BUC 5+	just downstream of 4th Avenue, downstream of CNR	boulder, cobble	174 m^2	December - March
	BUC 6+	150 m downstream of BUC 5	LWD, SWD, cobble	120 m^2	December - March
	BUC 7	Buck Creek release pond	LWD pool	28 m^2	December - March
	BUC 8	Buck Creek release pond	cobble, trace LWD pool	30.3 m^2	December - March
Toboggan	TOB 1+	just downstream of hatchery near start of Nature Trail	SWD, cobble pool	70 m^2	December - March
	TOB 2+	upstream of Brandt Brook (at smolt fence location)	LWD, SWD, cobble	103 m^2	December - March
	TOB 3	at CNR bridge	side channel	fall assessment not conducted	December, January
	TOB 8	at train bridge at Eric Johnson's	side channel		December - March
	TOB 5	100 m in front of Jill Storey's	Lake		December - March
	TOB 6	50 m to the right of TOB 5	Lake		December - March
	TOB 7	at outlet of Toboggan Lake at CNR crossing	Lake outlet		March

([1] also see Figure 1 for site locations; Mission and Toboggan Creek sites are not indicated on Figure 1
+ indicates sites also sampled in the winter of 1999 - 2000; * indicates sites also sampled in the winter of 1998 - 1999)

Table 2. Physical parameters recorded in the field for each site sampled prior to freeze up in the Upper Bulkley River overwintering study.

	Parameter	Unit/Categories	Methods
channel	channel width	meter	tape
	wetted width	meter	tape
	max. wetted depth	centimeter	meter stick
	max. bankful depth	centimeter	meter stick
	interval between channel measurements	meter	tape
pools	percent of site	percent	visual estimate
	Dominant Substrate	fines, gravel, cobbles, larges, boulders	visual estimate
	Sub-Dominant Substrate	fines, gravel, cobbles, larges, boulders	visual estimate
	D90	centimeter	tape
	% embeddedness	percent	visual
glides	percent of site	percent	visual estimate
	Dominant Substrate	fines, gravel, cobbles, larges, boulders	visual estimate
	Sub-Dominant Substrate	fines, gravel, cobbles, larges, boulders	visual estimate
	D90	centimeter	tape
	% embeddedness	percent	visual
edge < 10 cm deep	percent of site	percent	visual estimate
	Dominant Substrate	fines, gravel, cobbles, larges, boulders	visual estimate
	Sub-Dominant Substrate	fines, gravel, cobbles, larges, boulders	visual estimate
	D90	centimeter	tape
	% embeddedness	percent	visual
riffles	percent of site	percent	visual estimate
	Dominant Substrate	fines, gravel, cobbles, larges, boulders	visual estimate
	Sub-Dominant Substrate	fines, gravel, cobbles, larges, boulders	visual estimate
	D90	centimeter	tape
	% embeddedness	percent	visual
cover	Total Instream Cover	None, Trace, Moderate, Abundant	visual estimate
	Out of stream Cover	None, Trace, Moderate, Abundant	visual estimate
	LWD	None, Trace, Moderate, Abundant	visual estimate
	# LWD pieces < 20 cm	number	count
	# LWD pieces 20-50 cm	number	count
	# LWD pieces > 50 cm	number	count
	SWD	None, Trace, Moderate, Abundant	visual estimate
	Boulder	None, Trace, Moderate, Abundant	visual estimate
	Single boulder > 30 cm	number	count
	Boulder clusters	number	count
	cobble	None, Trace, Moderate, Abundant	visual estimate
	cobble proportion of site	percent	visual estimate
	undercut banks	None, Trace, Moderate, Abundant	visual estimate
	undercut bank length	meter	tape
	average undercut bank width	meter	tape
	aquatic vegetation	None, Trace, Moderate, Abundant	visual estimate
	overhanging vegetation	None, Trace, Moderate, Abundant	visual estimate
other	distance to nearest upstream pool	meter	tape
	distance to nearest downstream pool	meter	tape
	site length	meter	tape
	gradient	percent	clinometer

3.1.2 Winter Assessments

Changes in physical and chemical parameters (Table 3) were recorded monthly for each sample site using a data form designed for overwintering sampling (Appendix 2). Monthly physical and chemical data were collected by removing ice from the limnological station using a chain saw or by hand. Winter assessment data between sites in the Upper Bulkley watershed and sites in Toboggan Creek were compared statistically where numeric data was available. These data include air temperature, water temperature, ice thickness, snow depth, conductivity, dissolved oxygen, and water depth. A Mann-Whitney U-test was used to compare data collected in the Upper Bulkley to data collected at Toboggan Creek.

Table 3. Physical and chemical parameters recorded on a monthly basis for each site sampled prior in the Upper Bulkley River overwintering study.

	Parameter	Unit/Categories	Method
general site description	weather	description	visual
	air temperature	Celsius	alcohol thermometer
	Ice Cover	percent	visual estimate
	Stream Flow	None, Low, Moderate, High	visual estimate
	Potential for fish migration	None, Low, Moderate, High	visual estimate
Limnological station	water depth	centimeters	meter stick
	ice thickness	centimeters	meter stick
	clarity of ice	None, Low, Moderate, High	visual estimate
	snow depth	centimeters	meter stick
	water temperature	Celsius	alcohol thermometer
	turbidity	None, Low, Moderate, High	visual estimate
	conductivity	µS/cm	Hanna
	Dissolved Oxygen	ppm	Oxyguard
	pH	pH units	Hanna H 19812

3.2 FISH SAMPLING

Low water temperatures precluded the use of electroshockers, since electroshocking at water temperatures below 4°C can be harmful to salmonids. Fish sampling was conducted by setting minnow traps baited with roe at each of the sample sites during each sampling period (once per month). Due to considerable ice thickness, a chain saw was used to remove sections of ice large enough to allow setting of minnow traps. The minnow traps were left for 24 hours. Fish were recovered from the traps, anesthetized with Alka Seltzer, identified to species, measured (fork length ± 1.0 mm), weighed (± 0.1 g using an Acculab V1200 electronic balance) and released back into the habitat. Due to difficulties encountered with estimates of population size in the winter of 1998/1999 (Donas and Saimoto 1999), no mark-recapture estimates were conducted in the winter of 2000/2001. Attempts were made to standardize the trapping intensity by considering the surface area of the site (a cluster of three traps/ 50 m^2 surface area). Difficulties in setting traps under the ice resulted in a reduction in trapping intensity at most sites to a cluster to three traps / 150 m^2 surface area. Trapping intensity at each site did not change during the winter. Total catch and particularly catch per unit effort (i.e. catch per trap) was used as an indicator of fish abundance, as suggested in previous studies (Swales *et al.* 1986). Sites were grouped as Upper Bulkley tributary, Upper Bulkley mainstem, Upper Bulkley side channel, Toboggan Creek mainstem, Toboggan Creek sidechannel and Toboggan Lake sites based on watershed and habitat type sampled, for comparisons of fish data.

Difficulties in sampling during the winter in interior systems is a major constraint on study design and data collection. Thick ice cover increases time requirements for sampling, and limits the number of traps that can be set at a site without significant disturbance to the winter conditions at that site. Fish handling is difficult at cold water temperatures, and during inclement weather. Fish behaviour and microhabitat selection are difficult to determine when ice covers the site. While snorkel surveys have been conducted to document microhabitat selection in some systems with ice cover (e.g. Cunjak 1986), most sites sampled during this study were in streams that are generally too small, and ice cover was complete, making sites not suitable for snorkel surveys in the winter. All these factors limit methodologies suitable for the study, and influence the ability of determining microhabitat selection of fish.

Minnow traps have been shown to be effective in providing relative estimates of juvenile salmonid abundance (Swales 1987), but minnow traps are known to be size and, to a lesser extent, species selective (Swales *et al.* 1986). In addition, minnow traps may be less effective at capturing fish at lower water temperatures since bait in the traps may be less likely to attract fish hiding in the substrate or near cover. Minnow traps are likely effective within a certain radius at a given temperature, but are less effective at attracting fish outside of this radius. Hence, attempts were made to standardize trapping intensity to reflect different sizes of the sites sampled. Most of the comparisons conducted in this overwintering study within and between sites and drainages were based on comparisons of density indices derived from minnow traps. The data must be viewed in light of the limitations of the sampling design, which may not give an accurate reflection of species densities at the sites. However, despite limitations of the capture technique used, we feel that minnow trapping is the only feasible sampling methodology for most of the sites sampled.

3.2.1 Species Distribution and Diversity

Species diversity was determined using the $\log_{10}$ Shannon index of diversity (Zar 1984) (equation 1). The number of potential categories (k) was chosen as the number of species captured among all sites (seven for this study).

Equation 1: $H' = -\Sigma\, p_i \log p_i$

where H' is the Shannon diversity index, and
p_i is the proportion of observations found in category i

Since the Shannon index is dependent on the number of potential categories (k) (Zar 1984), evenness was also calculated, as shown in equation 2.

Equation 2: $J' = H' / H'_{max}$

where J' is evenness
H' is the Shannon diversity index (equation 1)
H'_{max} is the maximum possible diversity calculated as $H'_{max} = \log k$

Species Richness was determined by counting the number of species captured at the site.

3.2.2 Density Indices

Several indices of abundance and density were considered in this study. The total catch by minnow trapping over a standardized time period (overnight) was used as an indicator of abundance for each species, as suggested in previous studies (Swales *et al.* 1986). In addition, catch per trap was calculated for each species to facilitate comparisons of the data collected in the current study to data collected in this and previous studies (Donas and Saimoto 1999, 2000). An index of density (catch/m^3) was determined for each species to compensate for the differences in volume at each site. Since pool depth has been identified as an important factor for overwintering habitat in other studies (Swales *et al.* 1986, Dolloff 1987), we felt that a measure of density per unit volume would be more comparable between sites than a measure of density per unit surface area. Volume was estimated using Equation 3.

Equation 3: $V = 0.5\ (W)\ (D_{max})(L)$

where: V = estimated site volume (m^3)
W = mean wetted width (m)
D_{max} = mean maximum depth of transects (m)
L = site length (m)

Volume estimates were adjusted by adjusting the mean maximum depth by the change in depth at the limnological station at each sampling interval.

Catch per unit effort and the number of fish per cubic meter were used to compare fish densities for each month. Catch per unit effort and fish per cubic meter were compared for each month among the different categories of sites using ANOVA.

3.2.3 Fish Age, Size, and Condition

Fulton's condition factor was calculated for sampling dates where both length and weight of the fish were recorded. Fulton's condition factor (equation 4) is useful where growth is isometric, and/or if the fish to be compared are of approximately the same length (Ricker 1975, Bagenal 1978). Fulton's condition factor provides a measure of fatness of the fish, which is expected to reflect a fish's health.

Equation 4: $$K = 10^5 (w / l^3)$$

where: K = Fulton's condition factor
w = weight (g)
l = length (mm)

Fork length data were compared statistically with ANOVA on ranked data due to unequal variances and non-normality (Conover and Iman 1981). Condition factor data were compared using ANOVA and t-tests on unranked data due to the lack of significant departures from normality.

3.2.4 Indicators of Habitat Suitability

The two main indicators of habitat suitability used in this study were species density indices, and fish size (fork length and condition factor). In order for habitat quality to have a significant impact on these measures, it is generally assumed that the fish at a given habitat are at or near carrying capacity (Dolloff 1987). If the density of fish is well below carrying capacity, habitat quality will likely have little influence on density or fish size unless fish actively select different quality overwintering habitat. Fish densities, particularly for coho, in the upper Bulkley watershed have been depressed from historic levels. It is unlikely that upper Bulkley densities are near carrying capacity. Densities of coho at Toboggan Creek are generally higher, and are likely to be closer to carrying capacity than densities in the Upper Bulkley watershed. Hence, differences in coho density and condition are likely clearer between and within sites at Toboggan Creek than in the upper Bulkley system.

In the absence of densities near carrying capacity, differences in habitat quality may still be documented provided that habitat of better quality is actively selected for by fish. This requires fish to move to different habitat prior to or during winter, as has been reported for rainbow trout (Narver and Bustard 1975, Swales *et al.* 1986). Several researchers have suggested a lack of movement of salmonids during winter (Envirocon 1986, Heifetz *et al.* 1986, Dolloff 1987, Swales *et al.* 1986, Giannico and Healey 1998) while others report extensive movements of salmonids during winter (Cunjak 1996, Heggersen *et al.* in prep.). Dolloff (1987) argues that extensive movement and active habitat selection in winter is unlikely since fish have no prior knowledge of habitat distribution, and since fish are vulnerable during and after movement. If

fish are unable to actively select overwintering habitat, differences in density indices are likely primarily due to overwinter mortality at different sites.

Overwintering habitat characteristic has been linked to different rates of survival and growth of salmonids in several systems (e.g. Swales *et al.* 1986, Cunjak 1996). However, in determining if overwintering habitat quality limits fish production, particularly of coho and rainbow trout/steelhead in Toboggan Creek and the upper Bulkley system it is important to consider limitations of data collected, study design, and underlying assumptions. Capture methodology, and fish densities that are likely below carrying capacity at several sites, particularly in the upper Bulkley system are the main limitations to the study. Capture methods may influence the validity of density indices (due to unknown capture efficiency), size distribution (size selectivity) and to a lesser extent species composition (species selectivity). However, consistency in sampling methodologies over the three years of the overwintering study facilitated data comparisons between the three winters during which overwinter sampling was conducted. In addition, the affects of habitat quality on species densities may not be detectable since species densities at most sites is likely below carrying capacity. Any speculations on the limitations of overwintering habitat quality based on data collected must be viewed in light of the limitations and assumptions of the study, and should not be taken at face value.

4.0 RESULTS

4.1 HABITAT ASSESSMENT

Sites chosen in the fall of 2000 represented a diversity of habitats, most of which were expected to be suitable for overwintering based. Twenty-three sites were located in the Upper Bulkley watershed. Six of these sites were located in the Upper Bulkley main channel (6 sites), 3 sites were located in Upper Bulkley side channel areas, and 14 sites were located in Upper Bulkley tributaries (14 sites). Two sites in the Buck Creek release pond created in the fall of 1999 (SKR 2000) were also sampled. For comparison, Toboggan Lake (3 sites), side channel (1 site) and mainstem habitats (2 sites) were represented among the six sites in Toboggan Creek. The distribution of sites among these general habitat types is summarized in Table 1 (section 3.1). Fall habitat assessment forms are located in Appendix 1.

4.1.1 Fall Assessments

4.1.1.1 UPPER BULKLEY SITES

Fall assessments were conducted at a total of 25 sites in the Upper Bulkley watershed, including 24 sites sampled throughout the winter, and at one additional site sampled in the winter of 1999-2000. The additional site is located on Richfield Creek, and is the old RIC 3 site, which was moved for sampling in 2000-2001 due to significant infilling. Twenty-three of the 25 sites can be characterized as fluvial habitat, while two sites (BUC 7 and 8) are unique in that they are located on the recently constructed release pond on Buck Creek (SKR 2000).

4.1.1.1.1 SURFACE AREA, WIDTH AND DEPTH

A total of 23 sites were sampled in November 2000 in the Upper Bulkley River. Sites ranged in surface area between 16 and 240 m^2, with a mean of 107.1 m^2 (SE = 61.0). Barren Creek site BAR 1 had the smallest surface area (16 m), while side channel site SID 1 had the largest surface area (240 m). Wetted width averaged 8.3 m (SE =3.5) at Upper Bulkley sites, while mean depth and maximum depth averaged 83.2 cm and 102.8 cm respectively (SE = 22.4 and 23.5 respectively). The mainstem site UBR 11 and Barren Creek site BAR 1 had the smallest wetted width (4.0 m), while side channel site SID 1 had the largest wetted width (16 m) along with the largest estimated surface area. Buck Creek site BUC 2 had the largest mean wetted depth (121 cm), while site SID 2, a side channel site, had the lowest mean and maximum wetted depth (39.7 cm and 50 cm respectively). The upper Bulkley mainstem site (UBR 9) had the highest maximum wetted depth recorded as 147 cm. Of the sites sampled, none had a surface area smaller than 15 m^2, and none had a maximum wetted depth shallower than 50 cm.

4.1.1.1.2 HABITAT COMPOSITION AND SUBSTRATE

The majority of habitat sampled consisted of pools, with some glide, and riffle habitat. Sites sampled exhibited low gradients, ranging between 0-2% (96% of sites had a gradient of 0%). Pool habitat accounted for an average of 61% at the sites sampled in the upper Bulkley (range = 10-100%, SE = 0.26). Glides accounted for an average of 25% of the habitat (range 0-70%, SE

= 0.22), riffles accounted for an average of 4.6% (range = 0-70%, SE = 0.141) and edge habitat accounted for an average of 8.7% (range = 0-20%, SE = 0.063). Of the 23 sites sampled in the upper Bulkley watershed, nine (36%) had less than 50% pool habitat. The old Richfield Creek site RIC 3 previously sampled in the winter of 1999-2000 (SKR 2000) had the lowest percentage of pool (10%), since infilling at this site has caused a shift in habitat from pool to riffle. Glide habitat was most prevalent at McQuarrie Creek, where this type of habitat accounted for 70% of the site. Edge habitat did not exceed 20% at any of the sites, due to the preferential selection of sites with water depths greater than 50 cm. Substrate at most of the sites consisted predominantly of cobbles (17 sites, 71%), with some sites having fines or mud as the dominant substrate (6 sites, 25%). The three Bulkley River side channel sites (SID 1, 2 and 3) all exhibited fines or mud substrate. Two of the Bulkley River mainstem sites (UBR 9 and 10) also had predominantly fines in the pool and glide habitat represented at these sites. Fines was the dominant substrate in pool and glide portions of the old RIC 3 site, which showed signs of infilling. Site UBR 11, a Bulkley River mainstem site, was the only site where boulders were the dominant substrate in pools, due to the presence of artificially placed rip rap. Embeddedness of substrate in pools and glides ranged between 0 and 50% among pools and glides with cobble substrate. Embeddedness was highest at the McQuarrie Creek site (McQ) with a score of 50%. Bank erosion upstream, cattle activity and abundant periphyton were noted at this site during fall assessments. The majority of upper Bulkley sites where cobbles was the dominant substrate exhibited embeddedness below 10% (13 of 17 sites). Most of the habitat sampled in the upper Bulkley watershed consisted of cobble substrate within pools with some glides and a low proportion of edge and riffle habitat.

4.1.1.1.3 COVER

In-stream cover was evaluated at a total of 25 sites, including the 24 sites sampled throughout the winter and the old RIC 3 site on Richfield Creek. In-stream and out of stream cover recorded at sites sampled in the Upper Bulkley watershed varied between none and abundant amounts. All but one site sampled in the Upper Bulkley watershed offered at least trace amounts of in-stream cover, and most (17, 68%) (Figure 3) had some out-stream cover. The only site with no in-stream cover was McQuarrie Creek site McQ1. While some cobble was present at this site, it was embedded to such a degree that it did not offer suitable habitat. This site also lacked overhanging vegetation cover, or other in-stream cover elements. Cobble was the most common cover element at all sites examined, regardless of the estimated total in-stream cover (Figure 3). LWD and SWD also added to the total instream cover at sites with trace, moderate and abundant total in-stream cover. Boulders were a notable in-stream cover element at sites with trace and moderate in-stream cover, but none of the sites with abundant total in-stream cover had boulder cover. Cutbanks and instream vegetation appeared to be relatively rare in-stream cover elements at sites sampled, while overhanging vegetation was noted as a source of out of stream cover at more than 68% of the sites sampled. Sites with cutbanks were purposely not selected for sampling since declines in water levels throughout the winter renders cutbank cover increasing unaffective. Varying amounts of in-stream cover were present at the sites sampled, however, the majority of sites (84%) exhibited trace or moderate amounts of cover. Cobble appeared to be the most common in-stream cover element at sites sampled between November 2000 and March 2001.

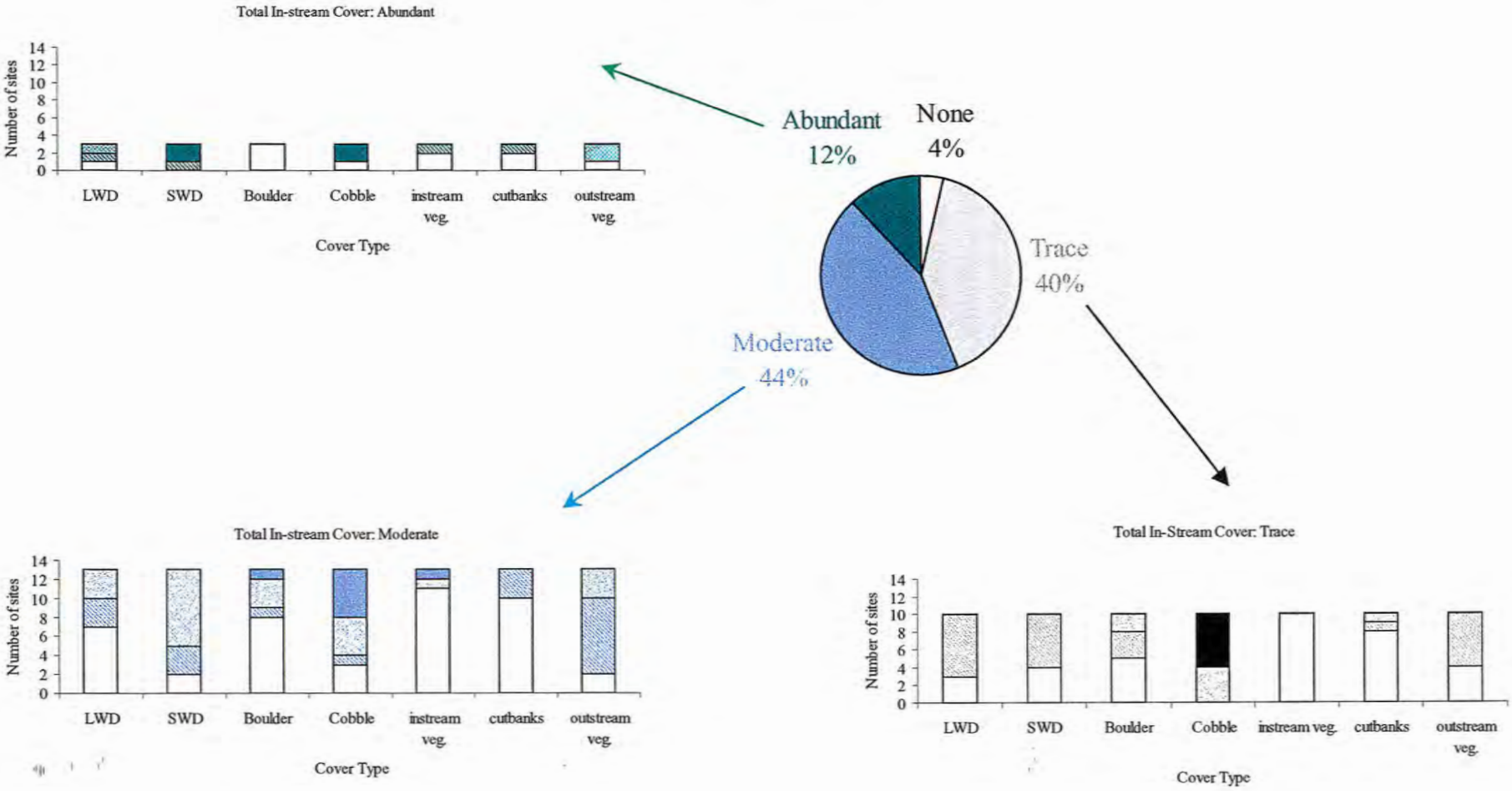

Figure 3. Pie chart illustrating the proportion of sites with varying levels of in-stream cover, rated as none, trace, moderate and abundant. Inset histograms illustrate the proportion of in-stream cover elements among sites with varying amounts of cover (white bars = none, diagonal bars = trace, cross hatched bars = moderate, solid bars = abundant cover). Also see Appendix 1b for enlarged histogram shown in this Figure.

4.1.1.2 TOBOGGAN CREEK SITES

Fall habitat assessments were conducted at two of the six sites sampled during the winter in the Toboggan Creek drainage (Appendix 1). Both of these sites (TOB 1 and TOB 2) are characterized by fluvial habitat, and are located near the Toboggan Creek fish hatchery. Sites TOB 8 (side channel habitat) and TOB 7 (Toboggan Lake outlet) were added part way through the winter, and no fall habitat assessments were conducted at these sites due to the presence of ice. An additional side channel site (TOB 3) was visited in December and January, but was not suitable for sampling due to low water depth. The remaining two sites (TOB 5 and 6) are located on Toboggan Lake. Fall habitat assessments for Toboggan Creek sites are therefore limited to sites TOB 1 and TOB 2.

4.1.1.2.1 SURFACE AREA, WIDTH AND DEPTH

Site length, wetted width and wetted depth measurements were obtained for the two fluvial sites assessed in November 2000 in Toboggan Creek (TOB 1 and TOB 2). Surface area was calculated to be 70 m^2 and 103 m^2 for sites TOB 1 and TOB 2 respectively (mean = 86.3, SE = 23.1). Wetted width at site TOB 1 averaged 5 meters, and wetted width at site TOB 2 averaged 9.3 meters (mean = 7.2, SE = 3.1). Mean wetted depth averaged 64.5 cm (SE = 6.6), while maximum depth averaged 81 cm (SE = 8.49). Of the two sites sampled, site TOB 2 was deeper (mean wetted depth = 69.2 cm, max. wetted depth = 87 cm) than site TOB 1 (mean wetted depth = 59.8 cm, max wetted depth = 75 cm). Of the two fluvial sites sampled in Toboggan Creek, site TOB 2 was larger in both width and surface area, and deeper than site TOB 1.

4.1.1.2.2 HABITAT COMPOSITION AND SUBSTRATE

Sites sampled in Toboggan Creek represent lake, fluvial and side channel habitat. All six of the sites sampled had a gradient of 0%. The majority of habitat at the two fluvial sites was comprised of pools (75% at site TOB 1 and 50% at site TOB 2), but both sites also had some edge habitat (10% at both sites) and riffle habitat (15% at site TOB 1 and 40% at site TOB 2), but no glide habitat. Substrate at both fluvial sites consisted primarily of cobbles, with fines as subdominant substrate in pools and riffles, except for pebbles, which were the sub-dominant substrate in the riffle portion of site TOB 1. Substrate size was on average larger at site TOB 2 as indicated by the larger D_{90} at this site (28 cm) than at site TOB 1 (7 cm). Embeddedness was estimated as 5% at both sites. Fluvial habitat sampled at Toboggan Creek consisted of two cobble pools with low gradient.

4.1.1.2.3 COVER

In-stream and out of stream cover was evaluated for the two fluvial sites sampled in Toboggan Creek. Total in-stream cover at both sites was rated as moderate. In-stream cover elements at site TOB 1 consisted of LWD (moderate), SWD (moderate), cobble (moderate), and cut banks (trace). In-stream cover at site TOB 2 was comprised of SWD (moderate), boulder (moderate), and cobble (abundant). Substrate appears to be a more important portion of instream cover at site TOB 2 than at site TOB 1, although the presence of boulder cover is somewhat in disagreement with substrate composition observed at this site (section 4.1.1.2.2, Appendix 1b).

4.1.1.3 COMPARISONS OF FALL HABITAT ASSESSMENTS AT UPPER BULKLEY AND TOBOGGAN CREEK

Fall habitat assessments for sites sampled in the Upper Bulkley and Toboggan Creek watersheds indicate that these sites are similar. Surface area, wetted width, mean and maximum wetted depth of the two Toboggan Creek sites fall within the range reported for Upper Bulkley sites, indicating that fluvial sites were similar in these dimensions, and should be comparable in terms of fish density indices (CPUE, catch/m^2 and catch/m^3). No statistically significant difference was found between Toboggan Creek and Upper Bulkley sites in terms of surface area ($t = 0.472$, $p = 0.641$), wetted width ($t = 12.706$, $p = 0.715$), mean wetted depth ($t = 1.160$, $p = 0.257$) or maximum wetted depth ($t = 1.286$, $p = 0.210$). Percent pool habitat is also similar between sites sampled in the Upper Bulkley watershed and fluvial habitat in Toboggan Creek ($t = 0.082$, $p = 0.935$). While some sites had a low amount of glide habitat (mean = 25%) and edge habitat (mean = 8.7%), no glide habitat was present in the two Toboggan Creek sites, and edge habitat was also rare (mean = 10%). The low number of sites with these types of habitat decreased sample size, and did not allow for statistical comparisons between percent glide and edge habitat. On average, riffle habitat was significantly more common at the two sites in Toboggan Creek (mean = 25%) compared to the 23 sites in the upper Bulkley (mean = 4.6%). The higher proportion of riffle habitat at Toboggan Creek sites when compared to Upper Bulkley sites, may compensate for the lack of glide and edge habitat at these sites. Cobble was the dominant substrate in both the upper Bulkley and Toboggan Creek sites, and formed an important part of in-stream cover. Among sites sampled in the Upper Bulkley and Toboggan Creek, the three upper Bulkley side channel sites (SID 1, 2, and 3), the two sites in the Buck Creek release pond (BUC 7 and 8), the Toboggan Creek side channel site (TOB 8) and the three Toboggan Lake sites (TOB 5, 6 and 7) are unique from the remaining 22 sites.

4.1.2 Winter Assessments

4.1.2.1 UPPER BULKLEY SITES

Notable variability in water temperature, ice cover, conductivity, dissolved oxygen, turbidity, ice thickness and snow depth were observed among upper Bulkley sites during the winter. Quantitative data recorded during winter sampling at Upper Bulkley sites are summarized in Table 4. Ranges, means and variability of conditions recorded during winter assessments at sites in the Upper Bulkley watershed are summarized in Table 4. The highest air temperature (9°C) during the study was recorded at sites BUC 7 and 8 on December 6th, 2000, while the lowest air temperature (-16°C) was recorded at site BYM 2 on December 15th and at sites BYM3 and UBR 2 on December 14th, 2000. Water temperature was highest (3.8°C) at site SID 2 on March 6, 2001, and lowest (0°C) at sites BYM 3 (February 8th, 2000), RIC 3 (December 18th, 2000) and UBR 12 (December 18th, 2000). The highest conductivity measurement was obtained at site BUC 8, with a conductivity of 320 µS/cm, while conductivity was lowest (40 µS/cm) at site BYM 1 and McQ 1 on February 5th, 2001. Dissolved oxygen was generally greater than 10 ppm at most sites, with a high of 13 ppm recorded at site RIC 2 (January 8th, February 5th, and March 5th sampling). The three side channel sites (SID 1, SID, 2 and SID 3) were the only sites where dissolved oxygen was consistently less than 10 ppm, and was as low as 6 ppm (site SID 2,

December 6th, 2000). Most of the Upper Bulkley tributary and mainstem sites exhibited ice cover of 100% for at least part of the winter, except site BYM 1, which had a maximum ice cover of 80% on December 5th, 2000. Two of the side channel sites (SID 2 and SID 3) had ice cover of 0% on December 6th, 2000. Water depth decreased to 0 cm at site SID 2 on December 6th, 2000, but was higher than 10 cm at all other sites for the duration of the winter. Ice thickness reached up to 73 cm (RIC 2 on March 5th, 2001). Ice thickness was variable, but was generally lower in side channel sites SID 2 and SID 3 (0-8 cm) than at other sites sampled. Snow depth was highest at site RIC 3 (45 cm on February 14th, 2001), and was generally lower at the channel sites SID 2 and 3 (0 cm) and a Byman Creek site BYM 2 (0-4 cm). Water was clear at all sites at all sampling events. Stream flow ranged from low to high, with most sites having moderate flow at most sampling events. High water flow was observed at sties BUC 6, BYM 1, RIC 2, UBR 9 and UBR 10. Low flow conditions were reported on more than one occasion at the side channel sites and all of the Richfield Creek sites. While some of these differences are due to changing environmental conditions during the winter, some of the variability appears to be due to differences between sites, particularly differences between side channel sites and tributary or mainstem sites sampled in the Upper Bulkley watershed.

Table 4. Summary of winter assessment results at sites in the Upper Bulkley Watershed.

Variable	N	Minimum	Maximum	Mean	Standard Error
Air Temperature	99	-16°C	9°C	-4.3°C	0.51
Water Temperature	100	0°C	3.8°C	0.65°C	0.069
Conductivity	71	40µS/cm	320µS/cm	117µS/cm[1]	4.43[1]
Dissolved Oxygen	100	6.0 ppm	13.0 ppm	11.15 ppm	0.142
Water Depth	100	26 cm	151 cm	78.2 cm	2.728
Ice Thickness	100	0 cm	73 cm	25.87 cm	1.682
Ice Cover	100	0%	100%	92.58%	1.987
Snow Depth	99	0 cm	45 cm	15.26 cm	1.396

[1] mean and SE for conductivity excludes outliers of 310 and 320 µS/cm at the Buck Creek release pond.

4.1.2.2 TOBOGGAN CREEK SITES

Within sites sampled in the Toboggan Creek watershed, sites differed in water temperature, ice cover, conductivity, dissolved oxygen, ice thickness, water clarity, water flow and snow depth during the winter. Quantitative data recorded during winter sampling at Toboggan Creek sites are summarized in Table 5. Air temperature was highest at site TOB 6 (March 19th, 2001), and consistently low (-12°C) among all Toboggan Creek sites sampled on December 20th, 2000. Water temperature was lowest (0.1 °C) at sites TOB 5 and TOB 6 on January 22nd, 2001, while the highest water temperature of 2.0°C was recorded at site TOB 7 on March 9th, 2001. The lowest water temperatures were recorded at the lake sites (TOB 5 and 6) while the highest water temperatures were recorded at fluvial sites (TOB 1, 2 and 8). Conductivity was lowest (30 µS/cm) at site TOB 8 (December 20th, 2000), and highest (110 µS/cm) at site TOB 6 (January 22nd, 2001). Dissolved oxygen was lowest (2 ppm) at site TOB 6 on March 19th 2000. In fact, dissolved oxygen was consistently low at this site (mean = 5.5 ppm, SE = 1.71). Dissolved oxygen was also relatively low at site TOB 7 (6 ppm on March 9th, 2001), and at site TOB 5 (3

ppm on March 19th, 2001). The highest dissolved oxygen readings (13 ppm) were obtained at site TOB 1. The three fluvial sites (TOB 1, TOB 2 and TOB 8) had dissolved oxygen readings greater than 10 ppm for the winter sampling period. All sites sampled throughout the winter (TOB 1, TOB 2, TOB 5, TOB 6 and TOB 8) had ice cover of 100% on at least one occasion. Ice thickness appeared to be greater at the lake sites (TOB 5 and 6), where ice thickness varied between 30 and 92 cm, than at the fluvial sites (TOB 1, 2 and 8) where ice thickness varied between 0 and 17 cm. The lowest water depth (30 cm) was recorded at site TOB 5 (March 19th, 2001), one of the lake sites, while the highest water depth (130 cm) was recorded at site TOB 7 at the lake outlet. Low water depth at a side channel site (TOB 3) visited on December 20th, 2000 and January 22nd, 2001, was insufficiently deep for sampling by minnow traps. Snow depth was highest at lake site TOB 5 (26 cm on January 22nd, 2001), and lowest at the fluvial sites (TOB1, 2 and 8) where snow depth ranged between 0 and 14 cm. Water was clear at all fluvial sites for the majority of sampling, but was moderately turbid for most sampling events at the lake sites (TOB 5 and 6). Stream flow ranged between low and high at fluvial sites, with high stream flow observed at sites TOB 2 and TOB 8 (March 19th, 2001), while no flow was observed at the lake sites (TOB 5 and 6). Although part of the variability in winter assessment data is attributable to seasonal differences in sampling, some of the variability appears to stem from differences between sites, particularly when comparing the lake sites (TOB 5 and 6) to the fluvial sites sampled in Toboggan Creek.

Table 5. Summary of winter assessment results at sites in Toboggan Creek drainage.

Variable	N	Minimum	Maximum	Mean	Standard Error
Air Temperature	21	-12°C	-2°C	-5.57°C	0.827
Water Temperature	20	0.1°C	2.0°C	0.77°C	0.122
Conductivity	10	30µS/cm	110µS/cm	77.0µS/cm	7.157
Dissolved Oxygen	20	2.0 ppm	13.0 ppm	9.12 ppm	0.738
Water Depth	20	30 cm	130 cm	71.15 cm	5.409
Ice Thickness	21	0 cm	53 cm	20.91 cm	4.428
Ice Cover	21	0%	100%	69.0%	9.139
Snow Depth	21	0 cm	26 cm	5.714 cm	1.810

4.1.2.3 COMPARISONS OF WINTER ASSESSMENTS AT UPPER BULKLEY AND TOBOGGAN CREEK

Winter sampling data between the Toboggan Creek and Upper Bulkley sites were compared to establish if there are distinct differences between the two drainages sampled. Air temperature is not statitistically different between the two drainages (U=922.00, p=0.414), indicating that the two drainages are subject to similar ambient conditions. However, snow depth is significantly greater in the Upper Bulkley watershed than at sites sampled in Toboggan Creek (U=615.5, p=0.003). The percent ice cover is significantly less at Toboggan Creek sites than at Upper Bulkley sites (U=771.5, p=0.013), while the thickness of the ice cover is similar between sites sampled in the two drainages (U=863.50, p=0.202). Higher snow levels and greater ice thickness at Upper Bulkley mainstem and tributary sites compared to Toboggan Creek sites may be due to differences in elevation between the two watersheds, and the slightly more interior climate experiences in the Upper Bulkley watershed when compared to Toboggan Creek. There is no statistically significant difference between water temperature in sites sampled in Toboggan

Creek or the Upper Bulkley River (U=1186.5, p=0.186). Conductivity and dissolved oxygen concentrations were significantly higher at Upper Bulkley sites than at Toboggan Creek sites (U=133.5, p = 0.002 excluding outliers in Buck Creek, and U = 607.0, p=0.004 respectively). Comparisons of dissolved oxygen between Upper Bulkley mainstem, tributary, and side channel sites, and Toboggan Creek mainstem, side channel and lake sites indicate that there is significant difference between these different categories of sites (ANOVA F = 71.297, p = 0.000). Dissolved oxygen at Toboggan Lake is significantly lower than of any site sampled (Tukey HSD $\geq$ 1.817, p $\leq$ 0.001). Similarly, dissolved oxygen is significantly lower in Upper Bulkley side channel sites than oxygen concentrations at other Upper Bulkley sites or fluvial habitat at Toboggan Creek (Tukey HSD $\geq$ 2.583, p $\leq$ 0.002). Dissolved oxygen concentrations are significantly lower at Upper Bulkley mainstem sites than in Upper Bulkley tributary sites (Tukey HDS = 1.240, p = 0.000), but there is no statistical difference in dissolved oxygen between Upper Bulkley mainstem sites or Toboggan Creek mainstem and side channel sites. Nor is there a statistical difference between Toboggan Creek fluvial sites (mainstem and side channel) and Upper Bulkley tributary sites. There was no statistical difference in water depth between the sites sampled in Toboggan Creek and the Upper Bulkley River (U=917.0, p = 0.559). While winter assessment data recorded for sites in the Upper Bulkley and Toboggan Creek watersheds are similar in many respects, there are statistically significant differences in snow depth, percent ice cover, conductivity, and dissolved oxygen.

4.1.3 Changes in Habitat During the Winter

Previous comparisons have indicated that the sites sampled during the Bulkley overwintering study can be grouped into six distinct categories based on geographical and physical features. Sites in the Upper Bulkley watershed can be grouped into mainstem, side channel and tributary sites (including fluvial sites and two sites at the Buck Creek release pond), and sites in the Toboggan Creek watershed can be grouped into lake, side channel and mainstem sites. These broad categories are used for comparisons of the remainder of the data.

4.1.3.1 UPPER BULKLEY SITES

Temporal trends in ambient temperature, water temperature, percent ice cover, ice thickness, water depth, snow depth, dissolved oxygen and conductivity were graphed for each site (Appendix 2b). These data were recorded at all sites during each sampling interval, except conductivity, which was not recorded in March due to meter malfunction. Ambient temperature is affected more by sampling date than by the type of site sampled (side channel, mainstem or tributary). Ambient temperature was most variable in December, as some sites were sampled during a warm spell in the first week of December. Ambient temperatures in January, February and March were less variable, and were generally lowest in January and February, with a marginal increase in March. Other temporal trends appear to be affected by both sampling dates and the type of site sampled. Temporal trends in water temperature, percent ice cover, ice thickness, water depth, snow depth, dissolved oxygen and conductivity are discussed separately for mainstem, side channel and tributary sites.

4.1.3.1.1 UPPER BULKLEY MAINSTEM

Temporal trends at Upper Bulkley mainstem sites differed from side channel and tributary sites sampled in the Upper Bulkley watershed. Water temperatures at Upper Bulkley mainstem sites were generally lower than side channel or tributary sites, especially in December and January, although water temperatures at sites UBR 11 and 12 downstream of Houston increased to among the highest recorded in the Upper Bulkley watershed by March (1.7 and 2.2 respectively compared to 0.1 - 0.5 at other Upper Bulkley mainstem sites, except for a temperature reading at UBR 1 of 1.3 on March 14 the latest of the three sites sampled). Ice cover was complete at all mainstem sites except for site UBR 9 in the first week in December (all sites sampled on the same day had incomplete ice cover), and site UBR 1 during the March sampling period. Ice thickness generally increased at the Upper Bulkley sites throughout the winter. Water depth fluctuated, but did not show a clear temporal trend, although it is interesting to note that the increase in water temperatures at sites UBR 11 and 12 between February and March coincides with an increase in water depth at site UBR 12, and a decrease in water depth at site UBR 11, despite the fact that these two sites were sampled on the same sampling dates in both February and March. Snow depth at Upper Bulkley mainstem sites appear to peak slightly during the January sampling period, and gradually declines to March while snow depth at tributary sites (particularly Richfield and Buck Creek sites) does not peak until February. Conductivity remained relatively consistent throughout the sampling period, but no conductivity readings were recorded in March due to meter malfunction. Dissolved oxygen also did not show any clear declines or increases during the winter, but remained relatively consistent and intermediate between side channel sites and tributary sites in the watershed. Overall, several of the data collected during the winter indicated that water quality remained relatively consistent at the mainstem sites in terms of water temperature, percent ice cover, conductivity, and dissolved oxygen, and that ice thickness generally increases throughout the winter at the Upper Bulkley mainstem sites.

4.1.3.1.2 UPPER BULKLEY SIDE CHANNELS

The three side channel sites sampled in the Upper Bulkley were distinct from other sites sampled in the Upper Bulkley. These sites had consistently higher water temperatures than those observed at either Upper Bulkley mainstem sites or Upper Bulkley tributary sites. Water temperatures decreased at side channel sites between December and January, but subsequently increased to the end of March. Ice cover was incomplete at side channel sites in December, and remained incomplete at site SID 2 for the duration of the winter. Incomplete ice thickness in December is likely a result of the sampling dates, which fell within the warm spell at the beginning of December, resulting in incomplete ice formation, while other sites were sampled a few days later at notably colder ambient temperature. Similarly, ice thickness at site SID 2 and 3 were among the lowest observed in the study, while ice thickness at site SID 1 was similar to that at other sites in the Upper Bulkley watershed. The low water depth (0 cm) at site SID 2 in December is likely a data error since water quality measures were taken, and subsequent water depth measurements were consistently between 40 and 45 cm. The relatively high water temperature at this site likely resulted in low percent ice cover, low ice thickness and low snow thickness. No clear temporal trends in percent ice cover, ice thickness, snow depth, water depth, dissolved oxygen or conductivity were found at the side channel sites sampled.

4.1.3.1.3 UPPER BULKLEY TRIBUTARIES

Water temperature, water depth, percent ice cover, ice thickness, snow depth, dissolved oxygen and conductivity were recorded at each of the 16 Upper Bulkley tributary sites throughout the winter. Water temperatures in tributaries were variable, and variation existed within and among tributary streams sampled. Water temperature at BYM 1 and 2 were generally higher than at BYM 3, which exhibited among the lowest water temp observed, and was consistently lower than most other tributary sites sampled. Water temperatures at the Buck Creek release pond were among the highest recorded, and were higher than temperatures in other Buck Creek sites. Water temp at RIC 1 generally increased over the sampling periods, while water temperature at RIC 2 decreased from December to January and remained low for the remainder of the study, similar to trends observed at most Buck Creek sites. Water temperature at all Richfield Creek and Buck Creek sites increased from February to March except at site RIC 5 where water temp decreased from 1.1 to 0.7 C. Water temperature at McQuarrie varied little over the winter and ranged between 0.2 to 0.4 C. Similar to Upper Bulkley mainstem sites, tributary sites sampled on December 6th, 2000 had incomplete ice cover due to high ambient temperature on that sampling date. Ice cover was incomplete (50% to 80%) at sites BYM 1 and BYM 3 for the duration of the winter while all other tributary sites had complete ice cover after the first week of December until the March sampling period. Flow levels at site BYM 1 appeared to be higher than at most other Upper Bulkley tributary sites. Similarly, Byman Creek sites had consistently lower ice thickness than other tributaries sampled, particularly when compared to Richfield Creek. Ice thickness generally increased at sampling sites during the winter. Snow depth was generally greater at Richfield Creek and Buck Creek sites than at Byman Creek, McQuarrie Creek or Barren Creek sites. Snow depth at tributary sites peaked in the February sampling period. Water depth generally declined at tributary sites, but conductivity and dissolved oxygen concentrations remained relatively consistent except for a peak in conductivity in the Buck Creek released pond in February. These unusually high conductivity readings were obtained after the field meter was submersed in water, causing the meter to become inoperable. Similar to Upper Bulkley mainstem sites, several of the data collected during the winter indicated that conditions remained relatively consistent at the mainstem sites in terms of water temperature, percent ice cover, conductivity, and dissolved oxygen. Ice thickness generally increases throughout the winter at the Upper Bulkley tributary sites, while water depth generally decreases.

4.1.3.2 TOBOGGAN CREEK SITES

Temporal trends in ambient temperature, water temperature, percent ice cover, ice thickness, water depth, snow depth, dissolved oxygen and conductivity were graphed for each site sampled in the Toboggan Creek watershed (Appendix 2b). These data were recorded at all sites during each sampling interval, except conductivity, which was not recorded in February or March. Ambient temperature is affected more by sampling date than by the type of site sampled (side channel, mainstem or lake). Ambient temperature was lowest in December, as sites were sampled during a relatively cold week in December (less than -10^{o}C). Ambient temperature remained between 0 and -10^{0}C for the remainder of the sampling period. Other temporal trends appear to be affected by both sampling dates and the type of site sampled. Temporal trends in water temperature, percent ice cover, ice thickness, water depth, snow depth, dissolved oxygen and conductivity are discussed separately for mainstem, side channel and lake sites.

4.1.3.2.1 TOBOGGAN CREEK MAINSTEM

Water temperature, water depth, percent ice cover, ice thickness, snow depth, dissolved oxygen and conductivity were recorded at each of the two Toboggan mainstem sites throughout the winter. Since the two sites sampled at Toboggan Creek were in close proximity to each other, these sites may not represent the variation in environmental conditions at Toboggan mainstem sites. Water temperature at site TOB 1 was relatively consistent throughout the winter, while water temperature at site TOB 2 fluctuated considerably. Ice cover also fluctuated at site TOB 2 between 0 and 100%, while ice cover at site TOB 1 was complete after the December sampling period. Ice thickness at the two Toboggan Creek mainstem sites was low throughout the winter, and increased slightly from January to February at both sites. Water depth at both Toboggan Creek mainstem sites was relatively consistent, and snow depth was low at both sites. Dissolved oxygen and conductivity did not fluctuate notably during the winter. Toboggan Creek mainstem sites show no temporal trends in water depth, ice cover, ice thickness, dissolved oxygen, conductivity, or water temperature over the winter.

4.1.3.2.2 TOBOGGAN CREEK SIDE CHANNELS

Two side channels were sampled in the Toboggan Creek watershed (sites TOB 3 and TOB 8), but only site TOB 8 was sampled throughout the entire winter. This was due to the fact that site TOB 3 did not have sufficient water depth to allow for trapping. Water temperature at site TOB 8 was relatively high at the onset of winter (likely due to mild fall and delayed winter conditions), but declined in January and then increased in February and March. The side channel site did not freeze completely until the February sampling period, and ice thickness did not show any clear temporal trends. Water depth remained relatively consistent at the side channel site throughout the winter, and snow depth was only noted in December. Conductivity at the Toboggan side channel site was low when compared to the mainstem sites. Dissolved oxygen remained relatively consistent over the winter (10 or 11 ppm). Overall, environmental conditions measured at the Toboggan Creek side channel site TOB 8 fluctuated little over the winter, and did not show any clear temporal trends.

4.1.3.2.3 TOBOGGAN LAKE

Two sites were sampled in Toboggan Lake throughout the winter, and a third site was added in March at the lake outlet since water depth at the two established Toboggan Lake sites was insufficient for trapping. Water temperatures at the Toboggan Lake sites were consistently lower than water temperature at Toboggan mainstem or side channel sites throughout the winter. Complete ice cover was present at the lake sites at all sampling intervals, and the ice was generally thicker than at the Toboggan mainstem or side channel sites. Ice thickness at the lake sites increased gradually but consistently throughout the winter sampling periods. Snow depth was also greater at the lake sites than at fluvial sites in Toboggan Creek in December, January and February (no snow was noted at any Toboggan sites in March). While conductivity remained relatively consistent at Toboggan Lake sites throughout the winter, dissolved oxygen showed a clear and consistent decline at the two Toboggan Lake sites sampled throughout the winter. Dissolved oxygen concentrations decreased from 10 ppm at both sites in December to 2 or 3 ppm in March. The lake outlet sampled only in March also exhibited a relatively low oxygen concentration of 6 ppm, although this concentration was intermediate between the lake

and fluvial sites sampled in the system. Toboggan Lake sites show clear declines in dissolved oxygen, and increase in ice thickness over the winter.

4.1.3.3 COMPARISONS OF CHANGES IN HABITAT DURING THE WINTER AT UPPER BULKLEY AND TOBOGGAN CREEK

Fluvial habitat sampled in both the Upper Bulkley and Toboggan Creek watersheds appear to show few consistent temporal trends in water depth, temperature, snow depth, ice thickness and cover, conductivity or dissolved oxygen. However, side channel sites in the Upper Bulkley watershed, and Toboggan Lake sites show declines in dissolved oxygen, and declines in water depth were noted in Upper Bulkley tributary sites. Most sites exhibit an increase in ice thickness over the winter, including Toboggan Lake, upper Bulkley mainstem and tributary sites, but this trend was not noted at sites were ice cover was incomplete in the winter (e.g. Upper Bulkley side channel sites, Toboggan Creek mainstem and side channel sites).

4.2 FISH SAMPLING

Eight species of fish were recorded in the fish data obtained in the Upper Bulkley and Toboggan Creek overwintering study. These species include coho, rainbow trout/steelhead (herein after referred to as rainbow trout), Dolly Varden, chinook, cutthroat trout, longnose dace, suckers and peamouth chub. Of the sites sampled, Buck Creek and Toboggan Creek are enhanced coho stocks with annual releases of coho. The following sections present fish sampling results for the Upper Bulkley and Toboggan Creek sites sampled between December 2000 and March 2001.

4.2.1 Species Distribution and Diversity

Species distribution and diversity varied between watersheds and between sites within watersheds. Of the eight species recorded in the study, three (coho, rainbow trout, and DollyVarden) were captured in the Toboggan Creek watershed. No non-salmonids were captured at the Toboggan Creek sites sampled. Seven species (coho, rainbow trout, chinook, longnose dace, suckers, peamouth chub and cutthroat trout) were recorded at sites in the Upper Bulkley watershed. The two cutthroat trout reported for the Upper Bulkley watershed may have been a misidentified rainbow trout, although this is unclear, and the data analysis assumed that the fish had been correctly identified. A greater variety of species was captured in the Upper Bulkley watershed than in the Toboggan Creek watershed.

Of the 1522 fish captured most were rainbow trout and coho, with each of these species contributing 43.5% of the catch. The remainder of the species were chinook (10.9%), Dolly Varden (0.7%), suckers (0.5%), longnose dace (0.5%), peamouth chub (0.3%) and cutthroat trout (0.1%). Most of the 662 coho were captured in the Toboggan Creek watershed (83%). Fourty-five percent of the 662 coho were captured in the two Toboggan Creek mainstem sites (TOB 1 and 2), 27% were captured in the Toboggan Creek side channel site (TOB 8) and 11% were captured in the two Toboggan Lake sites (TOB 5 and 6) and the outlet of Toboggan Lake (TOB 7). No coho were captured in the Upper Bulkley side channel sites (SID 1, 2 and 3), while 13% were captured in the 22 tributary sites, and 4% were captured in the six Upper Bulkley mainstem sites. The majority of the 662 rainbow trout sampled during the study were captured in the Upper Bulkley watershed, with 49% captured in the Upper Bulkley tributary sites, 20% in the Upper Bulkley mainstem sites, and none in the Upper Bulkley side channel sites. An additional 22% of the 662 rainbow trout were captured in Toboggan Creek mainstem sites, 7% were captured in the Toboggan side channel site, and 2% in the Toboggan Lake and outlet sites. All of the 166 chinook were captured in the Upper Bulkley watershed, with 59% captured in Upper Bulkley tributaries (Richfield and Buck Creek sites), and 41% in Upper Bulkley mainstem sites. All of the ten Dolly Varden were captured in the Toboggan Creek watershed, and were present in Toboggan mainstem (30%), Toboggan Lake and Toboggan Lake outlet (50%) and Toboggan side channel sites (20%). Cutthroat trout, longnose dace, suckers and peamouth chub were only captured in the Upper Bulkley watershed (Upper Bulkley mainstem, side channel, Buck Creek, Richfield Creek and Byman Creek).

Species richness, diversity and evenness was determined for each site, and averaged for the four sampling intervals during the winter (Appendix 3). Up to four different species were captured at the sites sampled during the winter. Sites with higher species richness tended to have higher

species diversity and evenness. No fish were captured at some Upper Bulkley tributary, mainstem and side channel sites during some sampling periods, but fish were captured at the Toboggan Creek side channel and mainstem site during each of the four sampling intervals. This decreased the range of species diversity, evenness and richness for the Toboggan Creek mainstem and side channel sites when compared to other sites.

Species richness, diversity and evenness were compared between drainages and between different categories of sites within the drainages. Average species richness, diversity and evenness of sites sampled in Upper Bulkley mainstem, side channel and tributaries, as well as in Toboggan Creek mainstem, side channel and lake sites are summarized in Table 6. On average, species richness, evenness and diversity did not differ significantly between Toboggan Creek and Upper Bulkley mainstem sites (Mann-Whitney U = 0.653, 1166.5 and 1166, p = 0.653, 0.078 and 0.078 respectively) despite the fact that a greater variety of species was captured among Upper Bulkley sites. Species richness differed significantly between tributary, side channel, mainstem and lake sites in the two drainages (KS = 22.711, p = 0.000), as did species diversity and evenness (KS = 11.253, p = 0.047). Species richness, diversity and evenness were highest in Upper Bulkley tributary sites, and lowest in Upper Bulkley side channel sites where few fish were captured. Toboggan mainstem and side channel also had among the highest species richness, diversity and evenness, which were just slightly lower than those observed at Upper Bulkley tributary sites. Toboggan Lake had relatively low species diversity, richness and evenness, similar to sites in the Upper Bulkley mainstem. Overall, average species richness, diversity and evenness was influenced more by the type of sites sampled (e.g. lacustrine versus fluvial) than by the drainage in which the sites were located. Species richness, diversity and evenness were highest in Upper Bulkley tributary sites, followed by Toboggan Creek mainstem and side channel sites, Upper Bulkley mainstem and Toboggan Lake sites, and Upper Bulkley side channel sites.

Table 6. Mean species richness, species diversity and evenness at tributary, side channel and mainstem sites in the Upper Bulkley watershed, and lake, side channel and mainstem sites in Toboggan Creek.

	Species Richness			Species Diversity			Evenness		
	Range	Mean	SE	Range	Mean	SE	Range	Mean	SE
Upper Bulkley Tributaries[1]	0 – 4	2.25	0.114	0.00-0.577	0.252	0.020	0.00-0.683	0.298	0.023
Upper Bulkley Sidechannels	0 – 2	0.667	0.284	0.00-0.301	0.100	0.043	0.00-0.356	0.119	0.051
Upper Bulkley Mainstem	0 – 3	1.682	0.232	0.00- 0.439	0.192	0.037	0.00-0.520	0.227	0.043
Toboggan Lake	0 – 3	1.286	0.421	0.00-0.308	0.112	0.054	0.00-0.364	0.133	0.064
Toboggan Sidechannel	2 – 3	2.250	0.250	0.132-0.217	0.190	0.020	0.157-0.257	0.225	0.024
Toboggan Creek Mainstem	2 – 3	2.125	0.125	0.141-0.287	0.212	0.018	0.167-0.340	0.252	0.022

In summary, species distribution, diversity, richness and evenness were found to differ somewhat between and within habitat types sampled in Toboggan Creek and the Upper Bulkley watershed. Coho is the dominant species at sites sampled in Toboggan Creek, while rainbow trout dominates catches at sites sampled in the Upper Bulkley watershed. Chinook, cutthroat trout and non-salmonid species (longnose dace, suckers and peamouth chub) were only encountered in the Upper Bulkley, while Dolly Varden were only captured in Toboggan Creek. Species richness, diversity and evenness does not differ significantly between the watersheds, but differs significantly between sites sampled. Upper Bulkley tributary sites had the highest and Upper Bulkley side channel the lowest average species diversity, richness and evenness.

4.2.2 Density Indices

Fish capture data and fall assessment data were used to calculate catch per unit effort (CPUE), and the number of fish by unit area and unit volume of habitat. All of these estimates of density are related, and are strongly correlated, generally showing the same temporal trends (Appendix 4). Fall assessments were not conducted at all sites (e.g. UBR 1 and UBR 2, TOB 5, TOB 6, TOB 7 and TOB 8), and these sites did not have sufficient data to determine catch per unit area or volume. Since comparisons of CPUE are able to include data for all sites, while catch per unit area and volume are limited to the sites for which fall assessments were conducted, the majority of the data analysis focuses on comparisons of CPUE data. This section present CPUE data, and compares CPUE and fish/cubic meter over time as well as between sites.

Total catch and CPUE for the four sampling intervals are summarized for each of the 31 sites in Table 7. Total catch was highest at Richfield Creek site (RIC 3), and lowest in the Upper Bulkley side channel sites (SID 1, SID 2, SID 3). Similarly, CPUE was highest at site RIC 3 and lowest in Upper Bulkley side channel sites. Total catch over the winter exceeded 100 fish over the four months of the study at five of the 31 sites (16.1%). These sites include Upper Bulkley mainstem site UBR 2, Upper Bulkley tributary sites BUC 5, RIC 2, RIC 3 and Toboggan Creek sites TOB 1. Two of the six Upper Bulkley mainstem sites (33%), and none of the Upper Bulkley side channel sites had CPUE greater than 1.5 fish / trap. However, 14 of the 22 Upper Bulkley tributary sites (63.6%) had CPUE greater than 1.5 fish / trap, and all Toboggan Creek side channel and mainstem sites had CPUE in excess of 1.5 fish / trap. CPUE in Toboggan Lake sites was lower than 1.5 fish / trap for the winter, but CPUE in the Toboggan Lake outlet, sampled in March was greater than 1.5 fish / trap. Over the winter, most of the fish were captured in the Upper Bulkley tributary sites, and the Toboggan Creek mainstem and side channel sites, while few fish were captured in to Upper Bulkley side channel and Toboggan Lake sites.

Table 7. Summary of trap catches of juvenile salmonids at each of the sites sampled during the overwintering study. C = total catch, % = proportion of the total catch, CPUE = mean catch of each species using monthly CPUE data. Upper Bulkley sites are indicated in regular text and Toboggan Creek sites are indicated in italics.

	Site	# Traps Set	Coho Salmon			Rainbow trout/ steelhead			Chinook Salmon			Dolly Varden			All Species	
			C	%	CPUE	C	%	CPUE	C	%	CPUE	C	%	CPUE	C	CPUE
Upper Bulkley mainstem	UBR1	12	0	0.0	0.00	3	30.0	0.25	7	70.0	0.58	0	0.0	0.00	10	0.83
	UBR2	12	29	27.1	2.42	44	41.1	3.67	34	31.8	2.83	0	0.0	0.00	107	8.92
	UBR9	12	1	4.2	0.08	10	41.7	0.83	13	54.2	1.08	0	0.0	0.00	24	2.00
	UBR10	12	0	0.0	0.00	2	28.6	0.17	3	42.9	0.25	0	0.0	0.00	7	0.58
	UBR11	12	2	13.3	0.17	7	46.7	0.58	6	40.0	0.50	0	0.0	0.00	15	1.25
	UBR12	15	0	0.0	0.00	0	0.0	0.00	4	100	0.33	0	0.0	0.00	4	0.33
Upper Bulkley Tributaries	BAR1	8	5	35.7	0.63	9	64.3	1.13	0	0.0	0.00	0	0.0	0.00	14	1.75
	BUC1	20	35	70.0	1.75	15	30.0	0.75	0	0.0	0.00	0	0.0	0.00	50	2.50
	BUC2	28	3	8.6	0.11	29	82.9	1.04	2	5.7	0.07	0	0.0	0.00	35	1.25
	BUC5	28	19	16.4	0.68	91	78.4	3.25	5	4.3	0.18	0	0.0	0.00	116	4.14
	BUC6	20	1	2.2	0.05	36	80.0	1.80	7	15.6	0.35	0	0.0	0.00	45	2.25
	BUC7	12	24	49.0	2.00	17	34.7	1.42	7	14.3	0.58	0	0.0	0.00	49	4.08
	BUC8	12	11	28.9	0.92	14	36.8	1.17	12	31.6	1.00	0	0.0	0.00	38	3.17
	BYM1	24	1	2.9	0.04	33	94.3	1.38	0	0.0	0.00	0	0.0	0.00	35	1.46
	BYM2	12	32	39.5	2.67	46	56.8	3.83	3	3.7	0.25	0	0.0	0.00	81	6.75
	BYM3	12	15	35.7	1.25	26	61.9	2.17	1	2.4	0.08	0	0.0	0.00	42	3.50
	McQ1	12	2	5.6	0.17	34	94.4	2.83	0	0.0	0.00	0	0.0	0.00	36	3.00
	RIC1	12	9	34.6	0.75	16	61.5	1.33	1	3.8	0.08	0	0.0	0.00	26	2.17
	RIC2	12	85	68.0	7.08	30	24.0	2.50	10	8.0	0.83	0	0.0	0.00	125	10.42
	RIC3	16	83	47.4	5.19	73	41.7	4.56	17	9.7	1.06	0	0.0	0.00	175	10.94
	RIC4	16	30	30.3	1.88	35	35.4	2.19	33	33.3	2.06	0	0.0	0.00	99	6.19
	RIC5	28	27	32.9	0.96	53	64.6	1.89	1	1.2	0.04	0	0.0	0.00	82	2.93
1	SID1	24	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	4	0.17
	SID2	12	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	2	0.17
	SID3	24	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	4	0.17
2	*TOB1*	*12*	*108*	*85.0*	*9.00*	*19*	*15.0*	*1.58*	*0*	*0.0*	*0.00*	*0*	*0.0*	*0.00*	*127*	*10.58*
	TOB2	*12*	*64*	*80.0*	*5.33*	*13*	*16.3*	*1.08*	*0*	*0.0*	*0.00*	*3*	*3.8*	*0.25*	*80*	*6.67*
3	*TOB5*	*12*	*9*	*75.0*	*0.75*	*0*	*0.0*	*0.00*	*0*	*0.0*	*0.00*	*3*	*25.0*	*0.25*	*12*	*1.00*
	TOB6	*12*	*4*	*100.0*	*0.33*	*0*	*0.0*	*0.00*	*0*	*0.0*	*0.00*	*0*	*0.0*	*0.00*	*4*	*0.33*
	TOB7	*4*	*13*	*76.5*	*3.25*	*2*	*11.8*	*0.50*	*0*	*0.0*	*0.00*	*2*	*11.8*	*0.50*	*17*	*4.25*
4	*TOB8*	*12*	*50*	*87.7*	*4.17*	*5*	*8.8*	*0.42*	*0*	*0.0*	*0.00*	*2*	*3.5*	*0.17*	*57*	*4.75*

1 = Upper Bulkley side channel sites, 2 = Toboggan Creek mainstem sites, 3 = Toboggan Lake sites, 4 = Toboggan side channel sites

Combined catch for all species varied during the sampling period (Appendix 4). CPUE for all species combined in Toboggan Creek was high in December, with a subsequent decline in CPUE in January (Figure 4). Compared to Toboggan Creek, CPUE for all species combined in the Upper Bulkley sites remained relatively consistent throughout the winter. CPUE for all species combined at Toboggan Lake and Upper Bulkley side channel sites were low throughout the winter, and no temporal trends were noted, although the inability to set traps in the two Toboggan Lake sites in March suggests that Toboggan Lake habitat sampled may not be suitable for overwintering. Total CPUE for all species did not change significantly over time at Toboggan Creek sites (ANOVA $F = 3.842$, $p = 0.057$), but the trend suggests a decline, particularly from December to January. Variability in the catch data may have been too large to detect a significant difference in the catch. Similarly, CPUE for all species combined did not change significantly over time at Upper Bulkley mainstem sites (ANOVA $F = 0.324$, $p = 0.808$) or at Upper Bulkley tributary sites (ANOVA $F = 0.917$, $p = 0.438$). CPUE for all species combined appears to decline somewhat, particularly when comparing CPUE in December and March, but this decline is not statistically significant. The lack of statistically significant temporal trends in CPUE for all species combined at sites sampled in the Upper Bulkley mainstem, tributaries, and Toboggan Creek mainstem and side channels may be due to the relatively large variability in the data.

CPUE for all species combined and the number of fish per unit volume were compared between Upper Bulkley mainstem and tributary sites, and Toboggan Creek mainstem and side channel sites for each of the four months sampled in the overwintering study. Toboggan Lake and outlet sites (TOB 5, 6 and 7) and Upper Bulkley side channel sites (SID 1, 2 and 3) were not included in this analysis since few fish were captured in these sites. CPUE differed significantly (ANOVA $F = 3.391$, $p = 0.036$), while the number of fish per cubic meter did not differ significantly between the Toboggan mainstem, Toboggan side channel, Upper Bulkley mainstem or Upper Bulkley tributary sites sampled in December. CPUE for all species combined was significantly higher at the Toboggan Creek mainstem sites than the Upper Bulkley tributary sites (Tukey HSD = 10.307, $p = 0.040$) and Upper Bulkley mainstem sites (Tukey HSD = 12.028, $p = 0.032$). CPUE for all species combined in Toboggan Creek side channel was also greater than at UBR mainstem and tributaries, but this difference was not statistically significant, probably due to the high variance. There was no statistically significant difference in CPUE for all species combined, or total catch per unit volume in January (ANOVA $F = 1.728$, $p = 0.192$ and ANOVA $F = 0.849$, $p = 0.444$ respectively), February (ANOVA $F = 0.365$, $p = 0.779$ and ANOVA $F = 1.572$, $p = 0.236$ respectively) or March (ANOVA $F = 1.058$, $p = 0.388$ and ANOVA $F = 1.024$, $p = 0.379$ respectively). The high CPUE for all species combined at Toboggan Creek mainstem sites in December resulted in the significant difference between these sites and Upper Bulkley mainstem and tributary sites in December.

In summary, CPUE for all species combined and catch per unit volume did not differ statistically over time, although the trend data suggest a decline in overall catch in both Toboggan Creek and the Upper Bulkley watershed. This decline is most pronounced in Toboggan Creek, where total catch was high in December, drastically declined in January and remained relatively low in February and March. Catch per unit effort was relatively low in the Upper Bulkley watershed when compared to Toboggan Creek, particularly in December. CPUE for all species combined was significantly higher at mainstem sites in Toboggan Creek than at sites in the Upper Bulkley

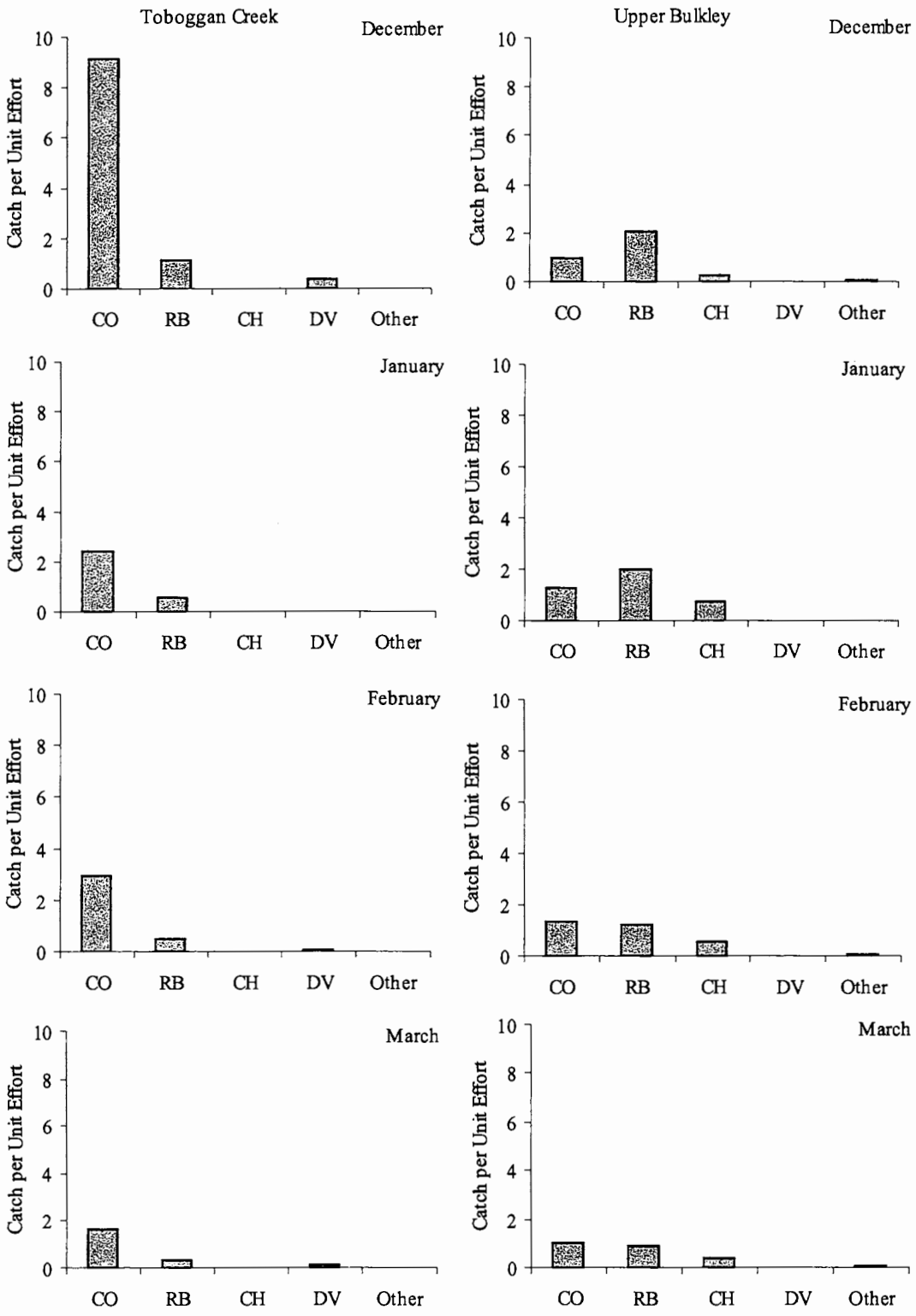

Figure 4. Comparisons of rates between Upper Bulkley sites and Toboggan Creek sites (CO = coho, RB = rainbow, CH = chinook, DV = Dolly Varden, other = cutthroat trout, longnose dace, suckers and peamouth chub).

(tributary and mainstem), CPUE for all species combined was not statistically different between sites in the Upper Bulkley mainstem and tributaries, Toboggan Creek mainstem and side channel. CPUE for all species combined was lowest in Toboggan Lake and Upper Bulkley side channels.

4.2.2.1 COHO

Most of the coho sampled in the study were captured in the Toboggan Creek watershed, despite the lower number of sites sampled in this watershed. Overall, 83% of all coho captured were captured in Toboggan Creek, which constituted 19.4% of the sites (one of these site was only sampled in March). On average, CPUE for coho was highest at Toboggan mainstem sites (TOB 1 and TOB 2). In fact, most the catch at these sites (> 80%) consisted of coho (Table 7). Most of the coho were captured in December at these sites (Figure 4). Among Upper Bulkley sites, coho CPUE was high in Richfield Creek sites (RIC 2 and 3) where coho comprised between 47 and 68% of the catch. Generally, coho CPUE was higher in Upper Bulkley tributary sites than in mainstem sites, except for site UBR 2, which is located near the mouth of Byman Creek. In tributary sites, 31.7% of the catch was comprised of coho, while in Upper Bulkley mainstem sites 7.4% of the catch was comprised of coho. Coho CPUE was lowest at Upper Bulkley side channel sites, Toboggan Lake sites (TOB 5 and 6) and Upper Bulkley mainstem sites (except UBR 2).

Coho CPUE varied over the four months of the overwintering study. Temporal variations in coho CPUE were not assessed for Toboggan Lake and Upper Bulkley side channel sites due to the low number of fish captured at these sites. Coho CPUE at Toboggan Creek mainstem and tributary sites changed significantly over the winter (ANOVA $F = 4.049$, $p = 0.050$). Coho CPUE was significantly higher in December than in March (Tukey HSD = 12.889, $p = 0.049$), but coho CPUE for all other months are statistically similar. The notable decline in coho CPUE at Toboggan Creek sites between December and January is not statistically significant (Tukey HSD = 1.0556, $p = 0.111$). Coho CPUE at Upper Bulkley mainstem sites did not change significantly over the sampling period (ANOVA $F = 0.792$, $p = 0.513$). The decline in coho CPUE that appears to be present in the data from February to March is not statistically significant at Upper Bulkley mainstem sites. Similarly, coho CPUE at Upper Bulkley tributary sites did not change significantly over the sampling period (ANOVA $F = 0.390$, $p = 0.761$). While significant declines in coho CPUE were found at Toboggan Creek mainstem and side channel sites, temporal changes in coho CPUE at Upper Bulkley mainstem and tributary sites were not significant.

Coho CPUE was compared between Upper Bulkley mainstem and tributary sites, and Toboggan Creek mainstem and side channel sites. Toboggan Lake and Upper Bulkley side channel sites were not included in the analysis due to the low number of fish captured at these sites in the winter. Coho catch per unit effort differed significantly between Upper Bulkley mainstem, Upper Bulkley tributary, Toboggan Creek mainstem and Toboggan Creek side channel sites in December (ANOVA $F = 21.735$, $p = 0.000$) and January (ANOVA $F = 4.288$, $p = 0.016$), but did not differ significantly in February (ANOVA $F = 1.082$, $p = 0.378$) and March (ANOVA $F = 2.754$, $p = 0.068$). Coho CPUE was significantly higher at Toboggan mainstem sites than in Toboggan side channel sites (Tukey HSD = 16.831 $p = 0.000$) and Upper Bulkley mainstem sites

(Tukey HSD = 17.722, p = 0.000) in December. However, Upper Bulkley mainstem and tributary sites and Toboggan Creek side channel sites had similar coho CPUE in December. Coho CPUE remained significantly higher than Upper Bulkley mainstem sites in January (Tukey HSD = 5.000, p = 0.010). However, there was no statistically significant difference between coho CPUE in Toboggan mainstem and Upper Bulkley tributary sites (Tukey HSD = 3.286, p = 0.085) or between Toboggan Creek mainstem and Toboggan Creek side channel sites (Tukey HSD = 3.833, p = 0.300). The lack of significant difference in coho CPUE in January between Toboggan Creek mainstem and Upper Bulkley tributary site is due to the decline in coho CPUE between December and January in Toboggan mainstem sites. Coho CPUE in Toboggan Creek mainstem sites was significantly higher than at Upper Bulkley mainstem and tributary sites in December, and at Upper Bulkley mainstem sites in January, but was similar in February and March as coho CPUE declined during the winter in Toboggan Creek mainstem sites.

Overall, coho CPUE was highest in Toboggan Creek mainstem and side channel sites and in Upper Bulkley tributary sites. Most of the Toboggan Creek coho were captured in the two mainstem sites (TOB 1 and 2), with the highest CPUE in December. Coho CPUE in Toboggan Creek declined significantly between December and March, with the most notable decrease between December and January. Coho CPUE at Upper Bulkley sites did not show strong temporal trends, although there was a slight (but not significant) decline in coho CPUE between December and March. No coho were captured in the Upper Bulkley side channel sites, and coho CPUE was relatively low in Toboggan Lake and Upper Bulkley mainstem sites.

4.2.2.2 RAINBOW TROUT/STEELHEAD

Most of the rainbow trout sampled in the study were captured in the Upper Bulkley watershed. Overall, 69% of all rainbow trout were captured in the Upper Bulkley watershed, where 80.6 % of the sites were located. On average, CPUE for rainbow trout was highest at Upper Bulkley tributary sites (Table 7), and in one of the six Upper Bulkley mainstem sites (UBR 2). No Rainbow trout were captured in Upper Bulkley side channel sites (SID 1, SID 2, and SID 3) or in Toboggan Lake sites, except the Toboggan Lake outlet sampled in March (site TOB 7). Catch per unit effort was low at five of the six Upper Bulkley mainstem sites, averaging less than one rainbow trout/trap. Rainbow trout accounted for 58.9% of the species captured at Upper Bulkley tributary sites, and for 37.3% of the catch at Upper Bulkley mainstem sites. As for coho, rainbow trout CPUE was lowest at Upper Bulkley side channel sites, Toboggan Lake sites (TOB 5 and 6) and Upper Bulkley mainstem sites (except UBR 2).

Rainbow trout CPUE generally declined over the four months of the overwintering study. Temporal variations in rainbow trout CPUE were not assessed for Toboggan Lake and Upper Bulkley side channel sites since no rainbow trout were captured at these sites. Rainbow trout CPUE at Toboggan Creek mainstem and tributary sites did not change significantly over the winter (ANOVA F = 0.719, p = 0.568). The apparent decline of rainbow trout CPUE during the winter at Upper Bulkley mainstem sites was not statistically significant (ANOVA F = 0.979, p = 0.424). However, rainbow trout CPUE differs significantly between sampling periods in Upper Bulkley tributary sites (ANOVA F = 4.716, p = 0.005). Rainbow trout CPUE did not change significantly between December and January (Tukey HSD – 0.154, p = 0.992), or January and February (Tukey HSD = 1.12, p = 0.192), but rainbow trout CPUE declined significantly

between February and March (Tukey HSD = 1.767, p = 0.010) at Upper Bulkley tributary sites. While significant declines in rainbow trout CPUE were found at Upper Bulkley tributary sites, temporal changes in rainbow trout CPUE at Upper Bulkley mainstem, Toboggan Creek mainstem and side channel sites were not significant.

Rainbow trout CPUE was compared between Upper Bulkley mainstem and tributary sites, and Toboggan Creek mainstem and side channel sites. Toboggan Lake and Upper Bulkley side channel sites were not included in the analysis since no rainbow trout were captured at these locations. Rainbow trout catch per unit effort did not differ significantly between Upper Bulkley mainstem, Upper Bulkley tributary, Toboggan Creek mainstem and Toboggan Creek side channel sites in December (ANOVA F = 0.460, p = 0.713), January (ANOVA F = 2.479, p = 0.089), February (ANOVA F = 2.237, p = 0.114) or March (ANOVA F = 0.832, p = 0.491). The fact that most of the rainbow trout captured during the study were captured at Upper Bulkley sites is therefore related to the fact that most of the sites are located in the Upper Bulkley watershed, rather than differences in rainbow trout CPUE between the two drainages.

In summary, most of the rainbow trout sampled in the overwintering study were captured in the Upper Bulkley watershed, where most of the sampling sites were located. Rainbow trout CPUE did not differ significantly between the Toboggan Creek mainstem and side channel sites, Upper Bulkley mainstem sites or Upper Bulkley tributary sites. Rainbow trout CPUE did not change significantly over the winter at Upper Bulkley mainstem, Toboggan Creek mainstem or side channel sites, but did decline significantly between February and March at Upper Bulkley tributary sites. No rainbow trout were captured in the Upper Bulkley side channel sites or the Toboggan Lake sites.

4.2.2.3 OTHER SPECIES

Species other than coho and rainbow trout captured during the overwintering study include chinook, cutthroat trout suckers, longnose dace, peamouth chub captured in the Upper Bulkley watershed, and Dolly Varden captured in the Toboggan Creek watershed. Chinook were captured at Buck Creek sites BUC 2, 5, 6, 7 and 8, Byman Creek sites BYM 2 and 3, all of the Richfield Creek sites (RIC 1, 2, 3, 4 and 5), and all Upper Bulkley mainstem sites (UBR 1, 2, 9, 12, 11 and 12) (Table 7). Chinook numbers were usually relatively low, with CPUE ranging between 0 and 2.83 (at UBR 2). One cutthroat trout was captured at Upper Bulkley side channel site SID 1 and one was captured at Byman Creek site BYM 1. Longnose dace were captured in three of the Buck Creek sites (BUC 2, 5 and 6), Byman Creek site BYM 1, and two of the Richfield Creek sites (RIC 1 and 5). Suckers were captured in the Buck Creek release pond (BUC 7 and 8), Richfield Creek (RIC 4 and 5) and Upper Bulkley side channels (SID 1 and 3). Peamouth chub were at all three Upper Bulkley side channel sites, but at no other sites in the Upper Bulkley watershed. Dolly Varden were captured in the Toboggan Creek mainstem site TOB 2, the side channel site (TOB 8), one of the Toboggan Lake sites (TOB 5) and the Toboggan Lake outlet (TOB 7). Dolly Varden CPUE was relatively low, ranging between 0 and 0.5 (Table 7). Catch per unit effort of species other than rainbow trout and coho was relatively low at both Toboggan Creek and Upper Bulkley sites.

4.2.3 Fish Age, Size, and Condition

Fork length and weight data were collected for salmonids throughout the overwintering study. A total of 613 coho, 657 rainbow trout, 152 chinook, 10 Dolly Varden, five longnose dace, and three suckers were measured and weighed during the overwintering study. Length and weight data are summarized in the following sections.

4.2.3.1 COHO

Of the 662 coho captured throughout the overwintering study, fork length and weight data were collected for 613 (92.6%). Length, weight and condition factor data for sites sampled in the Upper Bulkley and Toboggan Creek are summarized in Appendix 5. The following sections present length and weight data for coho captured in Toboggan Creek and the Upper Bulkley watershed.

4.2.3.1.1 AGE AND LENGTH

Fork length data was recorded for coho captured at sites sampled in the Upper Bulkley and Toboggan Creek watersheds. Mean fork length in Buck Creek appeared to be higher than at other sites sampled for the sampling period. Buck Creek is the only system were hatchery origin coho were captured, and these fish tended to be larger than wild origin coho (Appendix 5), resulting in a greater mean fork length for sites in the Buck Creek tributary. Fork length data for Buck Creek sites is therefore analysed separately from other Upper Bulkley tributary sites. Ranked fork length did not change significantly over the winter at Buck Creek (ANOVA $F = 0.445$, $p = 0.721$), or Upper Bulkley mainstem sites (ANOVA $F = 2.740$, $p = 0.065$), at Toboggan Lake (ANOVA $F = 0.148$, $p = 0.930$), and Toboggan mainstem (ANOVA $F = 1.646$, $p = 0.182$). However, fork length differed significantly between months at Upper Bulkley tributary sites (ANOVA $F = 4.442$, $p = 0.005$) and at Toboggan Creek side channels (ANOVA $F = 8.311$, $p = 0.000$). Fork length decreased significantly between December and January at Upper Bulkley tributary sites excluding Buck Creek (Tukey HSD = 45.593, $p = 0.004$), and remained significantly lower than fork lengths in December throughout the February sampling period (Tukey HSD = 40.164, $p = 0.022$). However, a gradual increase in fork length from January to March resulted in no significant difference in ranked for length between December and March (Tukey HSD = 24.317, $p = 0.801$). Ranked fork length at Toboggan side channel sites were significantly lower in January than in February (Tukey HSD = 20.875, $p = 0.017$) and March (Tukey HSD = 37.875, $p = 0.000$). Ranked fork length was also significantly higher at Toboggan Creek side channel sites in March than in December (Tukey HSD = 25.386, $p = 0.002$). Coho fork length generally changed little during the winter at most sites although fork length declined in early winter at some sites, and increased between February and March at other sites.

Comparisons of ranked fork length between sites in the Upper Bulkley mainstem, Buck Creek sites, other Upper Bulkley tributaries, Toboggan Creek mainstem, side channel and lake indicates statistically significant differences for fish captured in December (ANOVA $F = 12.142$, $p = 0.000$), January (ANOVA $F = 27.055$, $p = 0.000$), February (ANOVA $F = 16.111$, $p = 0.000$) and March (ANOVA $F = 23.299$, $p = 0.000$). Ranked fork length data at Buck Creek was

statistically similar to mean fork length at the Upper Bulkley mainstem sites and Toboggan Lake sites in December (Tukey HSD ≤ 31.849, p ≥0.529). Relatively large variance in fork length data at the Upper Bulkley mainstem sites may have resulted in the inability to detect a significant difference between coho fork length at Buck Creek, Toboggan Lake and the Upper Bulkley mainstem sites. Ranked fork length was significantly greater at Buck Creek than at other Upper Bulkley tributary sites (Tukey HSD = 78.474, p = 0.000) and Toboggan Creek mainstem sites (Tukey HSD = 97.974, p = 0.000). Fork length was statistically similar between Toboggan Creek mainstem, Toboggan Creek side channel, Upper Bulkley mainstem and Upper Bulkley tributary sites excluding Buck Creek (Tukey HSD ≤ 80.00, p ≥ 0.104) in December. Ranked fork length was statistically similar between Toboggan Creek mainstem and Toboggan Lake sites in December (Tukey HSD = 46.625, p = 0.057), but ranked fork length was greater at Toboggan Lake sites than at Toboggan side channel sites (Tukey HSD = 60.125, p = 0.013) in December. Ranked fork length at Buck Creek was significantly greater than ranked fork length at other sites sampled in January (Tukey HSD ≥ 70.006, p = 0.000) except Toboggan Lake, which had a large variance in fork length (Tukey HSD = 41.441, p = 0.833). Ranked fork length did not differ significantly between Upper Bulkley mainstem, Upper Bulkley tributary sites excluding Buck Creek, Toboggan Lake, Toboggan mainstem or Toboggan side channel sites sampled in January (Tukey HSD ≤ 68.250, p ≥0.196). As in January, ranked fork length data obtained in February at Buck Creek was significantly greater than at other sites sampled (Tukey HSD ≥ 45.487, p ≤ 0.041) except Toboggan Lake, which had a large variance in fork length (Tukey HSD = 13.208, p = 0.993). Ranked fork lengths did not differ significantly between Toboggan Lake, Toboggan mainstem, Toboggan side channel and Upper Bulkley mainstem sites (Tukey HSD ≤ 51.625, p ≥0.198). However, ranked fork length at Upper Bulkley tributaries excluding Buck Creek were significantly lower than ranked fork length recorded at other sites sampled in February (Tukey HSD ≥ 30.207, p ≤ 0.028) except at Toboggan Creek side channels, where ranked fork length was statistically similar to Upper Bulkley tributaries (Tukey HSD = 25.255, p = 0.124). Ranked fork length at Buck Creek remained higher than at all other sites (Tukey HSD ≥ 27.962, p ≤ 0.004) except the Toboggan side channel site, which had a large variance in fork length (Tukey HSD = 9.000, p = 0.973). Ranked fork length at Upper Bulkley tributary sites excluding Buck Creek were significantly lower than ranked fork length at other sites (Tukey HSD ≥ 24.727, p ≤ 0.014) except at the Toboggan Creek mainstem (Tukey HSD = 3.030, p = 0.998). Ranked fork length at Toboggan Creek side mainstem sites were significantly lower than ranked fork length at Toboggan Creek side channel sites (Tukey HSD = 43.833, p = 0.010). Compared to most sites, ranked fork length was significantly higher at Buck Creek for all four sampling intervals and ranked fork length was significantly lower at Upper Bulkley tributaries excluding Buck Creek for January to March.

Coho ages were not determined empirically, but were estimated from fork length distributions obtained from samples collected at sites sampled in the Toboggan Creek and Upper Bulkley watersheds. Based on length frequency distributions of coho (Appendix 5), three different age groups (0+, 1+ and 2+) appear to be present in the sample obtained during the winter at Upper Bulkley tributary and Toboggan Creek sites. The majority of coho captured at Upper Bulkley tributary sites and Toboggan Creek sites are estimated to be 0+, with some 1+ coho and few 2+ coho. The few coho captured in Upper Bulkley mainstem sites appear to fall within the 0+ and 1+ age groups. Since ages were not determined empirically, but are estimated from fork length

data, and since there is considerable overlap in fork length between the estimated age classes, fork length data was not separated by age.

Coho age distribution based on fork length was used to estimate the proportion of 0+ coho in the total catch of coho obtained at sites sampled in the Upper Bulkley and Toboggan Creek systems in December to March. The Toboggan Lake outlet sites (TOB 7) were not included in this data since it was only sampled in March. The estimated mean proportion of 0+ coho at sites sampled in the Upper Bulkley mainstem, tributaries and side channels, and Toboggan Creek mainstem, side channel and lake sites are summarized in Table 8. Similarly, the catch per unit effort of 0+ coho and coho older than 0+ was determined at these sites for the duration of the study period (Table 9, Figure 5). These rough approximations of age distribution indicate that CPUE for 0+ coho in the Upper Bulkley sites (mainstem and tributary sites) declined by 32.3% between January and March, while the CPUE of coho estimated to be older than 0+ declined by only 8% in the same period. The estimated CPUE for 0+ coho in Toboggan Creek sites (mainstem, side channel and lake excluding the lake outlet) declined by 76% between January and March, and CPUE for coho older than 0+ did not decline between January and March, due to an increase in CPUE of coho older than 0+ in the Toboggan Creek side channel site. In fact, CPUE of 0+ coho declined by 92.8% between December and March in Toboggan Creek sites, and CPUE of coho older than 0+ declined by 78.9%. If only Toboggan Creek mainstem sites are considered, CPUE of 0+ coho declined by 73.2% between January and March, and CPUE of coho older than 0+ declined by 16% between January and March. More markedly, CPUE for Toboggan Creek mainstem sites declined by 90.9% for 0+ and 90% for coho older than 0+ between December and March. The decline of coho CPUE by age indicates a more significant decline in CPUE for coho in Toboggan Creek than in Upper Bulkley sites, particularly for age 0+ coho, which may be due to higher overall densities and resulting competition in Toboggan Creek sites.

In summary, coho captured during the overwinter study were found to be significantly larger at Buck Creek sites than at other sites. Similarly, coho fork length at Upper Bulkley tributary sites were significantly lower than those at most other sites in January, February and March. Low sample sizes and greater variance in fork length data collected at Upper Bulkley mainstem, and Toboggan Lake sites decreased the ability of statistical analysis to document significant differences between these sites and other sites during some months. In addition, 0+ fish were estimated to predominate catches in both Toboggan Creek and Upper Bulkley sites. Declines in the estimated CPUE for 0+ fish was greater than that for fish estimated to be older than 0+. Declines in CPUE for 0+ coho and coho older than 0+ were more severe at Toboggan Creek sites than at Upper Bulkley sites.

Table 8. Mean coho catch per unit effort and percent of catch estimated to be age 0+ (excluding hatchery origin coho) for the December 2000 to March 2001. Site TOB 7 at the Toboggan Lake outlet is not included in this data since it was only sampled in March.

	December		January		February		March	
Sites	CPUE	% 0+	CPUE	% 0+	CPUE	% 0+	CPUE	% 0+
Upper Bulkley Tributaries	1.17	71.43	1.88	79.21	1.97	91.43	1.17	76.92
Upper Bulkley Mainstem	0.28	0.00	0.17	100.00	0.72	92.31	0.61	72.73
Upper Bulkley Sidechannel	0	0	0	0	0	0	0	0
Upper Bulkley Combined	0.81	70.42	1.24	79.81	1.44	91.53	0.90	76.19
Toboggan Creek Mainstem	18.00	76.56	5.17	90.32	3.5	80.95	1.67	75.00
Toboggan Creek Side Channel	7.33	100.00	1.33	100.00	6.67	90.00	1.33	25.00
Toboggan Lake	1.13	50.00	0.17	100.00	0.50	25.00	0	0
Toboggan Creek Combined	9.12	78.72	2.40	91.67	2.93	77.78	0.93	56.25

Table 9. Mean coho catch per unit effort estimated to be age 0+ and coho older than 0+ for the December 2000 to March 2001. Site TOB 7 at the Toboggan Lake outlet is not included in this data since it was only sampled in March.

	December		January		February		March	
Sites	0+	≥ 1+	0+	≥ 1+	0+	≥ 1+	0+	≥ 1+
Upper Bulkley Tributaries	0.84	0.33	1.49	0.39	1.80	0.17	0.90	0.27
Upper Bulkley Mainstem	0.00	0.28	0.17	0.00	0.67	0.05	0.44	0.17
Upper Bulkley Sidechannel	0	0	0	0	0	0	0	0
Upper Bulkley Combined	0.57	0.24	0.99	0.25	1.32	0.12	0.67	0.23
Toboggan Creek Mainstem	13.78	4.22	4.67	0.50	2.83	0.67	1.25	0.42
Toboggan Creek Side Channel	7.33	0.00	1.33	0.00	6.00	0.67	0.33	1.00
Toboggan Lake	0.57	0.57	0.17	0.00	0.13	0.37		
Toboggan Creek Combined	7.18	1.94	2.20	0.20	2.28	0.65	0.52	0.41

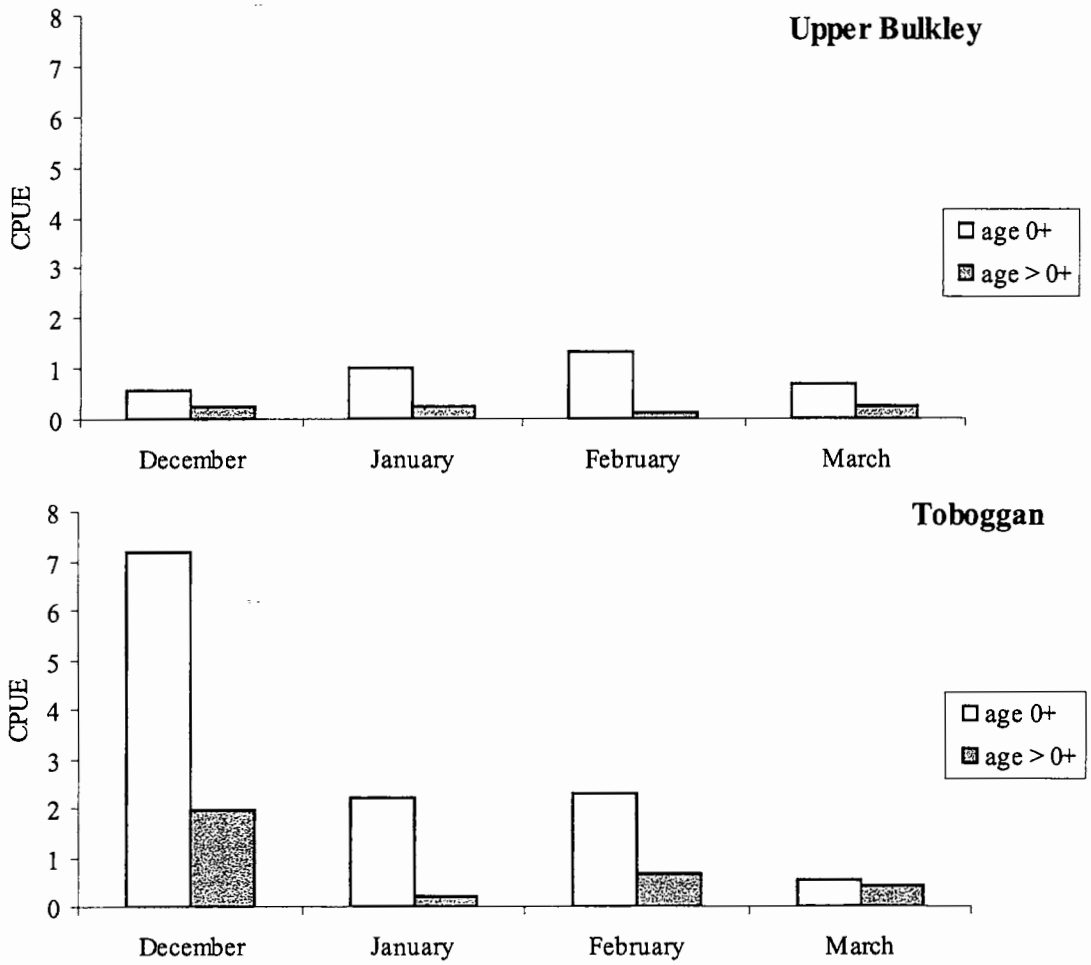

Figure 5. Estimated CPUE of 0+ coho and coho estimated to be older than 0+ at sites sampled in the Upper Bulkley and Toboggan Creek watersheds. Ages are estimated from fork length distributions (see Tables 8 and 9).

4.2.3.1.2 CONDITION

Weight data is more variable than condition factor data, since condition factor is adjusted for variability in fish size. However, there appears to be a negative correlation between fork length and condition factor, since smaller fish appear to have greater condition, and since there is greater variability in the condition factor of smaller fish. This may be due to a combination of exaggerated effects of measuring errors on smaller fish and/or a lack of isometric growth in the population. Therefore, condition factor data for coho do not appear to be independent of coho size.

Condition factor appeared more variable early in the winter (December sample) than later in the winter (Appendix 5). This was especially the case at Toboggan Creek sites, where the variability in condition factor data appeared to be reduced later in the winter. Comparisons of condition factor data over time at Upper Bulkley sites indicate that condition factor varies significantly between months (ANOVA $F = 35.837$, $p = 0.000$), with condition factor varying little between December and January, followed by a significant decline in condition factor from February to March (Figure 6). Condition factors of Upper Bulkley coho are significantly lower in March than in December, January or February (Tukey HSD ≥ 0.251, $p = 0.000$). Similarly, condition factor at Toboggan Creek sites are significantly higher early in the winter than later in the winter (ANOVA $F = 25.413$, $p=0.000$). Coho condition factor at Toboggan Creek sites is statistically similar between December and January samples, but mean condition factor is statistically lower in February than in December (Tukey HSD = 0.246, $p = 0.000$) or January (Tukey HSD = 0.280, $p = 0.000$). Coho condition factor at Toboggan Creek further declines in March, and is significantly lower than the February sample (Tukey HSD = 0.181, $p = 0.027$), and hence also significantly lower than the December or January samples (Tukey HSD ≥ 0.427, $p = 0.000$) (Figure 6). The condition factor was found to decline significantly for coho during the winter at both Upper Bulkley and Toboggan Creek sites.

Mean condition factor varied between sites sampled in the Upper Bulkley and Toboggan Creek watersheds. Within the Upper Bulkley system, condition factor appeared to be higher at tributary than mainstem sites (Appendix 5), with the highest mean condition factor noted at Byman Creek site BYM 2 and at the Richfield Creek sites. Condition factors were generally low at Buck Creek sites, which may be attributable to the presence of larger, hatchery origin coho (see previous section). Since condition factor is negatively correlated with size, the lower condition factor at Buck Creek may be a result of larger fork length of these fish. At Toboggan Creek sites, coho condition factor appeared to be higher at mainstem and side channel sites than at Toboggan Lake sites. In December, condition factor differed significantly between Upper Bulkley mainstem, Upper Bulkley tributary, Toboggan mainstem, Toboggan side channel and Toboggan Lake sites (ANOVA $F = 4.626$, $p = 0.001$). Condition factor at Buck Creek was significantly lower than condition factor at other Upper Bulkley tributary sites (Tukey HSD = 0.255, $p = 0.027$), at Toboggan mainstem sites (Tukey HSD = 0.306, $p = 0.003$), or at Toboggan side channel sites (Tukey HSD = 0.466, $p = 0.000$) sampled in December. Condition factors continued to differ significantly between sites in January (ANOVA $F = 6.470$, $p = 0.000$), with Toboggan side channel sites having significantly higher condition factor than Toboggan mainstem sites (Tukey HSD = 0.370, $p = 0.011$), Upper Bulkley tributaries excluding Buck Creek (Tukey HSD = 0.471, $p = 0.000$) and Buck Creek (Tukey HSD = 0.516, $p = 0.000$). Condition factor of coho did not differ significantly between Upper Bulkley mainstem, Upper

Bulkley tributary, Buck Creek, Toboggan mainstem, Toboggan side channel or Toboggan Lake sites in February, but condition factors did differ significantly in March (ANOVA F = 3.122, p = 0.012). Coho condition factor was significantly higher at Toboggan Creek mainstem sites than at Toboggan Lake sites (Tukey HSD = 0.161, p = 0.033), or at Toboggan side channel sites (Tukey HSD = 0.247, p = 0.019), while all other condition factor data were not significantly different. Condition factor was generally higher at Toboggan mainstem, Toboggan side channel and Upper Bulkley tributary sites (excluding Buck Creek).

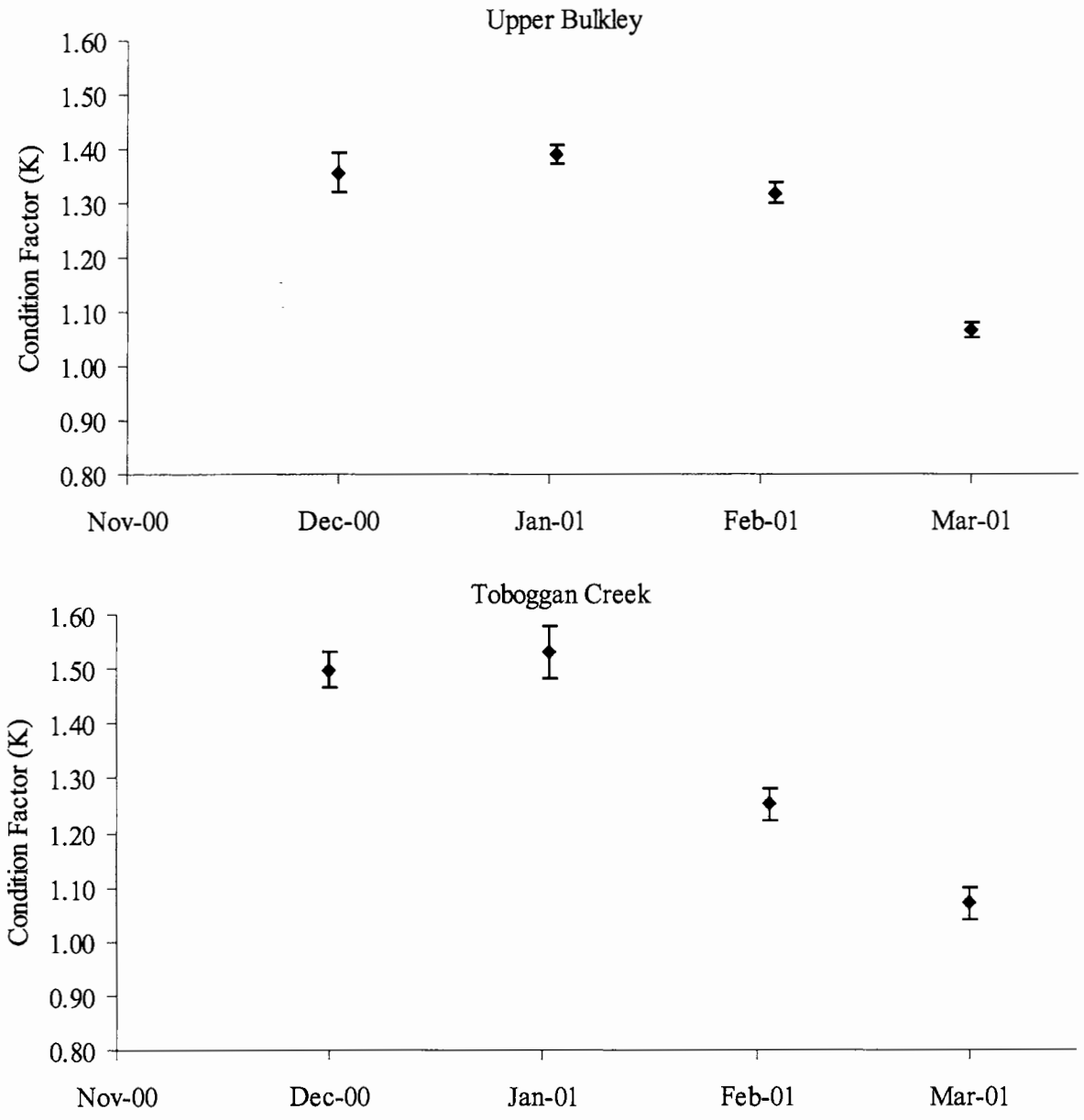

Figure 6. Mean Condition factor for coho captured at sites sampled in the Upper Bulkley Watershed (above) and at Toboggan Creek (below). Bars indicate standard errors.

In summary, condition factor was more variable, and was generally higher in early winter when compared to samples obtained at the end of winter. Condition factor varies with fork length, since larger fish tend to have lower condition than smaller fish (Appendix 5). Fish released into Buck Creek in August 2000 have significantly lower condition during much of the winter than their wild counterparts, which is not surprising since fork length and condition are negatively correlated. Of the sites sampled, condition factor was higher in Upper Bulkley tributary sites excluding Buck Creek, Toboggan Creek mainstem and Toboggan Creek side channel sites, but the temporal trends in condition factor over time are consistent between the watersheds, and between sites.

4.2.3.2 RAINBOW TROUT/STEELHEAD

Of the 662 rainbow trout captured throughout the overwintering study, fork length and weight data were collected for 657 (99.2%). Length, weight and condition factor data for sites sampled in the Upper Bulkley and Toboggan Creek are summarized in Appendix 5. The following sections present length and weight data for rainbow trout captured in Toboggan Creek and the Upper Bulkley watershed.

4.2.3.2.1 AGE AND LENGTH

Fork length data was recorded for rainbow trout captured at sites sampled in the Upper Bulkley and Toboggan Creek watersheds. Mean fork lengths for each site at each sampling interval are summarized in Appendix 5. Fork length frequency histograms (Appendix 5) indicate that fork length is not normally distributed, and statistical analysis was conducted on ranked data to address the deviations from normality in the data. Ranked fork length increased gradually over the winter at Toboggan Creek sites, but the chang in fork length was not statistically significant (ANOVA $F = 2.412$, $p = 0.083$). However, ranked fork length did change significantly at Upper Bulkley sites (ANOVA $F = 13.372$, $p = 0.000$) due to a significant decrease in fork length between December and January (Tukey HSD = 13.311, $p = 0.000$). Fork length of rainbow trout increased significantly between January and February (Tukey HSD = 5.902, $p = 0.017$), but was still significantly lower than fork length in December (Tukey HSD = 7.408, $p = 0.002$). This is partly due to significant difference in ranked fork length in both Upper Bulkley mainstem sites (ANOVA $F = 7.640$, $p = 0.000$) and in Upper Bulkley tributaries (ANOVA $F = 13.056$, $p = 0.000$). In Upper Bulkley mainstem sites, ranked fork length was significantly lower in January than in December (Tukey HSD = 16.886, $p = 0.000$), or February (Tukey HSD = 12.489, $p = 0.025$). In Upper Bulkley tributary sites, ranked fork length in December was significantly higher than in January (Tukey HSD = 57.992, $p = 0.004$), February (Tukey HSD = 118.759, $p = 0.000$) or March (Tukey HSD = 73.051, $p = 0.005$). Ranked fork length was lowest in February, and was significantly lower than ranked fork length in January (Tukey HSD = 60.767, $p = 0.004$). While ranked fork length for rainbow trout did not change significantly over the winter at Toboggan Creek sites, it was significantly lower in January in Upper Bulkley mainstem sites, and in February at Upper Bulkley tributary sites.

Comparisons of ranked fork length between sites in the Upper Bulkley mainstem, Upper Bulkley tributaries, Toboggan Creek mainstem, and Toboggan Creek side channel indicates statistically significant differences for fish captured in December (ANOVA $F = 8.356$, $p = 0.000$), and

February (ANOVA F = 6.500, p = 0.000), but not for January (ANOVA F = 1.191, p = 0.314), or March (ANOVA F = 2.388 p = 0.057). Ranked fork length at the Toboggan Creek side channel sites was consistently lower than at other sites, but the large variability associated with the fork length data at this site resulted in no statistically significant difference between the Toboggan Creek side channel site and other sites sampled in December. Ranked fork length data at Upper Bulkley tributary sites were significantly lower than ranked fork length at Upper Bulkley mainstem sites (HSD = 61.684, p = 0.002), and Toboggan Creek mainstem sites (Tukey HSD = 39.111, p = 0.014) in December. Ranked fork length at Upper Bulkley mainstem sites were also significantly lower than ranked fork length at Toboggan Creek mainstem sites (Tukey HSD = 100.795, p = 0.000) in December. However, Toboggan Creek mainstem sites did not differ significantly in ranked fork length from Upper Bulkley mainstem sites (Tukey HSD = 24.917, p = 0.678) or Upper Bulkley tributary sites (Tukey HSD = 34.450, p = 0.166) in January, while ranked fork length was significantly higher at Upper Bulkley mainstem sites than in Upper Bulkley tributary sites (Tukey HSD = 59.366, p = 0.001) or at Toboggan Creek side channel sites (Tukey HSD = 88.250, p = 0.031). Ranked fork length differed significantly between Upper Bulkley mainstem, Upper Bulkley tributary, Toboggan Creek mainstem and Toboggan Creek side channel sites with Toboggan Creek mainstem sites having relatively high ranked fork length, and Upper Bulkley tributary sites having relatively low ranked fork length.

Rainbow trout ages were not determined empirically, but were estimated from fork length distributions obtained from samples collected at sites sampled in the Toboggan Creek and Upper Bulkley watersheds. Based on length frequency distributions of rainbow trout (Appendix 5), three different age groups (0+, 1+ and 2+) appear to be present in the sample obtained during the winter at Upper Bulkley mainstem, tributary and Toboggan Creek sites. A relatively clear gap in fork length at 56 mm was used as the division between age 0+ rainbow trout and rainbow trout older than age 0+. The distinction between age 1+ and 2+ rainbow trout was less clear due to considerable overlap in fork length. The majority of rainbow trout captured during the overwintering study are estimated to be older than 0+. The smallest rainbow trout captured during the study was 38 mm and few rainbow trout smaller than 40 mm were present in the sample. The predominance of rainbow trout estimated to be 1+ and 2+ in the sampled may be due to sampling error (traps are inefficient at catching smaller 0+ rainbow trout), or the inability of smaller fish to survive the winter (size selective mortality).

Rainbow trout age distribution based on fork length was used to estimate the proportion of 0+ rainbow trout in the total catch of rainbow trout obtained at sites sampled in the Upper Bulkley and Toboggan Creek systems in December to March. The Toboggan Lake outlet site (TOB 7) was not included in this data since it was only sampled in March. The estimated mean proportion of 0+ rainbow trout at sites sampled in the Upper Bulkley mainstem, tributaries and side channels, and Toboggan Creek mainstem, side channel and lake sites are summarized in Table 10. Similarly, the catch per unit effort of 0+ rainbow trout and rainbow trout older than 0+ was determined at these sites for the duration of the study period (Table 11, Figure 7). These rough approximations of age distribution indicate that CPUE for 0+ rainbow trout in the Upper Bulkley sites (mainstem and tributary sites) declined by 60.2% between January and March, and the CPUE of rainbow trout estimated to be older than 0+ declined by 61.3% in the same period. The estimated CPUE for 0+ rainbow trout in Toboggan Creek sites (mainstem, side channel and lake excluding the lake outlet) was low throughout the winter. CPUE for rainbow trout older

than 0+ in Toboggan Creek sites declined by 20.8% between January and March. As with coho, rainbow trout CPUE declined mostly between December and January at Toboggan Creek sites (43% for rainbow trout older than 0+). The decline of rainbow trout CPUE by age indicates a similar decline in CPUE for both age categories at Upper Bulkley sites (~60%), while declines in CPUE appear to be lower in Toboggan Creek than in Upper Bulkley sites particularly in January to March.

Table 10. Mean rainbow trout catch per unit effort and percent of catch estimated to be age 0+ for the December 2000 to March 2001. Site TOB 7 at the Toboggan Lake outlet is not included in this data since it was only sampled in March.

	December		January		February		March	
Sites	CPUE	% 0+	CPUE	% 0+	CPUE	% 0+	CPUE	% 0+
Upper Bulkley Tributaries	2.80	7.69	2.95	21.26	1.79	29.77	1.24	23.81
Upper Bulkley Mainstem	1.94	0	1.11	5.00	0.39	0	0.22	0
Upper Bulkley Sidechannel	0	0	0	0	0	0	0	0
Upper Bulkley Combined	2.26	7.27	2.16	19.82	1.24	30.47	0.86	22.73
Toboggan Creek Mainstem	2.67	18.75	1.17	0	1.33	0	0.83	0
Toboggan Creek Side Channel	0.33	0	0.33	0	0.37	50	0.33	0
Toboggan Lake	0	0	0	0	0	0	0	0
Toboggan Creek Combined	1.13	17.65	0.53	0	0.50	12.5	0.42	0

Table 11. Mean rainbow catch per unit effort estimated to be age 0+ and older than 0+ for the December 2000 to March 2001. Site TOB 7 at the Toboggan Lake outlet is not included in this data since it was only sampled in March.

	December		January		February		March	
Sites	0+	≥1+	0+	≥1+	0+	≥1+	0+	≥1+
Upper Bulkley Tributaries	0.22	2.58	0.63	2.33	0.53	1.26	0.29	0.94
Upper Bulkley Mainstem	0	1.94	0.06	1.06	0.39	0.22	0	0.22
Upper Bulkley Sidechannel	0	0	0	0	0	0	0	0
Upper Bulkley Combined	0.16	2.09	0.43	1.73	0.38	0.86	0.20	0.67
Toboggan Creek Mainstem	0.50	2.17	0	1.17	0	1.33	0	0.83
Toboggan Creek Side Channel	0	0.33	0	0.33	0.33	0.33	0	0.33
Toboggan Lake	0	0	0	0	0	0	0	0
Toboggan Creek Combined	0.2	0.93	0	0.53	0.06	0.44	0	0.42

In summary, rainbow trout captured during the overwintering study appeared to be larger at Toboggan Creek sites when compared to Upper Bulkley sites. This difference in size was statistically significant in December and February, and may be due to a greater proportion of rainbow trout older than 0+ at Toboggan Creek sites (CPUE of 0+ rainbow trout at Toboggan Creek was negligible). Similarly, rainbow trout fork length at Upper Bulkley tributary sites were significantly lower than those at Upper Bulkley mainstem sites in both December and February. Ranked fork length increased gradually over the winter at Toboggan Creek sites, although this increase was not statistically significant. Fluctuations in ranked fork length at Upper Bulkley sites were significant, and fork length was generally highest in December and lowest in January (Upper Bulkley mainstem sites) and February (Upper Bulkley tributary sites) with an increase in

fork length in the March sample. Low sample sizes and greater variance in fork length data collected at Toboggan Lake and side channel sites decreased the ability of statistical analysis to document significant differences between these sites and other sites during some months. In addition, rainbow trout older than 0+ were estimated to predominate catches in both Toboggan Creek and Upper Bulkley sites. Declines in the estimated CPUE for 0+ fish was similar to declines in CPUE for rainbow trout estimated to be older than 0+ in the Upper Bulkley sites. Declines in CPUE of rainbow trout were less severe in Toboggan Creek sites than in Upper Bulkley sites between January and March, although declines in CPUE of rainbow trout decreased more in December to January at Toboggan Creek sites.

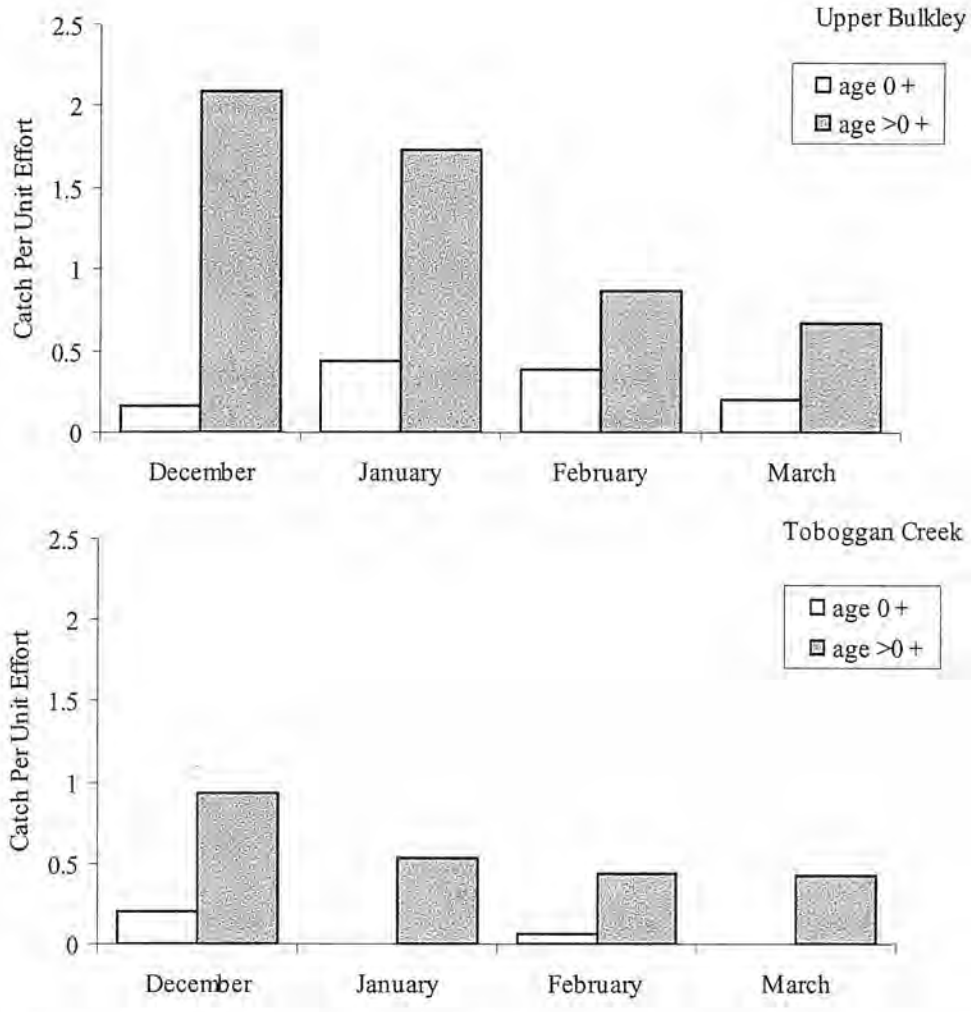

Figure 7. Estimated CPUE of 0+ rainbow trout and rainbow trout estimated to be older than 0+ at sites sampled in the Upper Bulkley and Toboggan Creek watersheds. Ages are estimated from fork length distributions (see Tables 10 and 11).

4.2.3.2.2 CONDITION

Weight data is more variable than condition factor data, since condition factor is adjusted for variability in fish size. However, there appears to be a negative correlation between fork length and condition factor, since smaller fish appear to have greater condition, and since there is greater variability in the condition factor of smaller fish. This may be due to a combination of exaggerated effects of measuring errors on smaller fish and/or a lack of isometric growth in the population. Therefore, condition factor data for rainbow trout do not appear to be independent of rainbow trout size.

Condition factor appeared more variable early in the winter (December sample) than later in the winter (Appendix 5). This was especially the case at Toboggan Creek sites, where the variability in condition factor data appeared to be reduced later in the winter. Condition factor appears to decline at sites sampled during the winter (Figure 8). Comparisons of condition factor data over time at Upper Bulkley sites indicate that condition factor varies significantly between months (ANOVA $F = 33.515$, $p = 0.000$), due to a significant decline in condition factor between February and March (Figure 8) resulting in the March sample having a significantly lower condition factor than the December sample (Tukey HSD = 0.195, $p = 0.000$), the January sample (Tukey HSD = 0.266, $p = 0.000$) or the February sample (Tukey HSD = 0.231, $p = 0.000$). Similarly, condition factor at Toboggan Creek sites is significantly higher early in the winter than later in the winter (ANOVA $F = 4.634$, $p=0.008$). Rainbow trout condition factor in March is significantly lower at Toboggan Creek sites than condition factor of rainbow trout in December (Tukey HSD = 0.376, $p = 0.006$), and January (Tukey HSD = 0.378, $p = 0.018$). Condition factor for rainbow trout declined significantly during the winter at both Upper Bulkley and Toboggan Creek sites.

Condition factor data were compared between sites sampled in the Upper Bulkley and Toboggan Creek watersheds. Since there were significant differences in condition factor over time, mean condition factor at Upper Bulkley and Toboggan Creek sites were compared separately for each month. Mean condition factor of rainbow trout did not differ significantly between Upper Bulkley and Toboggan Creek sites in December ($t = 0.912$, $p = 0.374$), January ($t = 0.087$, $p = 0.933$), February ($t = 1.462$, $p = 0.182$) or March ($t = 2.145$, $t = 0.073$).

Overall, condition factor was more variable, and was generally higher in early winter when compared to samples obtained at the end of winter. Condition factor varies with fork length, since larger fish tend to have lower condition than smaller fish (Appendix 5). Condition factor was not statistically different between Upper Bulkley and Toboggan Creek sites. Condition factor declined during the winter at both Upper Bulkley and Toboggan Creek sites.

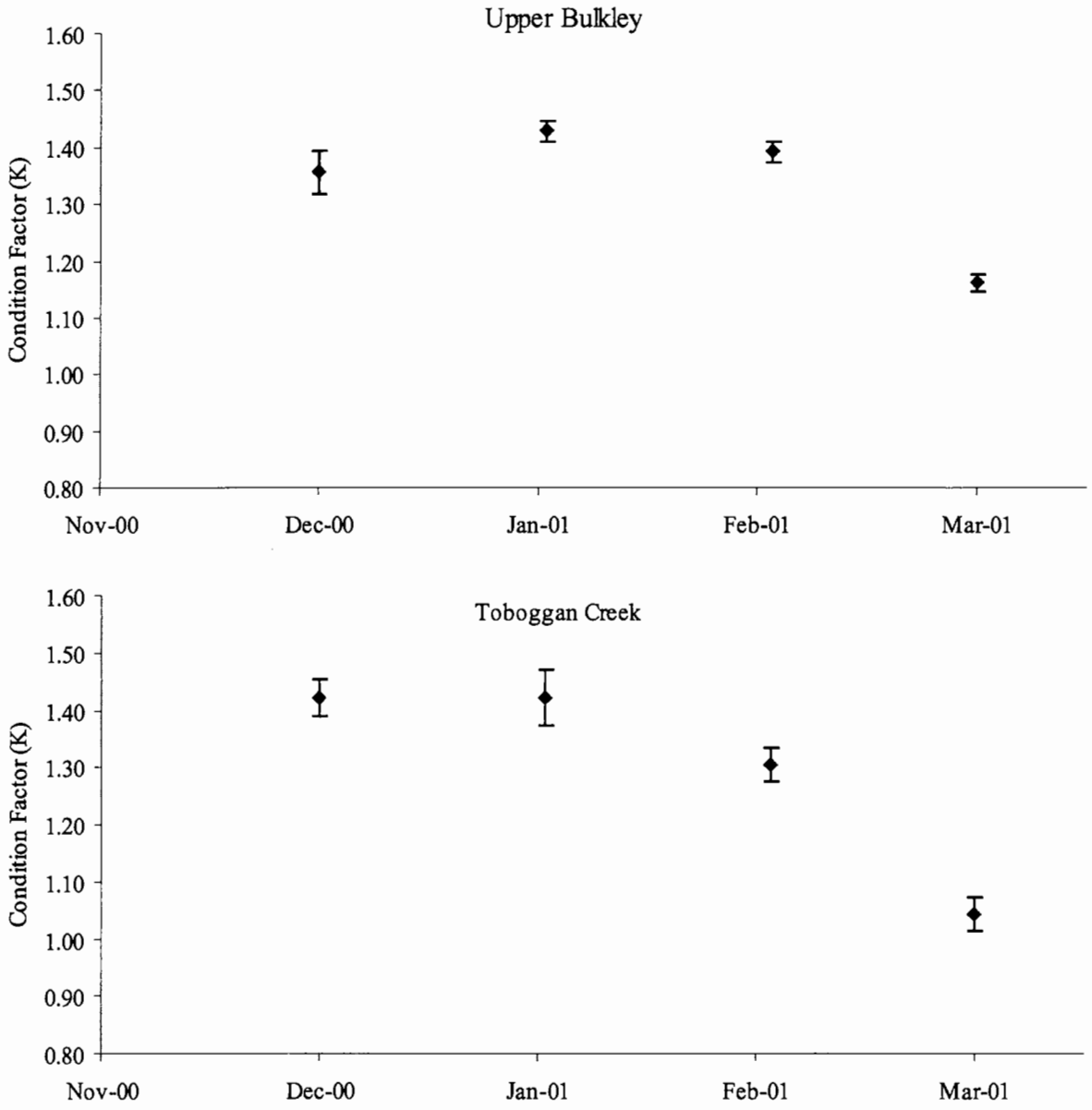

Figure 8. Mean condition factor for rainbow trout captured at sites sampled in the Upper Bulkley Watershed (above) and at Toboggan Creek (below). Bars indicate standard errors.

4.2.3.3 OTHER SPECIES

Other species captured during the overwintering study include three species of salmonids (Dolly Varden, chinook and cutthroat trout) and three species of non-salmonids (peamouth chub, longnose dace and suckers). Dolly Varden were only captured in Toboggan Creek, and the remaining species were only captured in Upper Bulkley system. Two cutthroat trout were captured in the Upper Bulkley system, one in a side channel site (SID 1) and one in Byman Creek (BYM 1). Fork length and weight data were recorded for five longnose dace (100% of catch), three suckers (100% of catch) and none of the peamouth chub captured. Due to the low sample size of cutthroat trout, longnose dace, and suckers, no data analysis was conducted for these species. Sample sizes for Dolly Varden (10) and chinook (152) were somewhat larger, allowing for some analysis of length and condition factor data.

4.2.3.3.1 AGE AND LENGTH

All of the ten Dolly Varden, and 91.6% of the 166 chinook that were captured during the overwintering study were measured. Fork length data are summarized in Appendix 5. Ranked fork length of chinook did not change significantly over the sampling period (ANOVA $F = 1.211$, $p = 0.308$), and neither did the ranked fork length of Dolly Varden (ANOVA $F = 0.778$, $p = 0.495$). Chinook were significantly longer in Upper Bulkley mainstem sites than in tributary sites in December ($U=2202.5$, $p = 0.017$), but fork lengths were similar between mainstem and tributary sites in January ($U = 33.50$, $p = 0.480$), February ($U = 217.5$, $p = 0.152$) and March ($U = 205.6$, $p = 0.263$). Sample size was too low to allow comparisons of Dolly Varden fork length between Toboggan Lake, Toboggan mainstem and sidechannel sites. Based on length frequency distribution, all of the 152 chinook that were measured are estimated to fall within the 0+ age group. Sample sizes of Dolly Varden were too low to speculate on age distribution, but two or three age classes are likely represented in the sampled (ages 0+, 1+ and 2+).

4.2.3.3.2 CONDITION

All of the ten Dolly Varden, and 152 (91.6%) of the chinook captured during the overwintering study were weighed, allowing for a calculation of condition. Condition factor was more variable in December than in March (Appendix 5). Chinook condition factor decreased significantly over the winter (ANOVA $F = 17.557$, $p = 0.379$) (Figure 9). While condition factor for December, January and February were not statistically different, condition factor in March was significantly lower than condition factor in December (Tukey HSD $= 0.199$, $p = 0.000$), January (Tukey HSD $= 0.245$, $p = 0.000$) or February (Tukey HSD $= 0.179$, $p = 0.000$). Although a similar trend is observed for Dolly Varden (Figure 10), condition factor did not change significantly over the sampling period for this species (ANOVA $F = 0.204$, $p = 0.820$). This may be due to low sample size and high variance in the sample for Dolly Varden. Sample size for Dolly Varden was too low to compare condition factors between Toboggan mainstem, sidechannel and lake sites, however sufficient chinook were captured to compare chinook condition factor between Upper Bulkley mainstem and tributary sites. Chinook condition factor did not differ significantly between Upper Bulkley mainstem and tributaries in December ($t = 0.499$, $p = 0.618$), January ($t = 0.157$, $p = 0.878$), February ($t = 0.894$, $p = 0.379$) or March ($t = 0.148$, $p = 0.883$). Declines in condition factor over the winter for both chinook and Dolly Varden (although not statistically significant for this species) are consistent with declines in condition factor for coho and rainbow trout over the winter.

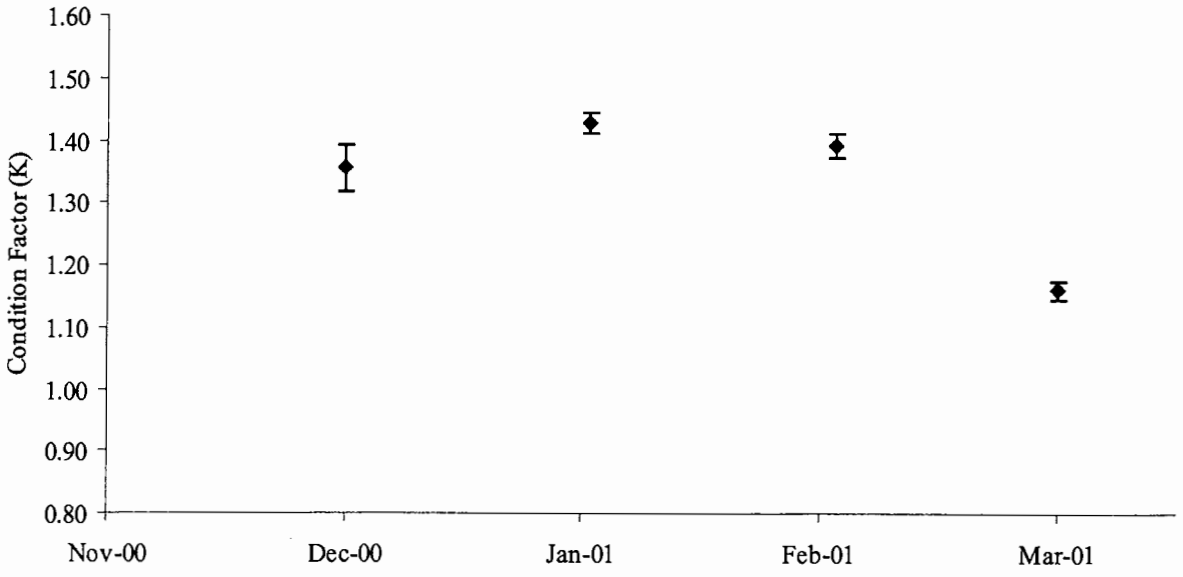

Figure 9. Mean condition factor for chinook captured at sites sampled in the Upper Bulkley Watershed. Bars indicate standard errors.

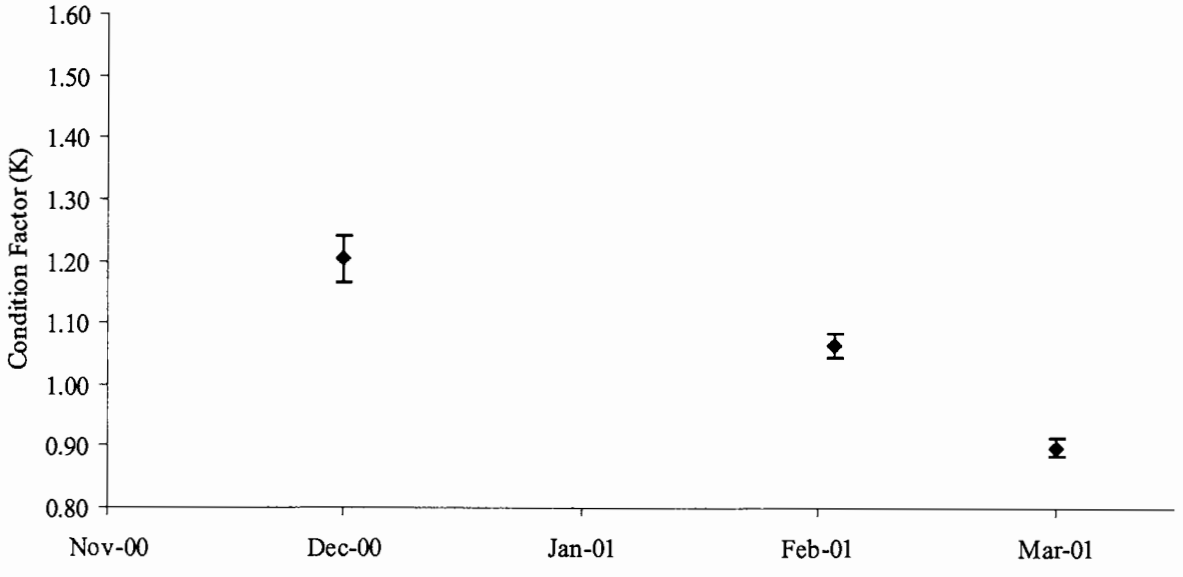

Figure 10. Mean Condition factor for Dolly Varden captured at sites sampled at Toboggan Creek (below). Bars indicate standard errors.

4.3 FISH AND FISH HABITAT

Catch per unit effort of species captured during the overwintering study depends in part on the distribution and overall escapement of the species to the sampled watersheds, as well as habitat characteristics sampled. Coho catch per unit effort was higher in Toboggan Creek and the Upper Bulkley watershed. Rainbow trout CPUE was not notably different between Upper Bulkley sites and Toboggan Creek sites. Habitat composition and location are factors, which may determine habitat suitability, and hence fish densities at sites sampled.

4.3.1 Upper Bulkley

While catch per unit effort differed between side channel, mainstem and tributary sites sampled in the Upper Bulkley watershed, some differences in catch per unit effort also existed among sites grouped in these broad categories. Catch per unit effort was generally low in Upper Bulkley side channel sites, when compared to Upper Bulkley tributary sites. Variability between Upper Bulkley tributary and mainstem sites were also found in the data collected.

Upper Bulkley side channel sites had the lowest capture rates and lowest species diversity sites sampled in the Upper Bulkley watershed. Substrate at these sites consisted primarily of fines, and water depths were among the lowest sampled (particularly at sites SID 2 and 3). In addition, these sites provided little cover, with undercut banks and instream cover being the main cover elements. The side channel sites sampled had some evidence of groundwater influence, as indicated by elevated water temperatures, lack of complete ice cover, and generally low dissolved oxygen. Dissolved oxygen concentrations in side channel sites sampled were among the lowest in the Upper Bulkley watershed. The majority of species captured at the Upper Bulkley side channel sites consisted of non-salmonids.

Catch per unit effort was moderate in Upper Bulkley mainstem sites, and consisted primarily of chinook, rainbow trout, and some coho. Among sites sampled in the Upper Bulkley mainstem, CPUE was generally highest at site UBR 2, and lowest at site UBR 12. Site UBR 2 is located at the mouth of Byman Creek, and is about 1 m deep, had moderate levels of instream cover (predominantly LWD and cobble), and consists primarily of pool habitat. Water levels and dissolved oxygen concentrations remained relatively consistent during the winter at this site, and the root wad at the site offers good cover, as does the cobble substrate, although embeddedness is 20%. Good cover, water quality and water levels are present at this site throughout the winter. In contrast, site UBR 12, is characterized by low instream cover (trace from LWD and moderate from cobble), with 50% pool habitat at the site. Embeddedness at this site is also 20%. Depth measurements were not recorded in the fall at this site, however, depth measurements at the limnological station are similar to those at site UBR 2. Some silt build up was noted at this site during fall sampling. The main differences between mainstem sites UBR 2 and UBR 12 is their proximity to a tributary with apparently high fish densities (Byman Creek for site UBR 2), the amount of cover, and the proportion of pool habitat. Chinook and rainbow trout form a major proportion of catches in mainstem sites sampled in the Upper Bulkley, and overall CPUE is high at a site with good cover, cobble substrate, a predominance of pool, and proximity to a tributary with apparently high fish densities.

Catch per unit effort in the Upper Bulkley watershed was highest at tributary sites, particularly for coho. Within the Upper Bulkley tributary sites, catch per unit effort was high in Richfield Creek (particularly RIC 2 and 3), Byman Creek (particularly BYM 2) and Buck Creek (BUC 5). Rainbow trout were dominant at the Buck Creek and Byman Creek site (78.4% and 56.8% respectively) while coho and rainbow trout co-dominated in Richfield Creek site RIC 3 (47.4% coho and 41.7% rainbow) and coho dominated at site RIC 2 (68.0%). Coho CPUE was highest at sites RIC 2, RIC 3, and BYM 2. All of these sites are relatively deep (89 – 95 cm maximum depth with BYM 2 being the shallowest). Pool is the predominant habitat type at sites BYM 2, and RIC 2, while glide habitat (40%) predominates at site RIC 3, although pool habitat is also present (30%). Overall cover ranged from trace (RIC 3) to moderate (BYM 2 and RIC 2) with cobble being the primary cover element (abundant at all sites), and embeddedness was low (5% except in glide habitat at RIC 2 where embeddedness was 25%). Large woody debris cover was not present at sites BYM 2 and RIC 2, but was rated as trace at site RIC 3. Small woody debris cover was present at sites BYM 2 and RIC 2 but not at site RIC 3. Sites where coho CPUE was abundant therefore offer deep, primarily pool habitat, with cobble and organic cover. Rainbow trout CPUE was highest at site BUC 5, BYM 2, and RIC 3. Two of these sites (RIC 3 and BYM 2) also had high coho CPUE, indicating that these species can coexist. Site BUC 5 was one of the deepest sites sampled (max. depth = 119 cm) and consisted primarily of pool (40%) and glide (40%) habitat with cobble substrate. Cover was at trace levels and consisted primarily of cobble substrate with no forms of organic cover (LWD or SWD). Cobble embeddedness was 10% at site BUC 5. Boulder cover was also present at this site, and may be suitable for rainbow trout cover. Despite poor cover (no instream cover), high substrate embeddedness (50%), low percentage of pool (30%), rainbow trout CPUE was also relatively high at McQuarrie Creek (McQ 1). Coho and rainbow CPUE were relatively high at sites with water depths near 1 meter (among the deeper sites sampled), abundant cobble substrate, presence of organic cover (for coho) and low substrate embeddedness.

In summary, catch per unit effort is lowest in Upper Bulkley side channel sites, but appears to depend partly on habitat composition and location in Upper Bulkley mainstem and tributary sites. Within Upper Bulkley mainstem sites, CPUE was low for sites located downstream of the confluence with Buck Creek, in part because these sites offered poor cover, and had embedded substrate. CPUE was higher for mainstem sites near tributaries, which also had high CPUE. Despite stocking in Buck Creek, coho CPUE was not remarkably higher at sites sampled in this tributary, but appeared to be high in Richfield Creek, Byman Creek, and the one site sampled in McQuarrie Creek. The lack of significantly higher coho CPUE at Buck Creek as a result of coho released to the system in August may stem from the fact that the release site is located upstream of sample sites, and upstream of a beaver dam. Rainbow trout were relatively common in both mainstem and tributary sites in the Upper Bulkley, and both species appeared to be able to coexist. Generally, higher CPUE appeared to be associated with cobble substrate, the presence of organic cover (more so for coho), suitable dissolved oxygen and flow conditions, and availability of relatively deep pool habitat in the sites sampled in the Upper Bulkley watershed.

4.3.2 Toboggan Creek

Of the sites sampled, coho were most commonly captured in Toboggan Creek mainstem and side channel sites, and appeared less abundant in Toboggan Lake sites. Rainbow trout CPUE at Toboggan Creek mainstem and side channel sites were comparable to those in Upper Bulkley mainstem and tributary sites. The lower capture rates of coho and rainbow trout in Toboggan Lake can be attributed to significant oxygen depletion at these sites during the winter. One of the Toboggan side channel sites (TOB 3) was not sampled during the winter due to low water depth, while the other side channel site (TOB 8) was utilized by salmonids throughout the winter. Coho CPUE was relatively high in Toboggan Creek mainstem sites, while rainbow trout CPUE was not as high as in some of the Upper Bulkley tributary sites, but rainbow trout CPUE was higher in Toboggan Creek mainstem sites than in Toboggan Creek sidechannel or lake sites. The two Toboggan Creek mainstem sites consisted primarily of pool habitat (50% at site TOB 1 and 75% at site TOB 2), with primarily cobble substrate and low embeddedness (5%). Cover was moderate with moderate levels of SWD at both sites, and moderate levels of LWD at site TOB 1. Boulders provided some cover at site TOB 2. Coho CPUE was somewhat higher at site TOB 1, which offered a greater amount of organic cover, than at TOB 2, which had larger substrate size, and less pool. Overall CPUE, and particularly coho CPUE was highest at the two Toboggan Creek mainstem sites and lowest at the Toboggan Lake sites.

5.0 DISCUSSION

Watershed characteristics, as well as habitat types sampled in the Upper Bulkley and Toboggan Creek watersheds are expected to influence species assemblages, fish densities, fish size and condition during the winter. Winter has been documented to be a critical time in the life history of salmonids (Bustard and Narver 1975), since this season can affect fish health and survival (Bustard and Narver 1975, Dolloff 1987). Several types of habitat, including side channel, off channel, ponds, beaver ponds, lakes and mainstems have been identified as important overwinter habitat for a variety of salmonids (Bustard and Narver 1975, Petersen 1982, Envirocon 1986, Swales *et al.* 1986, Swales and Levings 1989). Within these types of habitat, the importance of cobble substrate, deep pools and organic cover have been documented (Bustard and Narver 1975, Swales *et al.* 1986, Dolloff 1987). Habitat composition at the different sample sites is therefore expected to result in different species assemblages, densities and fish size. The two main indicators of habitat suitability in this study were species density indices (CPUE) and fish size (fork length and condition). Comparisons of habitats sampled, species assemblages, fish density and size, as well as the affects of habitat on fish are discussed in the following sections.

5.1 HABITAT ASSESSMENT

The results from both fall and winter habitat assessments were found to be valuable toward helping provide explanations for many of the trends in species diversity, catch per unit effort and fish size that were identified during this study. This section provides an overview of the results from the fall and winter habitat assessments and provides some definitions of the qualities and characteristics of different habitat types with some discussion regarding the most important qualities and changes to these habitats that occurred over the winter.

The majority of the sites sampled during the winter 2000/2001 were characterized by pool habitat with primarily cobble substrate. These sites were chosen because of their accessibility, and because they were thought to provide among the best overwintering habitat in the system. While Cunjak and Power (1987) indicate that riffles may be used for overwintering by trout, glide, edge and riffle habitat are less likely to be used for overwintering of coho and rainbow trout which have been found to prefer pool habitat in other studies (Bustard and Narver 1975, Cunjak and Power 1986, Heifetz *et al.* 1986, Swales *et al.* 1986, Dolloff 1987). Cobble was the dominant substrate at all sites where fall assessments were conducted except for Upper Bulkley side channel sites, where fines was the dominant substrate. Although percent embeddedness can affect the suitability of substrate for cover (Hillman *et al.* 1987), embeddedness was low to moderate but generally less at Toboggan Creek sites (5%) than at most Upper Bulkley sites (10%). Cobble has been found to be an important cover element at low water temperatures, as fish are often associated with interstitial spaces in the substrate (Bustard and Narver 1975, Heifetz *et al.* 1986, Swales *et al.* 1986). This would suggest that interstitial spaces in cobble substrate at the two Toboggan Creek sites may be more suitable for cover than those in Upper Bulkley sites, although the critical level at which embeddedness limits suitability of interstitial spaces for cover is not clear. Sites with cobble/pool habitat were found to maintain the most suitable conditions for winter rearing based on associated cover, habitat stability and water quality (i.e. constant oxygen supply).

Although the majority of sample sites sampled in winter 2000\2001 consisted primarily of cobble pools in mainstem and tributary areas, some side channel sites in both Toboggan and the Upper Bulkley, and two Toboggan Lake sites were also sampled. The Toboggan Lake and Upper Bulkley side channel sites that were sampled offered primarily fines for substrate, had little flow, and dissolved oxygen concentrations declined throughout the winter at these sites. Although side channel habitats (Bustard and Narver 1975, Peterson 1982, Envirocon 1986, Swales *et al.* 1986) and lakes (Swales and Levings 1989) have been reported to provide good overwintering habitat in other systems, the overwintering conditions at lake and side channel sites deteriorated over the winter and were of limited suitability for overwintering. The results from this study indicated the side channel and lake sites to have relatively poor quality in comparison to cobble pool habitats, but it is suspected that the sites sampled may not be completely representative of habitat available due to the relatively small sample size. It is suspected that lake and side channel habitat are more variable between sites and over the winter than tributary or mainstem sites.

In summary, both fall and winter habitat assessments were found to be useful toward obtaining a better understanding of the qualities of overwintering habitat in the Upper Bulkley River and Toboggan Creek. Probably due to greater velocity associated with cobble pools, these sites appear to provide the most stable habitat and water quality during the winter. Other studies have documented that substrate size, and the suitability of substrate to provide cover is in part determined by water velocity (Wetzel 1983, Chambers *et al.* 1987, Hunter 1991), which is consistent with findings during this overwintering study. The levels of dissolved oxygen and ice cover at the site samples were dependent on the current velocity and the influence of groundwater. Sites with greater current velocity have higher and more consistent dissolved oxygen, while sites with groundwater influence and/or low to no current generally have low dissolved oxygen, consistent with trends reported in other studies (Schreier *et al.* 1980, Wetzel 1983, Chambers *et al.* 1987). The best overwintering habitat that was identified in the Upper Bulkley River and Toboggan Creek, was characterized by cobble substrate, a relatively high proportion of deep pool habitat, the presence of organic cover (for coho) and moderate water flow.

5.2 FISH SAMPLING

Species diversity, densities, and fish size were recorded at all sites throughout the winter, since these measures were suspected to reflect the quality of overwintering habitat sampled. Habitat segregation during the winter has been reported for some salmonids (Bustard and Narver 1975, Cunjak 1986, Swales *et al.* 1986, Heifetz 1986, Hillman *et al.* 1987), and different species assemblages may occur at sites offering different types of habitat. In addition, overwintering habitat characteristics have been linked to different rates of survival (i.e. densities) and growth (i.e. fork length and condition factor) of salmonids in several systems (e.g. Swales *et al.* 1986, Cunjak 1996). This section of the discussion summarizes the variation of species distribution and diversity, density indices, age based on fork length data, fish condition, and the relationships of these factors between sites and watersheds.

5.2.1 Species Distribution and Diversity

Species richness, diversity and evenness were expected to vary between and within watersheds, as species assemblages differ between the watersheds, and since some habitats are likely able to better support a variety of species. The number of species at a site is partly determined by the ability of some species to access the sites, while others may be absent from the area (Krebs 1999). In addition, greater habitat complexity has been shown to allow a greater variety of species to utilize sites (Hunter 1991). The relationship between species richness, diversity and evenness, and species distribution as well as catch per unit effort are discussed in this section.

Species richness, diversity and evenness were lowest at Upper Bulkley side channel sites, and Toboggan Lake sites. Species diversity at the sites sampled during the overwintering study is in part determined by the distribution of the species in the drainage, and the suitability of the site sampled for that species. No Dolly Varden were captured in the Upper Bulkley watershed, and no chinook were captured at Toboggan Creek. Chinook have rarely been captured in Toboggan Creek during other studies (O'Neil pers. comm., SKR 1995, 1996, 1997, 1998, 1999, 2000a), and likely stem from a low proportion of strays from other chinook populations. The lack of juvenile chinook in the Toboggan Creek samples is therefore consistent with the distribution of the species. Likewise, Dolly Varden have been documented in the Upper Bulkley watershed (FISS), but appear to be present at low densities. The presence of non-salmonids at sites sampled in the Upper Bulkley is consistent with the distribution of these species in the watershed, as is the lack of these species from Toboggan Creek (FISS, SISS, SKR 2000a). Despite differences in species assemblages, species richness, species diversity and evenness were not significantly different between Toboggan Creek and the Upper Bulkley. However, species richness, diversity, and evenness were significantly higher at Upper Bulkley tributary sites and lower at Upper Bulkley side channel sites. Species richness, diversity and evenness appeared to be somewhat lower at Upper Bulkley side channel sites and Toboggan Lake sites. Relatively high species richness, diversity and evenness at Upper Bulkley tributary and Toboggan Creek mainstem and side channel sites (TOB 8) indicate that these sites offer suitable overwintering habitat for a variety of species.

Sites with high overall CPUE (e.g. Upper Bulkley tributary and Toboggan Creek mainstem/ side channel sites) had higher species richness, species diversity and evenness than sites with low overall CPUE (e.g. Toboggan Lake, Upper Bulkley side channel). This is not surprising, since a higher CPUE infers a larger sample size, which often results in a greater number of species captured (Krebs 1999). Upper Bulkley tributary and Toboggan Creek mainstem sites had higher CPUE, species richness, species diversity and evenness, while Toboggan Lake sites and Upper Bulkley side channel sites had lower CPUE, species richness, diversity and evenness, indicating that these sites are less suitable for overwintering.

While species assemblages differ between Toboggan and Upper Bulkley sites, due to different species distributions in the two drainages, species richness, evenness and diversity is generally similar. Species richness, diversity and evenness were lowest in Upper Bulkley side channel sites and Toboggan Lake sites, sites that offered lower habitat complexity, and poorer habitat quality than other sites sampled. In particular, sampling in Upper Bulkley side channel site resulted in the capture of non-salmonids, indicating that these sites are unsuitable for salmonid

overwintering. Generally, species richness, diversity and evenness were higher at sites with greater catch per unit effort. Toboggan Creek mainstem, Toboggan Creek side channel site (TOB 8) and Upper Bulkley tributary sites had the highest species richness, diversity and evenness, and also had high catch per unit effort, which indicates that these sites have more diverse habitat characteristics that are suitable for a greater variety of species during the winter.

5.2.2 Density Indices

Fish density is expected to vary between watershed, sites and over time. Differences in densities, as measured by CPUE, between watersheds are in part determined by species distribution, escapement of spawners, and survival of juveniles to the winter season. Sites with lower escapement, and sites with lower survival of juveniles in the summer and fall would result in lower juvenile densities than sites with higher escapement or juvenile survival. Likewise, density is expected to be higher throughout the winter at sites, which offer good, stable overwintering habitat able to support fish from fall to spring. Changes in CPUE over time may result from different levels of immigration and emigration to a site, or from mortality at the site, both of which may indicate the suitability of the habitat for overwintering. Differences in CPUE between watersheds and over time are discussed in the following sections.

Catch per unit effort for coho were higher at Toboggan Creek sites than at Upper Bulkley sites, while CPUE for rainbow trout did not differ significantly between the two drainages. This is likely due to the fact that Toboggan Creek sites are an enhanced coho stock, with hatchery releases of smolts, and subsequent returns of hatchery origin adults to the system. Escapement of coho to the Toboggan Creek system have been significantly higher than to the Upper Bulkley system, as determined at adult fence counts (Table 12), despite the fact that the Upper Bulkley is a bigger system than Toboggan Creek. Higher adult returns are expected to result in higher seeding of available spawning habitat, and consequently higher numbers of juveniles. This appears to be the case at Toboggan Creek. However, juvenile densities at Buck Creek, where fry have been released in August 1999 and August 2000 (Tamblyn 2000, SKR 2000a), do not appear to be higher than for other Upper Bulkley Tributaries. This could be due to several factors, including very low densities of wild coho at Buck Creek, and/or movement of released coho prior to the onset of winter, resulting in an inability to capture these fish. These fish may select sites other than those sampled, migrate out of the system, or died. An emigration study conducted in Buck Creek with a rotary screw trap (RST) in the fall of 2000 after the release of hatchery origin coho suggests that most coho did not migrate downstream prior to ice - up, although the RST trap could not be fished at all times (Tamblyn 2000). Fry released in Buck Creek in the fall were released upstream of a beaver dam located upstream of the release pond, and may not have been able to disperse to sample sites located downstream of the beaver dam prior to the onset of winter. Two sites sampled during the overwintering study (BUC 1 and BUC 2) had 100% hatchery coho, while the proportion of hatchery origin coho declined to 0% downstream of the release pond. Coho catch per unit effort was higher at Toboggan Creek than in the Upper Bulkley system, which is speculated to be a direct result of greater levels of escapement to Toboggan Creek when compared to the Upper Bulkley.

Table 12. Summary of adult escapement estimates at weirs in the Upper Bulkley and Toboggan Creek systems (Ewasiuk 1998, Glass 1999, 2000, O'Neil pers. comm.).

Year	Upper Bulkley	Toboggan Creek
1996	170	1124 (80.4% wild)
1997	~ 85 (incomplete count of 22 coho at fence)	359 (79.7% wild)
1998	317 (31% wild)	2415 (81.7% wild)
1999	1073 (20.2% wild)	9224 (68.6% wild)

Significant declines at sites with high CPUE for rainbow trout or coho, while sites with low CPUE for coho or rainbow trout exhibited little change in CPUE for these species, indicate that sites where rainbow trout or coho are present in early winter either experience net emigration or mortality. Decreases in coho and rainbow trout CPUE were most pronounced at sites where CPUE for these species was relatively high in the beginning of the winter. Coho CPUE was very high in Toboggan Creek mainstem sites in December, and declined drastically particularly in January and February. Likewise, rainbow trout and coho CPUE were higher in Upper Bulkley tributary sites in the beginning of winter, and declined significantly during the winter. Rainbow trout CPUE in Upper Bulkley mainstem sites was lower than in tributary sites, and no significant change in rainbow CPUE was noted during the winter at Upper Bulkley mainstem sites. Similarly, coho CPUE was relatively low in Upper Bulkley tributary and mainstem sites, and did not change significantly during the winter. Higher CPUE indicates higher fish densities, which could result in increased intra- and inter-specific competition, increased stress, increased mortality, and render habitat less suitable (Ricker 1975, Bagenal 1978, Krebs 1985, Hauer and Lamberti 1996). Catches consisted predominantly of coho and rainbow trout, for which CPUE were generally highest in early winter, and declined between December and March.

Drastic decreases of CPUE at Toboggan Creek sites (primarily for coho) early in winter, and gradual but consistent decreases in CPUE at most sites in Upper Bulkley (for both coho and rainbow) in late winter suggest significant emigration and/or mortality in both systems. Winter has been identified as a potential bottleneck in some systems, since this period is associated with high stress, low metabolic activities, energy loss, decrease growth and survival (Bustard and Narver 1975, Dolloff 1987). Estimates of overwinter survival range from 6% to 73% (Bustard and Narver 1975, Envirocon 2984, Heifetz *et al.* 1986). Net emigration from sites is also a plausible explanation for declines in CPUE, since considerable movement of salmonids during the winter has been reported in other studies, including ones conducted on streams with ice cover (Cunjak 1996, Heggersen *et al.* in prep, Jakober *et al.* 1998, Simpkins *et al.* 2000, Wet'suwet'en pers. comm.). Many researchers however suggest that salmonids move little during the winter to minimize energy expenditure (Envirocon 1986, Heifetz *et al.* 1986, Swales *et al.* 1986, Dolloff 1987, Giannico and Healey 1998). Net emigration may be a potential explanation for some sites, but an overall decline in CPUE early in the winter at Toboggan Creek sites and later in the winter at Upper Bulkley sites indicates that movement of fish is not the primary factor influencing CPUE. Movement of fish should result in a decrease in CPUE at some sites, and an increase at other sites, as was observed for coho in some of the Upper Bulkley sites between December and February. The decreased activity of fish during the winter may result in decrease capture rates since fish are less likely to enter traps (Swales *et al.* 1986). This may account for some of the reduction in capture rates at some sites, but does not explain decreased CPUE from February to

March in Upper Bulkley sites despite increases in water temperature, or the relatively consistent capture rates of coho at Upper Bulkley sites throughout the winter. Likewise, simple changes in capturability of fish due to changes in temperature does not explain varying levels of changes in CPUE that are not related to varying water temperatures. Decrease in rainbow trout and particularly coho CPUE at most sites, particularly in early winter in Toboggan Creek, are speculated to be due to mortality or net emigration rather than decreased capture efficiency.

Catch per unit effort for coho and rainbow trout differed between watersheds, between sites within the two watersheds sampled, and changed over time. Coho CPUE was generally higher at Toboggan Creek than in Upper Bulkley sites, which is likely due to differences in spawner escapements to the two drainages. Rainbow trout CPUE was generally similar between the two watersheds. Catch per unit effort generally declined over time, particularly for coho at Toboggan Creek, which may indicate significant emigration and/or mortality at these sites. Differences in CPUE between Toboggan and Upper Bulkley sites, particularly for coho, at the start of winter are speculated to be a result of spawner escapements, while declines in CPUE during the winter, particularly for coho in Toboggan Creek are likely a result of emigration or mortality, which may indicate overseeding of the habitat.

5.2.3 Fish Size, Age and Condition

Fish size, age structure and condition are expected to be affected by differences in recruitment, age class strength due to differing levels of escapement, size dependent mortality or migration patterns, and/or competition. Larger fish are frequently thought to have a competitive advantage over smaller fish, and may be able to displace smaller fish from better habitat (Giannico and Healey 1998). Conversely, higher fish densities are expected to result in greater competition, which may lower growth rate, and therefore fish size and condition. The following sections summarize the comparisons of fish size, age, and condition, which may reflect differences in recruitment, or habitat suitability for overwintering.

5.2.3.1 FISH SIZE

Fish size is expected to remain similar or increase over the winter and at sites offering better overwintering habitat. The competitive advantage inferred for larger fish, and consequent displacement of smaller fish to less suitable habitat (Giannico and Healey 1998) would result in size selective movement of fish, as smaller fish move to more marginal habitat. Fish size during the winter may increase due to growth, size selective mortality or size selective migration. Of these factors, growth is less likely to have a significant effect on fork length in interior systems, as growth rates are likely minimal (Dolloff 1997), and coho did not grow even under hatchery conditions in the Toboggan Creek hatchery (O'Neill 1999). Size selective mortality or migration can result in a shift in fish size during the winter. Generally, higher mortality rates are suspected to occur for smaller fish (Giannico and Healey 1998) or fish in lower condition (Cargnelli and Gross 1997), which are assumed to have fewer energy reserves to survive adverse conditions. Differences in fork length between sites and during the winter are relatively small, and consist primarily of decreases in fork length at sites with relatively high CPUE, which is contrary to the expected changes in fork length. Coho were significantly smaller at Upper Bulkley tributary sites when compared to other Upper Bulkley sites, and at Toboggan Creek mainstem sites when

compared to other Toboggan Creek sites in March. Declines in fork length are significant between December and January in Upper Bulkley mainstem sites (rainbow trout) and Upper Bulkley tributary sites (rainbow trout and coho), while fork length appears to increase in Toboggan Creek side channel sites in March. An unexpected decline in fork length at these sites is speculated to be due to size selective movement of larger fish out of these sites, smaller fish that may be displaced from other sites in the system into these sites, or due to chance events. The lack of a change in fork length at most sample sites is consistent with the expected temporal trends in fork length.

5.2.3.2 AGE

The proportion of younger, smaller fish at sample sites was expected to remain similar or decrease over the winter due to size selective mortality or migration. Differences in age distribution between sites may be a result of different spawner escapement, or affects of size selective movement or mortality on fish at the sampled site. Generally, age 0+ fish were expected to dominate the catch, since the affects of cumulative mortality and smolting of some fish after their first winter on older age classes should reduce their numbers compared to younger age classes. Mortality during the winter was also expected to be more severe for age 0+ fish, since larger, older fish are generally better able to out compete smaller fish (Giannico and Healey 1998). This is expected to result in a decrease in the proportion of 0+ of the total catch during the winter. A predominance of age 0+ coho (1999 brood year) at both Upper Bulkley and Toboggan Creek sites is not surprising since younger fish are expected to be more numerous. In addition, adult escapement, particularly at Toboggan Creek, was higher for the 1999 brood year than in 1998 brood year (Table 12). Age classes older than 0+ appear to dominate the rainbow trout catches during the study. This may be due to inaccurate interpretation of the length at age data, a decreased efficiency of minnow traps to catch smaller fish, or an inability of smaller 0+ fish to survive the winter. Alternatively, the combination of rainbow trout older than 0+ may actually form a larger group of fish than rainbow trout younger than 0+ at sites sampled. Changes in the proportion of 0+ in the catch for coho at both Upper Bulkley and Toboggan Creek sites indicate that a smaller proportion of age 0+ coho are captured at the end of winter (March) than in the beginning of winter (December or January). The decline is more obvious for Toboggan Creek, where coho CPUE was notably higher than in Upper Bulkley sites, between January and March, and even more so between December and March. Densities of rainbow trout age 0+ and rainbow trout older than age 0+ appear to decline by about the same amount at Upper Bulkley sites, but age 0+ rainbow trout were rarely captured at Toboggan Creek, and did not allow for this comparison. The proportion of age 0+ in the catch of coho at the end of winter is significantly lower than in the beginning of winter in Upper Bulkley and especially Toboggan Creek sites, while changes in age distribution for rainbow trout are less clear, which may be due to more complex age structures, sampling bias favoring larger, older rainbow tout, and lower sample size for this species.

5.2.3.3 CONDITION FACTOR

Condition factor is expected to change over the winter, and differ between sites, since the amount of energy loss during the winter is expected to vary between sites. Condition may be expected to decline in winter as fish utilize their stored energy reserves to survive this stressful season (Dolloff 1987). Condition factor may differ between sites as a result of varying

environmental (e.g. temperature, habitat complexity) and biological (e.g. competition, food availability) factors. The differences in condition factor between sites and during the winter are discussed in this section.

Condition factor changed significantly over the winter for most species, and at most sites. Condition factor was more variable in early winter, but variance decreased as winter progressed (particularly for coho at Toboggan Creek sites). This may partly be due to the clear predominance of smaller fish (which have more variable and generally higher condition factor) at Toboggan Creek sites in December, and the drastic decline of 0+ fish from December to January. Declines in condition factor for coho, rainbow trout and chinook are statistically significant, and most obvious between the February and March samples.

Sites with high CPUE appear to have more smaller fish with higher condition factor than sites with low CPUE, which may be due to the affect of competition on migration patterns (size selective movements of fish), growth and/or condition. Combined with CPUE, fork length distribution affected condition factor at sites sampled during the overwintering study. Coho tended to be significantly smaller at sites with higher overall CPUE (Upper Bulkley tributary, Toboggan Creek mainstem and side channel), except coho in Buck Creek, which are of hatchery origin. Rainbow trout tended to be smaller in Upper Bulkley tributary sites (with relatively high overall CPUE), than at Upper Bulkley mainstem sites (relatively low CPUE), which were in turn smaller than rainbow trout captured at Toboggan Creek mainstem sites (high overall CPUE). Sites with high CPUE also had generally high coho condition factor (e.g. Upper Bulkley tributaries, Toboggan Creek mainstem/side channel sites), which is expected since fork length and condition factor appear to be inversely related. These differences in coho condition factor are more pronounced earlier in the winter (December and January), while there was no significant difference in condition between sites in February. However, coho condition factor was significantly greater at Toboggan Creek sites than Upper Bulkley sites in March, while rainbow trout condition factors were not significantly different between Toboggan Creek and Upper Bulkley sites, which also did not differ significantly in rainbow trout CPUE. Sites with high overall CPUE are expected to have higher densities of fish, which may result in increased inter and intra-specific competition, as reflected in differences in condition factor and fork length of fish.

Condition factor generally declined during the winter for rainbow trout, coho and chinook, and mean condition factor was consistently lower at sites with high CPUE. The significant decline in condition factor for a variety of species supports that winter is a stressful season for fish. Winter has been identified as a potential bottleneck for salmonid production (Bustard and Narver 1975, Swales *et al.* 1986, Dolloff 1987), and is usually associated with energy loss, declining fish health and increased mortality (Bustard and Narver 1975, Dolloff 1997). The decline in condition for salmonids found during the 2000/2001 overwintering study is consistent with other studies that have associated energy loss with winter, since stored reserves are utilized during the winter, resulting in a decline in fish condition.

5.3 FISH AND FISH HABITAT

Fish habitat is expected to play a role in species assemblages, fish densities, fish size and condition. While species diversity and density are in part determined by the distribution and escapement of the species to the watersheds sampled, differences in fish habitat within a watershed is also expected to play a role. The effects of different species distribution and escapement on species diversity, densities, size and condition have been discussed in the previous sections. The following sections focus on relationships between species assemblages and fish densities within sites sampled in the Upper Bulkley and Toboggan Creek watersheds.

5.3.1 Upper Bulkley

Species assemblages and densities were expected to vary among the different types of sites sampled, depending on the type of habitat offered by each site. Sites sampled in the Upper Bulkley watershed represented mainstem, tributary and side channel habitat, all of which are known to be important for overwintering for a variety of different species. Side channel, off channel and slough areas have been noted to be utilized for overwintering by coho (Bustard and Narver 1975, Bustard 1986, Swales *et al.* 1986, Sandercock 1991), while rainbow trout and chinook appear to overwinter more frequently in mainstem and tributary habitat (Swales *et al.* 1986, Heifetz *et al.* 1986, Healey 1991). Other studies have pointed to the importance of substrate cover (Cunjak 1988, Heifetz 1986, Reihle and Griffith 1993, Heggenes *et al.* in prep.) and organic cover for salmonids, particularly coho (Bustard and Narver 1975, Swales *et al.* 1986), during the winter. Minimum water quality criteria (e.g. dissolved oxygen and water depth) must be met in order to ensure the survival of salmonids at a site. Differences in species assemblages and catch per unit effort between and within Upper Bulkley side channel, mainstem and tributary sites are discussed in this section.

Side channels were expected to offer important salmonid overwintering habitat, especially for coho. Salmonids, especially coho, have been documented to utilize side channel habitat for overwintering in several systems (Bustard and Narver 1975, Bustard 1986, Envirocon 1986, Swales *et al.* 1986, Sandercock 1991). However, overall catch per unit efforts, species richness and diversity in the Upper Bulkley watershed was lowest at the three Upper Bulkley side channel sites. Substrate at these sites consisted primarily of fines, and water depth were among the lowest sampled (particularly at sites SID 2 and 3). These sites therefore do not offer any cover associated with substrate, which has been found to be important for salmonids in other studies (Cunjak 1988, Heifetz 1986, Reihel and Griffith 1993, Heggenes *et al.* in prep.). Swales et al. (1986) found a predominance of coho in off channel ponds in the Coldwater and Nicola systems. These ponds had similar substrate characteristics to the side channels sampled in the Upper Bulkley, but were significantly deeper (mean depth = 1 to 2 m) than Upper Bulkley side channel sites (maximum depth = 0.5 – 1 m). The combination of lack of substrate cover and relatively low water depth may have influenced the quality of overwintering habitat at side channel sites in the Upper Bulkley. While substrate cover was lacking at the side channel sites, undercut banks and instream vegetation provided some cover. Ice formation in the channel margins may render undercut banks unsuitable for cover in the winter. Thus, suitable cover for use during the winter by salmonids in Upper Bulkley side channel sites appears limited. In addition, dissolved oxygen concentrations at these sites were among the lowest in the Upper Bulkley watershed, while water

temperatures were generally higher, indicating some ground water influence (Appendix 2). The combination of substrate composition, lack of organic cover (other than instream vegetation), low dissolved oxygen and relatively low water depth likely reduced the suitability of side channels sampled in the Upper Bulkley system for overwintering.

Mainstem habitat in the Upper Bulkley was expected to be utilized primarily by chinook and rainbow trout, while coho were not expected to utilize these sites to a significant degree. Rainbow trout are frequently found associated with deeper pools in mainstem habitat (Swales *et al.* 1986, Heifetz *et al.* 1986), where they may be concentrated along the stream margins (Bustard and Narver 1975) and with larger substrate size (Bustard and Narver 1975, Swales *et al.* 1986, Dolloff 1987). Similarly, chinook tend to be associated with larger substrate size, moving from tributary to mainstem sites for overwintering (Healey 1991). They are generally less frequently found in ponds, although they may also utilize off channel ponds for overwintering in some systems (Swales *et al.* 1986). As expected, catch per unit effort, species richness and diversity was moderate in Upper Bulkley mainstem sites, and consisted primarily of chinook, rainbow trout, and some coho. The predominance of chinook and rainbow trout over coho in mainstem sites is consistent with findings in other overwintering studies conducted elsewhere in B.C. (Swales *et al* 1986). A predominance of chinook in the catches obtained at Upper Bulkley mainstem sites therefore suggests that Upper Bulkley chinook utilize mainstem habitat for overwintering. Among sites sampled in the Upper Bulkley mainstem, CPUE was generally highest at site UBR 2, and lowest at site UBR 12. This is consistent with speculations that mainstem sites near confluences with major tributaries are more attractive to fish since they offer access to a wider variety of habitat, satisfying a number of life history stages, and since water quality is presumed to be better at these sites than other mainstem sites (BCCF 1997, 1998). Good cover (LWD and substrate), water quality and water levels are present at site UBR 2 throughout the winter, and fluctuations in CPUE at UBR 2, as well as changes in fork length (see above) indicate that there may be movement of salmonids between this site and nearby Byman Creek. The main differences between mainstem sites UBR 2 and UBR 12 is their proximity to a tributary with apparently high fish densities (Byman Creek for site UBR 2), the amount of cover, and the proportion of pool habitat. Site UBR 12 is located in below the confluence with Buck Creek, an area of the Upper Bulkley mainstem noted for poor potential for fish production (BCCF 1998). As expected, chinook and rainbow trout form a major proportion of catches in mainstem sites sampled in the Upper Bulkley, and overall CPUE is high at a site with good cover, cobble substrate, a predominance of pool, and proximity to a tributary with apparently high fish densities.

Tributary habitat in the Upper Bulkley watershed was expected to be utilized primarily by coho and rainbow trout, while chinook were expected to be less common at these sites. Rainbow trout and particularly coho have been documented to overwinter in suitable tributary habitat in other studies (Bustard and Narver 1975), and small tributaries have been identified to offer important habitat for coho (Rosenfeld *et al.* 2000). As expected, catch per unit effort, species richness and diversity in the Upper Bulkley watershed was higher at tributary sites than in mainstem sites, particularly for coho. Coho have been documented to be more closely associated with organic cover types (e.g. LWD) than with substrate cover (e.g. cobbles) in some studies (Narver and Bustard 1975, Swales *et al.* 1986, Tschaplinski and Hartman 1993), although a preference of cobble cover has also been documented (Heifetz *et al.* 1986). Within the Upper Bulkley

tributary sites, catch per unit effort was high in Richfield Creek, Byman Creek and Buck Creek. Rainbow trout were dominant at the Buck Creek and Byman Creek site while coho and rainbow trout co-dominated in Richfield Creek site RIC 3 and coho dominated at site RIC 2. Tributary sites where coho CPUE was abundant offer deep, primarily pool habitat, with cobble and organic cover. In addition, Richfield Creek and Byman Creek, both of the tributaries where coho CPUE was highest, are located near spawning concentrations for Upper Bulkley coho documented during aerial counts of spawners (Finnegan pers. comm.). Rainbow trout CPUE was highest at site BUC 5, BYM 2, and RIC 3. Two of these sites (RIC 3 and BYM 2) also had high coho CPUE, indicating that these species can coexist. Site BUC 5 was one of the deepest sites sampled, and consisted primarily of pool and glide habitat with cobble and boulder cover, but no organic cover. Coho and rainbow CPUE were relatively high at sites with water depths near 1 meter (among the deeper sites sampled), abundant cobble substrate, presence of organic cover (for coho) and low substrate embeddedness, as well as proximity to suspected locations of spawning areas.

Among the sites sampled in the Upper Bulkley watershed, rainbow trout and coho CPUE were highest in Upper Bulkley tributary sites, while rainbow trout CPUE was also high at some Upper Bulkley mainstem sites, but salmonids were generally lacking at side channel sites. The lack of salmonids at the three side channel sites is somewhat surprising since the importance of side channels for overwintering has been pointed out in several studies (Bustard and Narver 1975, Bustard 1986, Swales *et al.* 1986, Sandercock 1991). However, the fact that the three side channels sampled during the overwintering study did not appear to provide suitable overwintering habitat should not be generalized across the whole watershed. The three side channels may not be representative of all side and off channel habitat in the Upper Bulkley. Overwhelming historic evidence points to the importance for these types of habitat, particularly by coho. As in other studies, coho are found to prefer tributary habitat with relatively deep pools, organic and substrate cover, and good water quality over mainstem habitat, while rainbow trout and chinook were captured in both mainstem and tributary habitat that provided substrate cover (e.g. cobble).

5.3.2 Toboggan Creek

Species assemblages and densities were expected to vary among the different types of sites sampled, depending on the type of habitat offered by each site. Side channel, off channel and slough areas have been noted to be utilized for overwintering by coho (Bustard and Narver 1975, Bustard 1986, Swales *et al.* 1986, Sandercock 1991), while rainbow trout appear to overwinter more frequently in mainstem and tributary habitat (Swales *et al.* 1986, Heifetz *et al.* 1986, Healey 1991). Lakes may be used for overwintering by coho (Swales and Levings 1989). Sites sampled in the Toboggan watershed represented mainstem, side channel, and lake habitat, all of which are known to be important for overwintering for a variety of salmonids. Other studies have pointed to the importance of substrate cover (Cunjak 1988, Heifetz 1986, Reihel and Griffith 1993, Heggenes *et al.* in prep.) and organic cover for salmonids, particularly coho (Bustard and Narver 1975, Swales *et al.* 1986), during the winter. Minimum water quality criteria (e.g. dissolved oxygen and water depth) must be met in order to ensure the survival of salmonids at a site. Differences in species assemblages and catch per unit effort between and within Toboggan Creek side channel, mainstem and tributary sites are discussed in this section.

Species diversity and catch per unit efforts were expected to be relatively high in Toboggan Lake sites when compared to Toboggan mainstem or side channel sites. Lake habitat has been identified as important for coho overwintering in several systems, and is frequently associated with good survival (Petersen 1982, Swales and Levings 1989, Quinn and Petersen 1996). Contrary to expectations, fish density, species richness and diversity were lower at Toboggan Lake than at Toboggan side channel or mainstem sites. The lower capture rates of fish, particularly coho and rainbow trout, in Toboggan Lake can be attributed to significant oxygen depletion at these sites during the winter to levels that are below minimum levels required by salmonids (Davis 1975, Canadian Council of Ministers of the Environment 1991). Toboggan Lake is a small (14.9 ha) shallow (1.9 m maximum depth) lake, with a predominance of littoral area vegetated by macrophytes (Remington and Donas 1999). As these macrophytes decompose during the winter, and as ice cover coupled with the lack of flow prevent re-oxygenation of the lake, oxygen levels decline and become unsuitable for salmonids, at least at the sites sampled between December 2000 and March 2001. Oxygen depletion into Toboggan Lake is at such levels as to cause lower oxygen concentrations in the outlet stream, which does have some flow. Low CPUE, species richness and diversity at Toboggan Lake, particularly at the conclusion of winter, can be attributed to low oxygen concentrations at Toboggan Lake sample sites, which appear to render this habitat unsuitable for overwintering.

Species diversity and densities were expected to be relatively high at Toboggan Creek side channel sites and mainstem sites, particularly coho, since the size of the Toboggan Creek mainstem is comparable to Upper Bulkley tributaries. Salmonids, especially coho, have been documented to utilize side channel habitat for overwintering in several systems (Bustard and Narver 1975, Bustard 1986, Envirocon 1986, Swales *et al.* 1986, Sandercock 1991). In addition, rainbow trout and particularly coho have been documented to overwinter in suitable tributary habitat in other studies (Bustard and Narver 1975), and small tributaries have been identified to offer important habitat for coho (Rosenfeld *et al.* 2000). While CPUE, particularly for coho, at Toboggan Creek side channel sites was expected to be high, one of the two side channel sites was unsuitable for sampling due to low water levels, and CPUE at the second side channel sites was comparable to CPUE in Toboggan mainstem sites. This indicates that not all side channel habitat is suitable for overwintering. Low winter flow and water levels can cause stranding and freezing of fish in some side channels, as has been documented in the Morice River (Envirocon 1984). Toboggan Creek mainstem habitat, which is comparable to Upper Bulkley tributary habitat in terms of stream size, appears to be more stable and suitable for overwintering of salmonids than some of the side channel habitat. Coho CPUE was relatively high in Toboggan Creek mainstem sites, and rainbow trout CPUE was higher in Toboggan Creek mainstem sites than in Toboggan Creek sidechannel or lake sites, which is expected as other studies have shown a preference for stream habitat for this species (Bustard and Narver 1975, Swales *et al.* 1986). Both mainstem sites offered primarily pool habitat, with cobble substrate and low embeddedness. Organic cover was also noted at site TOB 1, where coho CPUE was somewhat higher, than at TOB 2, which had larger substrate size, and less pool. This is consistent with the reported preferences of coho for organic cover in other studies (Bustard and Narver 1975, Heifetz *et al.* 1986, Swales *et al.* 1986). Fish densities, species richness and diversity was highest at the two Toboggan Creek mainstem sites, particularly the site offering organic cover in addition to substrate cover, and lowest at the Toboggan Lake sites. Toboggan Creek side channel, and

particularly Toboggan Creek mainstem habitat offered more suitable overwintering habitat or salmonids, as indicated by high CPUE, species richness and diversity at these sites.

Among the sites sampled in the Toboggan Creek watershed, CPUE, species richness and diversity were highest in Toboggan Creek mainstem and side channel sites, and lowest at Toboggan Lake. The low number of salmonids captured in Toboggan Lake, particularly at the end of the winter appears to be due to unsuitable water quality at the sample sites, as oxygen levels dropped below minimum requirements for salmonids. One of the two side channel sites was utilized by a number of fish during the winter, as indicated by relatively high CPUE, species richness and diversity, while the other side channel site could not be sampled due to low water levels. This indicates that some side channel habitat is unstable, and can result in stranding of fish during the winter. Similarly unstable overwintering habitat has been reported in other interior systems (e.g. Envirocon 1986), but the importance of stable, suitable side channel habitat has been identified in several studies (Bustard and Narver 1975, Bustard 1986, Swales *et al.* 1986, Sandercock 1991). High fish densities, species diversity and richness at the two mainstem sites, which offered cobble pool habitat with organic cover at site TOB 1 is similar to findings of overwinter distribution of coho and rainbow trout in other interior system (e.g. Swales *et al.* 1986), substantiating that cobble pools with organic cover and adequate water quality are important for overwinter survival of fish. Fish densities, particularly for coho, species diversity and evenness were highest at Toboggan mainstem sites, particularly the mainstem site offering both substrate and organic cover.

6.0 A BRIEF REVIEW OF THE THREE YEARS OF OVERWINTERING DATA

Since November 1998, overwintering data has been collected in the Upper Bulkley and Toboggan Creek watersheds to identify potential factors that may influence overwinter habitat quality. Winter sampling was conducted at 28 sites (including 4 in Toboggan Creek) in 1998/1999, at 21 sites (including 4 in Toboggan Creek) in 1999/2000 and at 31 sites (6 in Toboggan) in 2000/2001. Over the three years of the study, fall and winter assessments were conducted at a total of 66 sites in the Upper Bulkley watershed, and 14 sites in Toboggan Creek, and resulted in the capture of 4,755 fish (1974 fish in 1998/1999, 1259 fish in 1999/2000, 1522 in 2000/2001). While the amount of data collected over the three years is large, funding sources are limited, and this has restricted comparisons of data collected. Data comparisons for the three years of the overwintering study are not exhaustive of the comparisons that could be made, and are limited to broad analysis. The cursory data analysis conducted on the three years of overwintering data focuses on obvious trends noted during the study.

6.1 GENERAL COMPARISONS

The overwintering study conducted in the Upper Bulkley and Toboggan Creek watersheds was initiated in November 1998, and was envisioned to include three years of data collection (Donas and Saimoto 1999, 2000). Sampling between November 2000 and March 2001 constituted the third and final winter field season of the overwintering studies in the Upper Bulkley and Toboggan Creek watersheds. During each of the three years, sites were sampled in the Upper Bulkley mainstem, Upper Bulkley tributaries and Toboggan Creek mainstem. However, side channel habitat (Upper Bulkley and Toboggan Creek) and lake habitat (Toboggan Lake) was not sampled in the first two years of the study. Measurements on habitat characteristics, particularly in the fall, were more detailed in the second (1999/2000) and third year (2000/2001) of the study, as detailed site assessment forms were developed after the initial field season of the study (Saimoto and Donas 1999, 2000).

6.1.1 Habitat Assessments

Characteristics in physical habitat parameters and winter conditions varied between the three years of the study. As data forms evolved, different data was collected in some cases, making comparisons of habitat and winter conditions in some instances difficult. However, some of the data that was collected is comparable. Subjective notes taken during the habitat assessments in the fall provided further indications on changes in overwintering habitat during the three years of the study. Cursory comparisons of habitat data and winter condition were conducted for the three years of the study in Toboggan Creek and the Upper Bulkley watershed.

Fall assessment data collected for sites sampled in the Upper Bulkley watersheds, documented some changes in physical conditions at sites, while the two sites sampled in Toboggan Creek appeared to have changed relatively little. In the Upper Bulkley sites, several notes on siltation and infilling were noted. For example, site RIC 3 was moved upstream slightly since site RIC 3 sampled in both 1998/1999 and 2000/2001 was infilling considerably. The pool habitat noted at this site during the first two years of the overwintering had infilled to such a degree that the site offered only fast flowing riffle habitat, with shallower depth than in previous years. Site RIC 4

located upstream of site RIC 3 also exhibited signs of infilling, and shifts in channel morphology between the years of the study (Appendix 1). Similarly, continual infilling was noted at sites BAR 1 (Barren Creek) and McQ 1 (McQuarrie Creek). Site BYM 1 was altered between the last two years of the study, as boulders in the center of the pool were removed for rip rap at the Highway 16 crossing (Appendix 1). The release pond sites sampled in Buck Creek were not present during the initial year of the study (1998/1999, SKR 2000b), and the addition of structure and substrate added complexity to the release ponds in 2000. In addition, sites selected in 1998/1999 and 1999/2000 represented a greater variety of substrate composition and organic cover types than sites selected in 2000/2001. The initial two years of the study had indicated an importance of substrate and organic cover types for overwinter, and sites deemed to provide good overwintering habitat based on these characteristics were focused on in the third year of the study. Notable changes in habitats at sites sampled during the last three years of the overwintering study in the Upper Bulkley, and the apparent lack of notable changes in Toboggan Creek indicate that sites sampled in the Upper Bulkley may be less stable.

Most of the data collected throughout the three years of the overwintering study were comparable between the three years of the study. For these comparisons, lake sites and Upper Bulkley side channel sites, which were notably different during the winter, were excluded. Air temperature was variable, and differed little between the three years of the study. Air temperature was lower in January 1998/99 than in January 2000/2001 in Toboggan Creek (ANOVA $F = 5.523$, $p = 0.043$; Tukey HSD = 3.00, $p = 0.043$), but not at Upper Bulkley sites. Air temperature was significantly higher in March 1998/99 than in March 2000/2001 at both Toboggan Creek (ANOVA $F = 73.484$, $p = 0.000$, Tukey HSD = 8.875, $p = 0.000$) and Upper Bulkley sites (ANOVA $F = 42.073$, $p = 0.000$, Tukey HSD = 4.805, $p = 0.000$). Air temperatures recorded during the study are not reflective of mean, maximum or minimum monthly air temperatures, as sampling was purposely biased towards warmer days that fall within the predetermined sampling period. Percent ice cover was recorded in the second (1999/2000) and third winter (2000/2001) of the study, and did not differ significantly for any months sampled in either the Upper Bulkley or Toboggan Creek watersheds. Similarly, water temperature did not differ significantly between these two years of the study. However, water temperature was significantly higher in March at Toboggan Creek sites (ANOVA $F = 6.806$, $p = 0.019$, Tukey HSD = 0.700, $p = 0.021$) in the first year of the study (1998/1999). Water temperatures measured in January were significantly lower in the first year of the study (1998/1999) than in subsequent years at Toboggan Creek sites (ANOVA $F = 4.425$, $p = 0.036$, Tukey HSD = 0.475, $p = 0.037$). Water depths measurements were generally similar between the three years of the study, as was ice thickness. However, snow thickness was consistently higher in the first year of the study than in the third year of the study, in both the Toboggan Creek and Upper Bulkley watersheds (ANOVA $F \geq 4.951$, $p \leq 0.035$, Tukey HSD ≥ 5.705, $p \leq 0.035$). Differences during the winter between the different years of the study appear relatively minor, and are most prevalent and consistent in snow depth, which was greater in 1998/1999 than in 2000/2001.

Habitat and winter conditions between the three years of the study were relatively similar, particularly at Toboggan Creek. In - filling noted in the Upper Bulkley system at several sites may have influenced overwinter habitat quality to some degree, particularly in terms of substrate composition, embeddedness and pool depth. A greater proportion of sites had cobble as the

dominant substrate in 2000/2001 than in the previous two years of the study, as the data collected in 1998/1999 and 2000/2001 pointed to the importance of substrate as a source for cover. Snow depth in 1998/1999 was significantly higher than in 2000/2001. The third winter of the study was noted to be milder than the first two years of the study, with a later onset of ice off, and a delayed spring thaw.

6.1.2 Fish Sampling

Data on fish distribution, abundance, length and condition factor data were collected for all three years of the overwintering study. These data are variable within and between years, and changes in sampling methodologies resulted in some difficulties for comparisons of fish data between the three years of the study. Due to changes in methodologies in habitat descriptions between years, fish densities/unit area or fish densities/unit volume could not be determined for all sites in all years. Therefore, comparisons of density were restricted to comparisons of CPUE (catch/trap), which could be determined for all sites in all years of the overwintering study. Sampling frequencies for length and weight data collection changed considerably after the first year of the overwintering study (Donas and Saimoto 1999, 2000), since primarily weight data was collected in the first year. In subsequent years, length and weight data were collected when possible, and comparisons of length and condition data were restricted to the overwintering studies conducted in 1999/2000 and 2000/2001. Age distribution was not estimated in 1999/2000 (Donas and Saimoto 2000), and age distribution was not compared between the years of the study. The following sections describe and analyse some of the trends and relationships of trends between different years related to species distribution and diversity, fish densities and fish and fish habitat for the three years of the study.

6.1.2.1 SPECIES DISTRIBUTION AND DIVERSITY

Generally, species distribution and diversity found between the three years of the study are similar. Coho, rainbow trout, chinook and longnose dace were captured in the Upper Bulkley watershed during all three years of the study. Burbot were also captured at a mainstem site in 1998/1999 (Donas and Saimoto 1999), and in Buck Creek in 1999/2000 (Donas and Saimoto 2000), but the species was not captured in the third year of the study. Burbot were present at low densities, and the lack of this species from samples obtained in the current year of the study appears purely due to chance. Suckers, peamouth chub and cutthroat trout were not captured in the previous two years of the study, but were captured in 2000/2001 in the Upper Bulkley watershed. Coho, rainbow trout and Dolly Varden were captured in all three years of the study at Toboggan Creek. In addition, a cutthroat trout was captured in Toboggan Creek in 1998/1999 (Donas and Saimoto 1999), and pink salmon and longnose dace were captured in Toboggan Creek in 1999/2000 (Donas and Saimoto 2000). The range in species richness in Upper Bulkley tributary sites was slightly larger in 2000/2001 (0–4 species) than in the initial two years of the study (0-3 species) (Donas and Saimoto 1999, 2000). Similarly, maximum levels observed for species diversity and evenness in Upper Bulkley tributary sites was greater in 2000/2001 than in the previous years of the study. Ranges in species diversity, evenness and richness at Upper Bulkley mainstem sites were similar between the three years of the study. While species richness in Toboggan Creek was similar between the three years of the study, the maximum richness and evenness at these sites were higher in 1998/1999 and 1999/2000 than in the third

year of the study. Species richness, evenness and diversity were generally similar for Upper Bulkley mainstem sites, but differed for Toboggan Creek and Upper Bulkley tributary sites between the three years of the study.

6.1.2.2 DENSITY INDICES

Catch per unit effort was determined in all three years of the study, and can therefore be used for comparisons of density indices between the three years. Rainbow trout, coho and total CPUE did not differ significantly between the three years of the study at Toboggan Creek sites, Upper Bulkley mainstem sites or Upper Bulkley tributary sites (Figures 11, 12 & 13). The lack of a significant difference in December or March CPUE indicates that increased escapement of spawners does not result in a significant increase in juvenile CPUE during the three years of the study. However, it is important to consider that CPUE is a rough indicator of density, some of the sites sampled were not sampled in all three years of the study, and that habitat changes over the three years of the study may have reduced overwinter habitat quality.

Coho CPUE declined between December and March in Toboggan Creek sites for all three years of the study, while coho CPUE at Upper Bulkley sites did not change significantly over the winter in each of the three years of the study. Coho CPUE at Toboggan Creek was notably higher in December (1999/2000 and 2000/2001 data only) than in March (Figure 12). In addition, coho CPUE in December is significantly higher at Toboggan Creek site than at Upper Bulkley mainstem or tributary sites in 1999/2000 and 2000/2001 (ANOVA $F = 12.888$, $p = 0.000$, $HSD \geq 13.205$, $p \leq 0.000$). However, coho CPUE in March is not significantly different between the Upper Bulkley sites (tributary and mainstem) and Toboggan Creek sites for any of the three years of the study (ANOVA $F = 1.346$, $p = 0.247$). Despite the fact that coho juvenile densities in December appear to be significantly higher at sites in Toboggan Creek than at Upper Bulkley mainstem or tributary sites, this difference does not persist at the end of winter since coho CPUE in March does not differ significantly between Toboggan and Upper Bulkley sites.

Rainbow trout CPUE appears to decline somewhat between December and March at Upper Bulkley and Toboggan Creek sites in each of the three years of the study. However, this decline is not statistically significant for any of the three years of the study. Rainbow trout CPUE was relatively low in December and March in Upper Bulkley sites for all three years of the study (Figure 13). While graphical comparisons of rainbow trout CPUE in Upper Bulkley sites to Toboggan Creek sites indicates that CPUE for rainbow trout was greater in the Upper Bulkley sites, this difference was not statistically significant in both December (ANOVA $F = 1.428$, $p = 0.210$) and March (ANOVA $F = 1.742$, $p = 0.118$). Rainbow trout CPUE did not differ significantly between watersheds or over the winter, although a general trend of decline in CPUE over the winter, and lower CPUE at Toboggan Creek when compared to Upper Bulkley sites was noted.

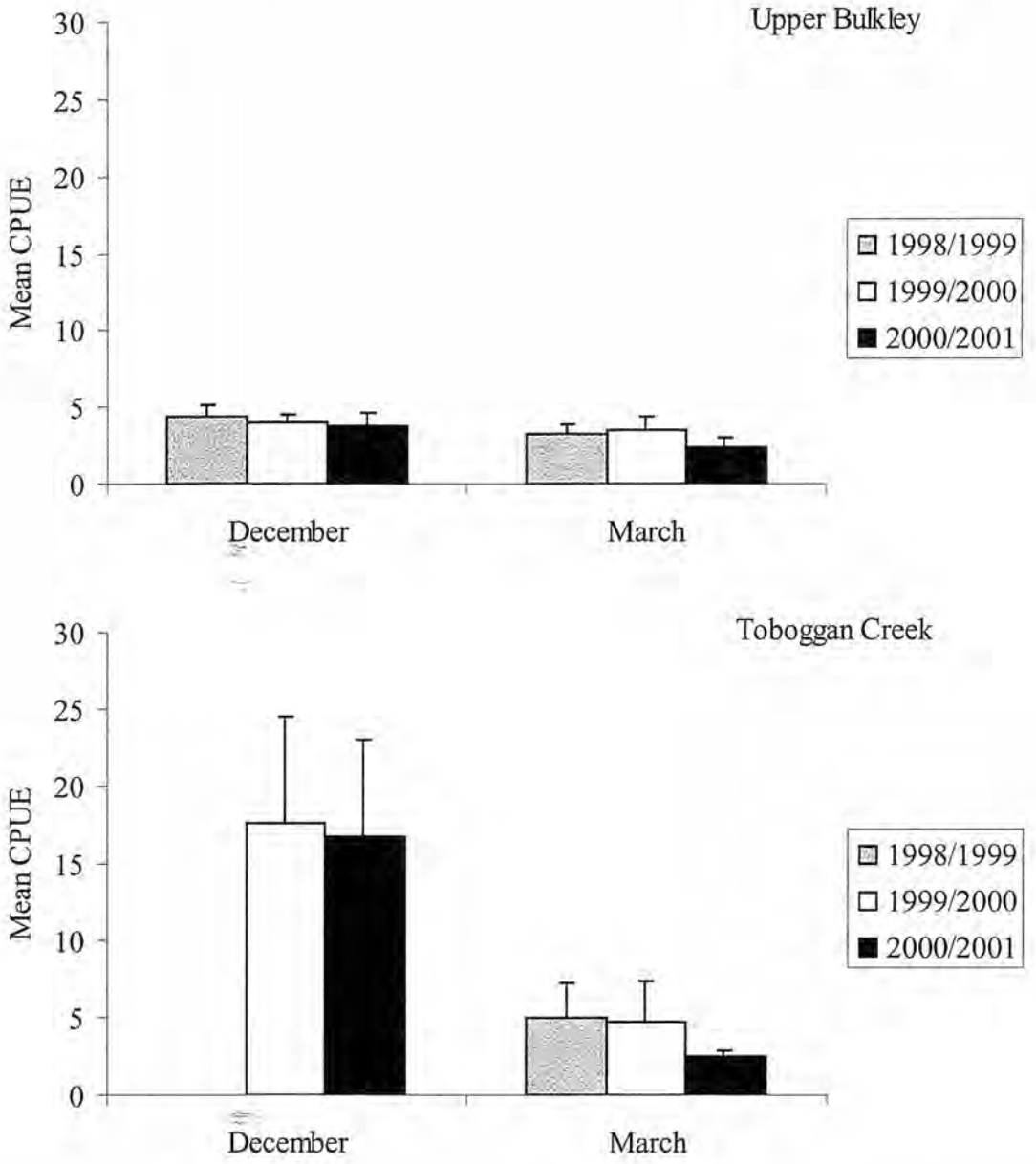

Figure 11. Total CPUE for the three years of the study. Toboggan Creek was not sampled in December 1998. Error bars indicate standard errors of catch per unit effort between the sites sampled

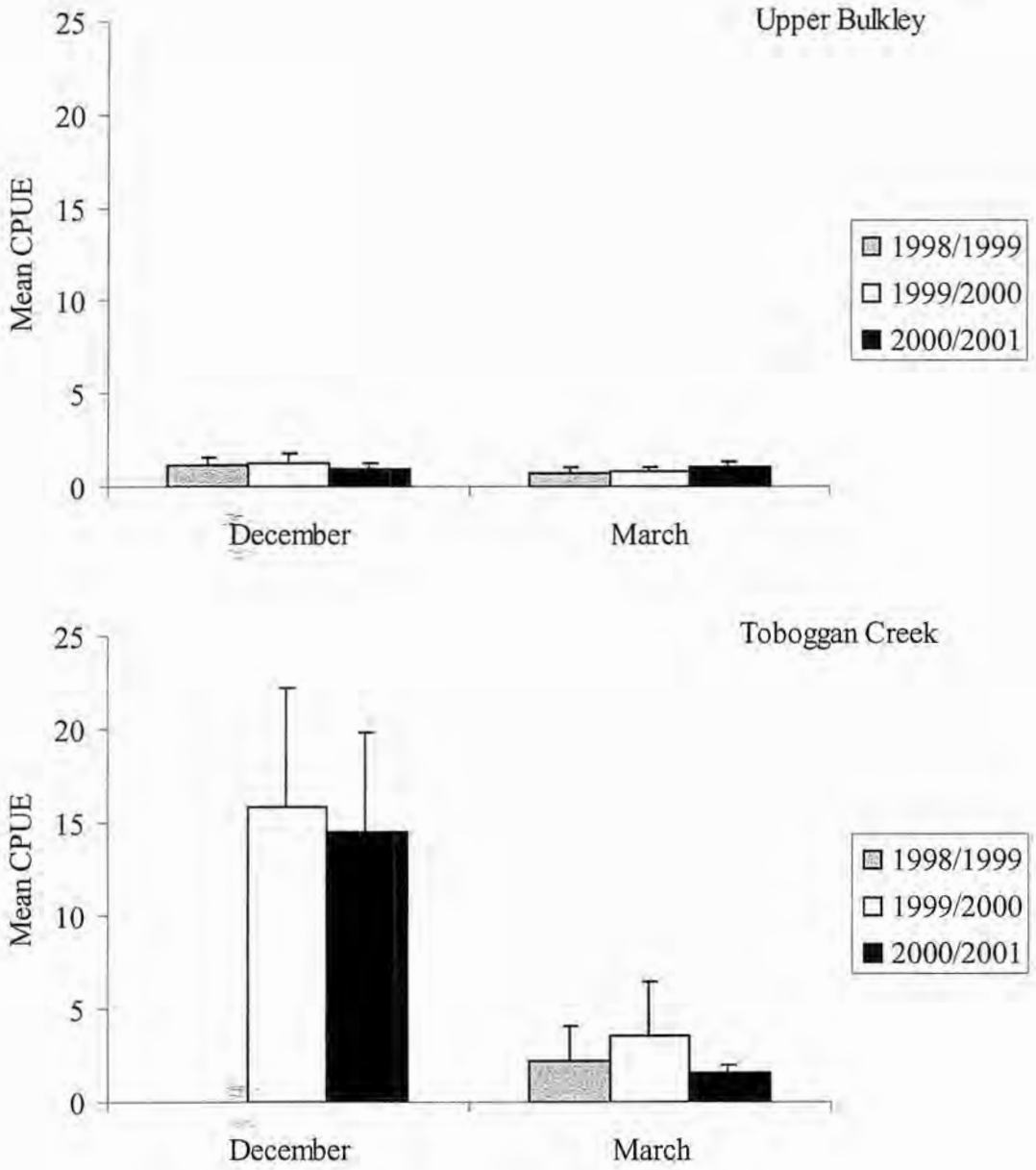

Figure 12. Coho CPUE for the three years of the study. Toboggan Creek was not sampled in December 1998. Error bars indicate standard errors of coho catch per unit effort between the sites sampled.

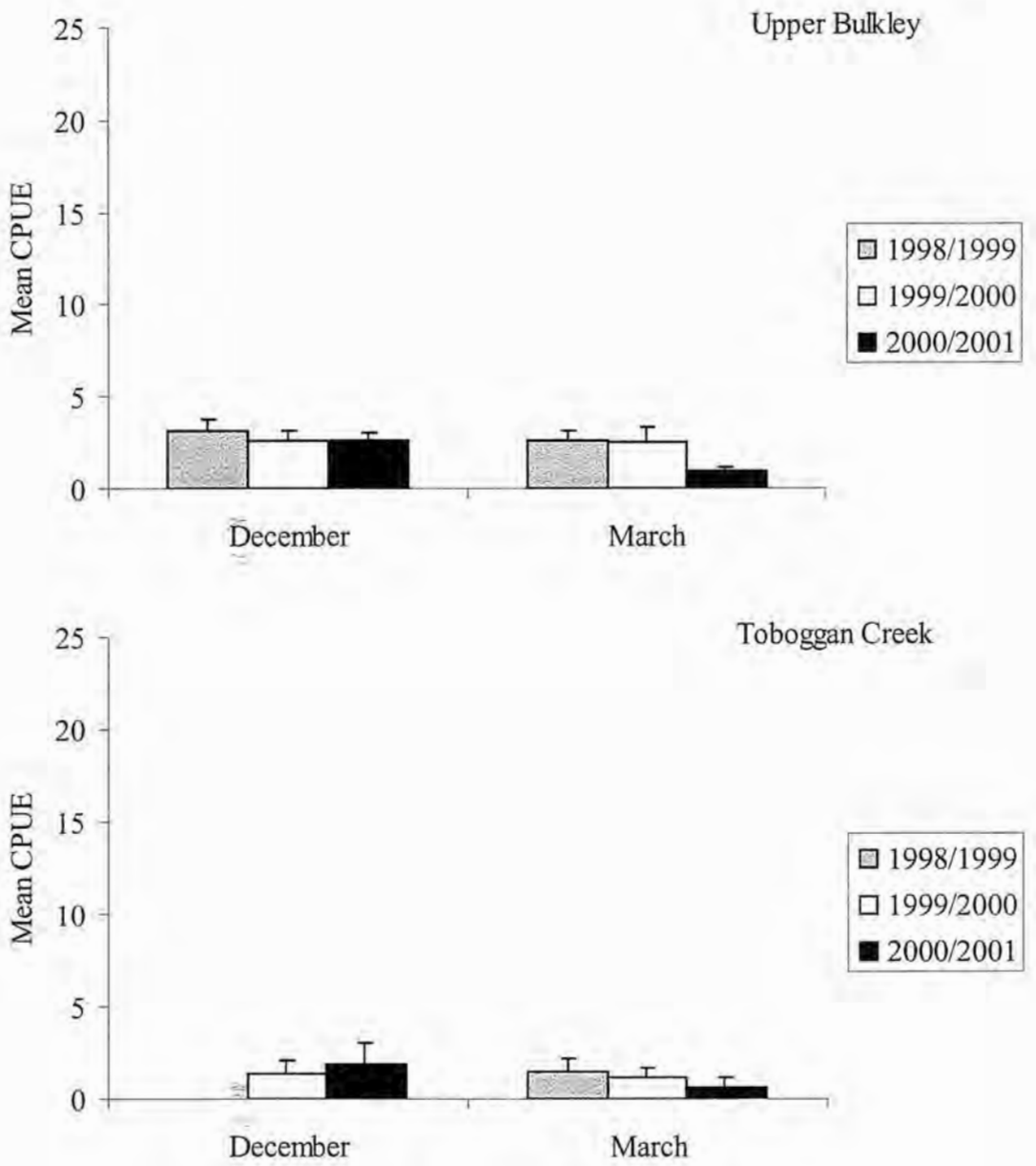

Figure 13. Rainbow CPUE for the three years of the study. Toboggan Creek was not sampled in December 1998. Error bars indicate standard errors of rainbow catch per unit effort between the sites sampled.

Density indices between the three years of the study are relatively similar. No significant differences were found between the three years of the study when comparing monthly CPUE at Toboggan Creek, Upper Bulkley mainstem and Upper Bulkley tributary sites. Temporal trends noted for coho, rainbow trout and total catch are consistent between all three years of the study. While rainbow trout CPUE appears to change little in Upper Bulkley mainstem, tributary of Toboggan Creek sites, coho CPUE does change significantly over time, resulting in a significant decline in total CPUE over the winter. In particular for Toboggan Creek sites, coho and total CPUE are significantly higher in December than in March. Coho and total CPUE at Upper Bulkley mainstem and tributary sites changes comparatively little over the winter. While coho CPUE at Toboggan Creek is significantly higher than in Upper Bulkley sites at the start of winter, coho CPUE are not significantly different between Toboggan Creek and Upper Bulkley sites in March.

6.1.2.3 FISH SIZE AND CONDITION

Fork length and weight data were collected with less consistency in 1998/1999 and 1999/2000 than in 2000/2001. In the first year of the overwinter study, fork length was collected more sporadically than weight since it was felt the weight measurements were less stressful on the fish (Donas and Saimoto 1999). However, weight data is not as suitable in estimating age distribution as length data. In subsequent years of the study, a greater emphasis was placed on the collection of length data, particularly in light of the lack of scale samples. Weights were collected more sporadically in 1999/2000 than in 2000/2001 due to mechanical problems with the scale at cold temperatures. Age distribution was not estimated in 1999/2000, and was therefore not compared between the two years of the overwintering study. However, differences in age structure are expected to influence fork length and condition factor data. Comparisons across age classes and across broad ranges in fork length may limit the validity of comparisons of fork length, and especially condition factor data. The following sections present the analysis of some of the trends in size and condition factor that were observed in the three years of the overwintering study for coho and rainbow trout.

6.1.2.3.1 COHO

Coho fork length and condition factor data were compared for samples obtained in 1999/2000 and 2000/2001. During the first year of the overwintering study, weight was recorded for fish captured throughout the study, but fork length data was not collected until March 1999 (Donas and Saimoto 1999). The lack of fork length data for 1998/1999 resulted in the restriction of fish size and condition comparisons to 1999/2000 and 2000/2001 samples. The following sections compare coho length and condition between the second and third year of the overwintering study.

6.1.2.3.1.1 Fork Length

Fork length for 1999/2000 and 2000/2001 were compared between sites for each of the months sampled. Since fork length data are not normally distributed, ranked fork lengths were compared among Buck Creek, other Upper Bulkley tributaries, Upper Bulkley mainstem and Toboggan Creek sites between the second and third year of the overwintering study. Coho fork length data

obtained in December samples differ significantly between years (ANOVA F = 20.583, p = 0.000), with Upper Bulkley tributary coho being significantly longer in December 1999 than in December 2000 (Tukey HSD = 96.096, p = 0.006), while Buck Creek coho were significantly longer in December 2000 than in December 1999 (Tukey HSD = 37.113, p = 0.000). Ranked fork length of coho captured in Toboggan Creek and Upper Bulkley mainstem were similar between the two years of the study. Ranked fork length in Upper Bulkley mainstem and tributary sites in January 2000 was significantly longer than ranked fork length in January 2001 (ANOVA F = 67.859, p = 0.000; Tukey HSD = 131.872 and 117.014 respectively, p = 0.000). However ranked fork length at Buck Creek or Toboggan Creek sites was not significantly different in January 2000 and January 2001. Ranked fork length at Upper Bulkley tributary sites continued to be higher in February 2000 than in February 2001 (ANOVA F = 34.671, p = 0.000; Tukey HSD = 132.995, p = 0.000), but ranked fork length at Buck Creek, Upper Bulkley mainstem and Toboggan Creek were not significantly different between February 2000 and February 2001. Similarly, ranked fork length for coho captured in Upper Bulkley tributary sites was significantly lower in March 2001 than in March 2000 (ANOVA F = 28.523, p = 0.000, Tukey HSD = 118.237, p = 0.000). Buck Creek coho were significantly longer in March 2001 than in March 2000 (Tukey HSD = 61.524, p = 0.000). While ranked fork length at most sites was similar or lower in 2000/2001 than in 1999/2000, ranked fork length at Buck Creek was similar or higher in 2000/2001 when compared to 1999/2000. This is likely attributable to the fact that coho fry releases occurred for the first time in August 1999, resulting in a predominance of 0+ coho in the catches during the winter at Buck Creek sites. Not all of the coho released in 1999 emigrated as smolts in the spring of 2000, but some remained to overwinter a second year in Buck Creek as 1+ coho in 2000/2001 (Saimoto and Donas 2000, Tamblyn 2000). Age 1+ coho were therefore present in Buck Creek in 2000/2001, but not in 1999/2000 and therefore likely resulted in the increase of ranked fork length in the third year of the study. Overall, wild coho populations were similar or smaller in ranked fork length in the 2000/2001 sampling period than in 1999/2000.

6.1.2.3.1.2 Condition

Coho condition factor also differed significantly between the second and third year of the overwintering study. Coho condition factor was significantly lower in December 2000 than in December 1999 at Toboggan Creek (ANOVA F = 30.855, p = 0.000). Tukey HSD = 0.253, p = 0.005), Buck Creek (Tukey HSD = 1.210, p = 0.000) and Upper Bulkley tributary sites (Tukey HSD = 0.719, p = 0.000), but not in Upper Bulkley mainstem sites (Tukey HSD = 0.246, p = 0.000). Condition factor did not differ significantly at Upper Bulkley mainstem, Upper Bulkley tributary, Buck Creek or Toboggan Creek sites between January 2000 and January 2001. However, condition factor was significantly lower in February 2001 than in February 2000 at Buck Creek (ANOVA F = 17.524, p = 0.000; Tukey HSD – 0.255, p = 0.006), Upper Bulkley mainstem (Tukey HSD = 0.385, p = 0.000), Upper Bulkley tributary (Tukey HSD = 0.351, p – 0.002) and Toboggan Creek sites (Tukey HSD = 0.400, p = 0.000). Condition factor continues to be significantly lower at Buck Creek (ANOVA F = 49.304, p = 0.000; Tukey HSD = 0.481, p = 0.000), Upper Bulkley mainstem (Tukey HSD = 0.400, p = 0.021) and Toboggan Creek sites (Tukey HSD = 0.586, p = 0.000) between March 2000 and March 2001, while condition factor for coho did not differ significantly at Upper Bulkley tributary sites between March 2000 and March 2001. Although condition factor in 1999/2000 and 2000/2001 is negatively correlated

with fork length (Donas and Saimoto 2000), higher fork lengths in 1999/2000 did not translate to lower condition factor in 1999/2000 when compared to 2000/2001. Fork length and condition data indicate that at sites other than Buck Creek, coho were generally smaller and in lower condition in 2000/2001 than in 1999/2000.

6.1.2.3.2 RAINBOW TROUT / STEELHEAD

Rainbow trout fork length and condition factor data were compared for samples obtained in 1999/2000 and 2000/2001. During the first year of the overwintering study, weight was recorded for fish captured throughout the study, but fork length data was not collected until March 1999 (Donas and Saimoto 1999). The lack of fork length data for 1998/1999 resulted in the restriction of fish size and condition comparisons to 1999/2000 and 2000/2001 samples. The following sections compare rainbow trout length and condition between the second and third year of the overwintering study.

6.1.2.3.2.1 Fork Length

Rainbow trout fork length data was compared between 1999/2000 and 2000/2001. Fork length data collected in 1998/1999 was restricted to the spring sample (March and April) (Donas and Saimoto 1999), and was not generally comparable to fork length data collected for the other two years of the study. Since fork length data are not normally distributed, ranked fork lengths were compared among Upper Bulkley tributary, mainstem and Toboggan Creek sites between the second and third year of the overwintering study. Rainbow trout ranked fork length did not differ significantly between December 1999 and December 2000, between February 2000 and February 2001, or between March 2000 and March 2001, at Upper Bulkley mainstem, Upper Bulkley tributary or Toboggan Creek sites. Ranked fork length for rainbow trout continued to be similar in January 2000 and January 2001 at Toboggan Creek and Upper Bulkley mainstem sites, but ranked fork length was significantly lower at Upper Bulkley tributary sites in January 2001 than in January 2000 (ANOVA $F = 5.407$, $p = 0.000$; Tukey HSD = 52.707, $p = 0.000$). Rainbow trout fork length were similar between 1999/2000 and 2000/2001 at Toboggan Creek and Upper Bulkley mainstem sites, while rainbow trout were significantly smaller in January 2001 than in January 2000 at Upper Bulkley tributary sites.

6.1.2.3.2.2 Condition

Condition factor data for rainbow trout were compared for 1999/2000 and 2000/2001. Rainbow trout condition factor at Upper Bulkley mainstem sites were similar for the four months of the overwintering study between the two years of the study. However, rainbow trout condition factor at Upper Bulkley tributary sites was significantly lower for December 2000 (ANOVA $F = 13.066$, $p = 0.000$; Tukey HSD = 0.689, $p = 0.000$), February 2001 (ANOVA $F = 5.056$, $p = 0.000$; Tukey HSD = 0.257, $p = 0.000$) and March 2001 (ANOVA $F = 11.566$, $p = 0.000$; Tukey HSD = 0.182, $p = 0.000$) than in respective months in the winter of 1999/2000. Rainbow trout condition factor for Toboggan Creek sites were similar between the two years of the study except in March, where condition factor in March 2000 was significantly higher than condition factor in March 2001 (Tukey HSD = 0.472, $p = 0.003$). Rainbow trout condition factor did not differ

significantly at Upper Bulkley mainstem sites between the two years of the study, but rainbow trout condition was significantly higher in 1999/2000 than in 2000/2001 for Upper Bulkley tributary sites. Although condition factor in 1999/2000 and 2000/2001 is negatively correlated with fork length (Donas and Saimoto 2000), higher fork lengths in 1999/2000 did not translate to lower condition factor in 1999/2000 when compared to 2000/2001. Rainbow trout appear to be similar or smaller and in lower condition (particularly at Upper Bulkley tributary sites) in 2000/2001 than in 1999/2000.

6.2 GENERAL DISCUSSION

A variety of habitats were sampled in the three years of the overwintering study, and the variability in habitat sampled was expected to have some influence on species assemblages, fish densities, size and condition. Variability in fish data was expected during the three years of the study due to different levels of recruitment (adult escapement levels) and differences in the severity of the winter conditions (e.g. temperature, precipitation, duration). During each of the three years, sites were sampled in the Upper Bulkley mainstem, Upper Bulkley tributaries and Toboggan Creek mainstem. Side channel habitat (Upper Bulkley and Toboggan Creek) and lake habitat (Toboggan Lake), which were not sampled in the first two years of the study, were sampled in 2000/2001 since other studies reported that these habitats may provide important overwintering habitat in some systems (Bustard and Narver 1975, Envirocon 1986, Swales *et al.* 1986, Swales and Levings 1989). A greater proportion of the upper Bulkley sites were located in mainstem habitat in 1998/1999 (33% of Upper Bulkley sites) and 2000/2001 (24.0% of Upper Bulkley sites) than in 1999/2000 (5.9% of Upper Bulkley sites) (Saimoto and Donas 1999, 2000). Toboggan Creek sites were sampled as an index for a productive system with good adult returns. During the three years of the overwintering study, sites representing a variety of different potential overwintering habitat were sampled, particularly in the Upper Bulkley watershed, and this variability was expected to result in differences of species assemblages, fish densities and fish size. The following sections discuss some of the general trends noted during the three years of the overwintering study.

6.2.1 Habitat and Winter Assessments

Among the sites that were sampled in all three years of the overwintering study, particularly in the Upper Bulkley watershed, habitat characteristics and winter conditions were not expected to be constant over the three years. Varying flow levels, shifts in channel morphology and LWD, and sediment sources upstream were expected to cause some changes in habitats sampled, although these changes were expected to be minor since no major flood event occurred. Notable changes in habitats at some sites in the Upper Bulkley watershed sampled during the last three years of the overwintering study, and the apparent lack of notable changes in Toboggan Creek indicate that sites sampled in the Upper Bulkley are less stable. Habitat and winter conditions between the three years of the study were relatively similar at most sites, particularly at Toboggan Creek. Habitat data and notes taken during habitat assessments provided evidence of infilling, sedimentation and shifts in channel morphology at several Upper Bulkley sites (e.g. Richfield Creek site RIC 3, McQuarrie Creek site McQ1, Barren Creek site BAR 1). These signs of shifts in channel morphology, and movement of sediment, are consistent with the documentation of extensive aggrading and degrading in the Bulkley watershed (BCCF 1997, 1998). A greater proportion of sites had cobble as the dominant substrate in 2000/2001 than in the previous two years of the study, as the data collected in 1998/1999 and 2000/2001 pointed to the importance of substrate as a source for cover. Differences in winter condition between the years was also noted, as snow depth in 1998/1999 was significantly higher than in 2000/2001, consistent with the observation that the winter of the third winter of the study was milder than the first two years of the study, with a later onset of ice off, and a delayed spring thaw. However, annual differences in winter conditions are likely minor compared to physical changes in habitats due to shift in channel morphology, sedimentation, aggrading or degrading. Sites sampled in the Upper Bulkley generally have higher substrate embeddedness and appear to be

less stable than Toboggan Creek sites, as indicated by considerable shifts in channel morphology observed in the watershed. It is speculated that the types and extent of development, as well as the underlying geology and geomorphology in the Upper Bulkley watershed have had a greater impact when compared to Toboggan Creek, and have significantly affected fish habitat.

6.2.2 Fish Sampling

6.2.2.1 SPECIES DISTRIBUTION AND DIVERSITY

Species distribution was generally similar between the three years of the study, and species richness, evenness and diversity were expected to be similar for the three years of the study at Upper Bulkley and Toboggan Creek sites. Species distribution, richness and evenness was expected to change as a result of notable alterations in habitat, rendering habitat less suitable for some species over time, changes in winter conditions over the three years, and/or changes in accessibility to the sites sampled. Species richness, evenness and diversity were generally similar for Upper Bulkley mainstem sites, but differed for Toboggan Creek and Upper Bulkley tributary sites between the years of the study. Since species assemblages were consistent between the three years of the study, accessibility to habitat sampled for species in the watersheds did not appear to have changed between the three years. Changes in species diversity, evenness and richness may in part be due to changes in overwintering habitat sampled (see section 6.1), the milder winter conditions in 2000/2001, and/or chance events. Comparisons of species richness, evenness and diversity are influenced by the fact that samples may not represent the complete assemblage of species in a community, and may thus provide a vague measure of the actual species richness, diversity and evenness at the site. Meaningful comparisons of species richness, evenness and diversity should involve a complete inventory of the species at each site (Krebs 1998), which is difficult to accomplish by overnight minnow trapping. The capture of one individual of a relatively uncommon species at a site can have significant impacts on measures of species richness, diversity and evenness, and this element of chance limits the comparability of species richness, diversity and evenness for studies were a complete list of species in a community is not available. The slight differences in species richness and diversity in Toboggan Creek mainstem and Upper Bulkley tributary sites are likely due to chance, since accessibility of habitat to the species present in the watershed does not appear to have changed in the three years of the study.

6.2.2.2 DENSITY INDICES

Fish densities are speculated to be partly determined by differences in escapement levels of spawners, variability in egg and juvenile survival rates, and differences in severity of winter conditions over the three years of the study. Fish density between the three years may differ since adult escapement, survival of juveniles prior to the onset of winter, and severity of winter conditions are not constant between the three years of the study. Catch per unit effort, calculated as a density index for all three years of the study, are used for comparisons of density indices between the three years of the overwintering study. Catch per unit effort are expected to be higher if escapement of the parent population is higher. Likewise, survival of eggs in the gravel, and juveniles to the first winter is expected to be higher when conditions are more conducive to incubation, emergence and growth and minimize stress on fish (e.g. moderate temperatures, good

dissolved oxygen, good food availability) (Hunter 1991). Trends in CPUE over the winter are expected to be similar between the three years of the study since habitat and winter conditions are relatively similar. This section discusses the trends in fish density observed in the three years of the overwintering study.

6.2.2.2.1 COHO

Coho densities, as indicated by CPUE were expected to vary between the three years of the study, especially at Toboggan Creek, as a result of increased spawner escapements of the parent generation. The numbers of adult spawners returning to the Upper Bulkley have been significantly lower than those returning to Toboggan Creek (Table 12), and have remained relatively low (Holtby *et al.* 1999, Glass 2000) despite the decline of harvest rates in the commercial fishery. Toboggan Creek coho escapement has increased in recent years. In addition, the proportion of wild fish returning to the Upper Bulkley system is lower than the proportion of wild fish returning to Toboggan Creek (Table 12). While the different levels of spawner escapement were expected to influence juvenile densities during the winter, the trend of decline in juvenile coho densities, particularly in Toboggan Creek was expected to be similar for all three years of the study. Trends in coho CPUE between and within the three years of the overwintering are discussed in this section.

Coho CPUE did not differ significantly between the three years of the study at Toboggan Creek sites, Upper Bulkley mainstem sites or Upper Bulkley tributary sites, despite the increased escapement of coho spawners into the Toboggan Creek and Upper Bulkley systems (Table 12). The lack of a significant difference in December or March CPUE indicates that increased escapement of spawners does not result in a significant increase in juvenile CPUE during the three years of the study. While CPUE is a rough approximation of fish densities, the lack of increased CPUE with increased spawner escapement provides circumstantial evidence that freshwater habitat may be a factor in limiting fish production in both systems, since juvenile densities did not appear to increase despite an increase in spawners. For the Upper Bulkley system, the number of spawners remains well below historic levels, and may not have resulted in a direct increase in juveniles because the system is likely chronically under seeded, and spawning may be patchy, resulting in patchy distribution of juveniles. For Toboggan Creek, spawner escapement are substantially higher than in the Upper Bulkley, and the system may be fully seeded, thus resulting in a lack of increase in juvenile densities with further increases in spawner escapement. Increased spawner escapement between 1997 and 1998 appears to have resulted in increased juvenile coho densities at Toboggan Creek from 1998 to 1999. However, a further increase in escapement between 1998 and 1999 did not result in an increase in juvenile coho densities in Toboggan Creek in the 2000 synoptic survey (Taylor 2000). While smolt enumerations have been conducted on Toboggan Creek, the methodologies used in estimating wild smolt output in the system have been adjusted over the last five years of the study. This makes wild smolt estimates more difficult to compare. In addition, confidence intervals around the more recent estimates (1999 and 2000) are broad since estimates are based on a relatively small number of censused and recaptured fish (SKR 1999, 2000). Future studies on coho smolt output at Toboggan Creek, particularly in 2001 (SKR in progress) will likely provide more conclusive evidence to document if smolt production is increased by an increased number of spawners. Data collected in the Lachmach, Babine and Toboggan Creek systems indicate that

the number of smolts produced per spawner decreases when escapements are high (Holtby *et al.* 1999), indicating that the number of spawners is not directly related to the number of smolts. This may be due to decreased survival as a result of competition in some cases. Competition should be reflected in decreased size of fish, and decreased condition, as well as lower survival rate.

Temporal trends noted for coho CPUE are consistent between all three years of the study. Coho CPUE changes significantly over time in all three years of the study, resulting in a significant decline in total CPUE over the winter. In particular for Toboggan Creek sites, coho CPUE are significantly higher in December than in March. The drastic decline of coho CPUE between December and March at Toboggan Creek with high coho escapement, particularly when compared to the Upper Bulkley with low escapement, indicates that winter has a greater affect on coho densities in Toboggan Creek than in the Upper Bulkley. Coho CPUE at Upper Bulkley mainstem and tributary sites changes comparatively little over the winter, indicating that loss of juveniles during the winter (either through migration or mortality) is low, and that overwintering habitat may not be limiting in the system at least at current escapement levels. While coho CPUE at Toboggan Creek is significantly higher than in Upper Bulkley sites at the start of winter, coho CPUE is similar between these sites by the end of winter. This may be a due to mortality or migration in Toboggan Creek. Increased juvenile mortality in Toboggan Creek than in Upper Bulkley sites may be due to lower habitat quality, or higher densities causing increased inter and intra-specific competition, and may indicate that Toboggan Creek is near its overwinter carrying capacity. If movement of fish is extensive during the winter, some sites would be expected to show an increase in CPUE, but none of the sites sampled at Toboggan Creek showed an increase in coho CPUE between December and March. However, it is important to consider that few sites were sampled in Toboggan Creek, and that the sites sampled do not represent all different types of habitat available to coho in the system. For example smaller tributaries, which may be used for overwintering (Bustard and Narver 1975) were not sampled. Similarly, the mainstem sites sampled during the study are located near the Toboggan Creek hatchery, and in close proximity to each other. Arguably, these sites do not represent the entire Toboggan Creek mainstem. Net movement out of these sites and into habitats not sampled during the study may have resulted in drastic decrease in coho CPUE between December and March observed during 1999/2000 and 2000/2001. Some researchers indicate that salmonids may move extensively during the winter (Cunjak 1996, Heggersen in prep.), and salmonids have been documented to move up to one kilometer in the winter (Jakober *et al.* 1998, Simpkins *et al.* 2000). However, several other studies point to a lack of extensive movement in the winter (Envirocon 1986, Heifetz *et al.* 1986, Swales *et al* 1986, Dolloff 1987, Giannico and Healey 1998). Dolloff (1987) argues that extensive movement and active habitat selection in winter is unlikely since fish have no prior knowledge of habitat distribution, and since fish are vulnerable during and after movement. If fish are unable to actively select overwintering habitat, changes in CPUE over the winter in some areas (e.g. Toboggan Creek) and less so in other areas (e.g. Upper Bulkley) are likely due to different overwinter mortality rates.

Catch per unit effort for coho did not differ substantially between the three years of the study. Neither did temporal trends in changes of CPUE between the three years of the study. Despite the fact that adult coho escapement, particularly in Toboggan Creek, was higher in some years than in other (Table 12), these changes were not reflected in increased CPUE of coho,

particularly in 2000/2001. This may be due to patchy distribution of juveniles, decreased survival of eggs and/or fry, or chronic under seeding of the system. In fact, coho CPUE through out the winter at Upper Bulkley sites is low, and does not differ statistically from CPUE in March in Toboggan Creek. In systems where spawner escapement meets or exceeds the capacity of the system, the number of smolts produced per spawner is expected to decline. Increased spawner escapement may not result in an increased density of juveniles (i.e. CPUE) in under-utilized systems since juveniles may occupy habitat that was previously unoccupied. Thus, CPUE is not affected, but overall smolt output may be affected. The decline in CPUE during the winter, particularly for coho in Toboggan Creek indicates that overwinter mortality may be affecting smolt output to some degree.

6.2.2.2.2 RAINBOW TROUT/STEELHEAD

Rainbow trout densities, as indicated by CPUE were expected to vary between the three years of the study due to different environmental conditions and different escapement levels of the parent generation. Rainbow trout CPUE generally appears to be lower in Toboggan Creek sites when compared to Upper Bulkley sites (Figure 13), although this difference was not statistically significant in December or March. Rainbow trout CPUE did not change significantly in Upper Bulkley or Toboggan Creek sites in the first two years of the study, but rainbow trout CPUE declined significantly between December and March in 2000/2001 in the Upper Bulkley watershed. This may be due to movement of fish, or mortality, particularly at Upper Bulkley tributary sites, between February and March, when the most significant decline in CPUE was noted (see section 5.2.2). The generally higher CPUE of rainbow trout in Upper Bulkley sites than at Toboggan Creek, though not statistically significant, may be due to better habitat quality for rainbow trout in the Upper Bulkley, or intra-specific competition with the relatively large numbers of juvenile coho in Toboggan Creek. The following sections discuss comparisons of fish size and condition between the last two years of the overwintering study.

6.2.2.3 FISH SIZE AND CONDITION

Comparisons in fork length and condition factor data between 1999/2000 and 2000/2001 indicate that coho and rainbow trout are generally similar or smaller and skinnier in 2000/2001. The only exception to this trend are coho captured in Buck Creek, which were similar or longer and in better condition in 2000/2001 than in 1999/2000. Buck Creek shows different trends for coho length and condition than other sites since the system is enhanced, with fry releases, which were initiated in August 1999. During the 1999/2000 overwinter study, these fry were captured as 0+. Not all of the coho released in 1999 emigrated as smolts in the spring of 2000, but some remained to overwinter a second year in Buck Creek as 1+ coho in 2000/2001 (Saimoto and Donas 2000, Tamblyn 2000). Age 1+ coho were therefore present in Buck Creek in 2000/2001, but not in 1999/2000 and therefore likely resulted in the increase of ranked fork length in the third year of the study. The general trend for fish to be smaller and skinnier in 2000/2001 is particularly apparent in Upper Bulkley tributary sites where it is consistent for both rainbow trout and coho. In addition, while coho had similar fork lengths between the two years of the study at Toboggan Creek, condition factor of coho at Toboggan Creek was lower in 2000/2001 than in 1999/2000. Lower fork length may be due to differences in age composition between the two years of the study, which were not compared separately since no age data was collected, and age

structure was not estimated in1999/2000 (Donas and Saimoto 2000). Lower fork lengths would be expected to result in more variable and higher condition factors, since condition factor appears higher and more variable for smaller fish during the overwintering study (Donas and Saimoto 2000). However, while rainbow trout and coho are significantly smaller in 2000/2001 than in 1999/2000 in Upper Bulkley tributary sites, and coho are similar in length at Toboggan Creek sites, they are not in better, but in worse condition, indicating that they are significantly skinnier. This suggests that juveniles captured in 2000/2001 are similar or less healthy and smaller when compared to juveniles captured in 1999/2000. This difference in condition and length may be due to deteriorating habitat quality, higher densities, and/or competition. Differences in overwinter habitat quality appeared to be relatively minor, and CPUE were similar between the three years of the study. However, adult escapement for spawners which produced juveniles captured in 1999 to 2001 are different. The lower fork length and condition of juveniles at some sites at the start of winter may be a result of increased competition prior to the onset of winter in 2000/2001 when compared to 1999/2000.

6.2.3 Fish and Fish Habitat

Habitat segregation between salmonids has been found in several systems, and overwintering habitat characteristics have been linked to different rates of survival and growth of salmonids. Different species of salmonids have been reported to utilize slightly different habitats (e.g. Bustard and Narver 1975, Envirocon 1986, Swales *et al.* 1986) and these differences in habitat utilization were expected to be found in the three years of the overwintering study. Differences in overwintering habitat quality were expected to correlate with species assemblages, fish densities and condition in all three years of the study.

6.2.3.1 COHO

Findings in the three years of the overwintering study in tributary and mainstem sites of the Upper Bulkley watershed and in Toboggan Creek indicate that coho CPUE is lowest in Upper Bulkley mainstem sites, and highest at sites that offer primarily cobble pool habitat (greater than 50 cm deep) with some organic cover elements, and with adequate flow to ensure the maintenance of adequate water depth and dissolved oxygen levels. Coho have been reported to utilize tributary, off channel, side channel, lake and pond habitat which offer deep pools with organic cover. The presence of relatively high densities of coho in riverine ponds, side channels, back channels, slough, beaver pond areas, lakes and tributaries has been documented in interior systems (Bustard 1986, Envirocon 1986, Swales *et al.* 1986, Petersen 1982, Swales and Levings 1989). Therefore, higher coho CPUE at Upper Bulkley tributary sites when compared to Upper Bulkley mainstem sites during all three years of the overwintering study is not surprising. However, the fact that coho were not captured in any of the three Upper Bulkley side channel sites, or in one of the two Toboggan Creek side channel sites is contrary to what was expected at the outset of the study. The lack of coho at these side channel sites can be attributed to poor water quality (low water depth and poor dissolved oxygen levels) and lack of suitable cover, which rendered these sites unsuitable for overwintering. In addition, access to side channel habitat may be limited by culvert crossings. Similarly, the relatively low CPUE for coho in Toboggan Lake when compared to mainstem habitat was contrary to expectation, since lakes have been reported to be utilized for overwintering by coho (Swales and Levings 1989). Again,

poor water quality appears to have rendered overwintering habitat at this site unsuitable for salmonids. While off channel and lake habitat may be important for overwintering habitat in some systems, these sites must have sufficient flow or water exchange to ensure adequate water quality. Although pool habitat with cobble substrate appears to be the most productive habitat for both coho and rainbow trout in the Upper Bulkley in the three years of the overwintering study, off channel habitats are still suspected to play an important role.

6.2.3.2 RAINBOW TROUT / STEELHEAD

During the three years of the overwintering study provide rainbow trout in the Upper Bulkley and Toboggan Creek systems were found to primarily use mainstem and tributary habitat consisting of primarily pool habitat dominated by cobble or larger substrate. Rainbow trout have been found to overwinter in mainstem, tributary and off channel habitat, primarily at sites, which offer abundant substrate, cover in the form of cobbles, boulders or rip rap. Rainbow trout are generally found overwintering in mainstem or tributary habitat, where they are associated with rubble, cobble, boulder or rip rap substrate (Bustard and Narver 1975, Swales *et al.* 1986, Heifetz 1986, Cunjak 1988). The suitability of substrate cover depends in part on particle size and embeddedness (Hillman *et al.* 1987). The suitability of substrate cover may be declining at some Upper Bulkley sites due to increased siltation (resulting in increased embeddedness), and channel instability (BCCF 1997), which may affect both rainbow trout and coho overwintering habitat since both species were more commonly found at sites with cobble substrate during the three years of the overwintering study.

7.0 RECOMMENDATIONS

Studies on overwinter survival in ice covered streams are labour intensive and logistically challenging. Seasonal and spatial variability, interactions of different factors, logistical difficulties of studying fish under the ice and in adverse environmental conditions, and the relatively poor knowledge of overwintering dynamics of juvenile salmonids are challenges influencing the effectiveness of overwintering studies. Overwinter habitat is but one aspect of the freshwater portion of juvenile coho life histories.

1. To examine if freshwater habitat is limiting Upper Bulkley salmonid production, it may be useful to estimate coho smolt production in the system. By comparing the number of spawners as determined at the Bulkley fence and through aerial counts upstream, to coho smolt production, it may be possible to obtain better evidence on the limitation of freshwater habitat to Upper Bulkley salmonid production. It may be possible to install a rotary screw trap downstream of the Buck Creek confluence. The release of hatchery reared coho in the spring into Buck Creek could be used as a marked group (provided they are marked differently from fry released in late summer/August).

2. Cursory examination of the watershed, and WRP reports indicate that a significant proportion of the side channel habitat in the Upper Bulkley is inaccessible due to poorly designed or installed crossings at roads and the CNR track. While the three side channel sites sampled in 2000/2001 did not appear to be important for salmonid overwintering, other side channels, off channels and riverine ponds in the system may provide suitable habitat, but be currently inaccessible. These habitats may also provide important summer rearing habitat. An inventory of road crossings in the Bulkley River valley flat area may indicate what proportion of these habitats are currently inaccessible due to anthropogenic barriers. In addition, investigations on water quality at side channels during the winter may provide further evidence if side channels offer potentially suitable overwintering habitat in the Upper Bulkley.

3. The overwintering study identified that pool habitat with cobble substrate is important in the upper Bulkley watershed, particularly since other habitat types known to be important in other systems (e.g. side channel, back channel, riverine ponds, sloughs etc) are lacking or inaccessible in the watershed. Existing information on pool habitat in the upper Bulkley watershed (e.g. from watershed restoration reports, community based surveys) could be summarized and evaluated to quantify pool habitat in the watershed. Pool composition in the Upper Bulkley River watershed could be compared to more productive systems to determine where pool composition rehabilitation projects are warranted.

4. The Upper Bulkley coho stock has been depressed for a number of years, and the system appears to be underseeded. Good habitat present upstream of Bulkley falls is not utilized by coho due to limited access. Spawners could be moved upstream of the cascade to utilize this habitat, and to increase the probability that fry will find refuge in the Upper Bulkley. Similarly, fry releases from the hatchery, such as those being conducted in Buck Creek, may allow for more utilization of available rearing habitat in the Upper

Bulkley. However, the impacts of such releases on other species of fish, and the carrying capacity of the system should be established prior to these releases.

5. Cursory observations at Toboggan Creek indicate that a significant number of fry are washed downstream during spring freshets, and the probability of survival of these fry is likely low. It is anticipated that a significant number of fry also are washed downstream during spring freshets in the Upper Bulkley. Moving these fry back into the system, into habitat that provides refuge from high water, may increase their probability of survival.

6. One of the main issues facing the Upper Bulkley watershed is the level and timing of water withdrawal. Adult coho may be deterred or prevented from accessing suitable spawning habitat in the Upper Bulkley system due to the low water levels and the presence of beaver dams in the fall. Likewise, water levels may result in stranding of some juveniles, or render habitat less suitable for rearing. Until issues of water withdrawal in the Upper Bulkley are addressed, enhancement activities in the system are not likely to return the system to its historic productivity.

7. Cobble substrate was found to be an important cover element for overwintering by both rainbow trout and coho. The embeddedness of cobble can render substrate cover less suitable, and embeddedness in the Upper Bulkley was noted to be higher than in Toboggan. The Upper Bulkley WRP project (BCCF 1997, 1998) was able to identify some sediment sources. Problems of sedimentation in the Upper Bulkley are also likely to influence spawning and summer rearing habitat quality. The extent of this problem should be investigated further, including an identification of significant sediment sources, the ability to control them, and their impact on substrate in the streams.

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Plate 13. Fork length, weight and condition factor data for coho captured at sites sampled during the upper Bulkley Overwintering study.

Site	Date	N	Fork Length (mm)				Weight (g)				Fulton's Condition Factor (K)			
			Min	Max	Mean	SE	Min	Max	Mean	SE	Min	Max	Mean	SE
BAR 1	2000/12/05	4	63.0	91.0	71.3	13.23	2.8	7.6	4.13	2.33	1.01	1.15	1.07	0.07
BUC1 (all hatchery)	2000/12/14	6	66.0	74.0	68.5	2.88	3.7	5.6	4.73	0.63	1.29	1.59	1.47	0.11
BUC1 (all hatchery)	2001/01/11	12	65.0	75.0	70.7	3.17	3.7	5.5	4.83	0.58	1.26	1.75	1.37	0.15
BUC1 (all hatchery)	2001/02/08	4	70.0	78.0	75.5	3.79	4.5	6.0	5.38	0.63	1.14	1.37	1.25	0.11
BUC1 (all hatchery)	2001/03/08	13	66.0	111.0	78.8	11.65	3.3	12.8	5.45	2.40	0.91	1.66	1.09	0.20
BUC2 (all hatchery)	2001/01/11	2	90.0	103.0	96.5	9.19	10.6	13.8	12.20	2.26	1.26	1.45	1.36	0.14
BUC2 (all hatchery)	2001/02/08	1	105.0	105.0	105.0	n.a.	15.2	15.2	15.20	n.a.	1.31	1.31	1.31	n.a.
BUC5 (all wild)	2001/01/11	11	66.0	89.0	80.8	6.43	4.3	9.6	7.28	1.66	1.03	1.54	1.36	0.14
BUC5 (1 hatchery, 5 wild)	2001/02/08	6	64.0	95.0	76.7	14.99	3.0	10.8	6.33	3.50	1.14	1.60	1.30	0.16
BUC5 (all wild)	2001/03/08	2	69.0	70.0	69.5	0.71	3.7	3.9	3.80	0.14	1.13	1.14	1.13	0.01
BUC6 (all hatchery)	2001/01/11	1	81.0	81.0	81.0	n.a.	5.6	5.6	5.60	n.a.	1.05	1.05	1.05	n.a.
BUC7 (5 hatchery, 7 wild)	2000/12/06	12	71.0	117.0	93.4	17.09	3.2	17.2	9.13	5.02	0.89	1.07	1.01	0.05
BUC7 (all hatchery)	2001/01/09	2	96.0	101.0	98.5	3.54	11.1	13.6	12.35	1.77	1.25	1.32	1.29	0.05
BUC7 (1 hatchery, 2 wild)	2001/02/06	3	71.0	100.0	83.0	15.13	4.3	12.9	7.60	4.64	1.18	1.29	1.22	0.06
BUC7 (2 hatchery, 5 wild)	2001/03/06	7	72.0	112.0	87.6	14.25	4.4	15.2	7.63	4.02	0.92	1.18	1.06	0.08
BUC8 (all wild)	2000/12/06	1	94.0	94.0	94.0	n.a.	9.2	9.2	9.20	n.a.	1.11	1.11	1.11	n.a.
BUC8 (1 hatchery, 5 wild)	2001/01/04	6	71.0	99.0	79.3	10.91	4.7	12.4	6.73	2.94	1.20	1.40	1.30	0.08
BUC8 (all wild)	2001/02/06	1	76.0	76.0	76.0	n.a.	6.4	6.4	6.40	n.a.	1.46	1.46	1.46	n.a.
BUC8 (all wild)	2001/03/06	2	80.0	102.0	91.0	15.56	6.1	10.8	8.45	3.32	1.02	1.19	1.10	0.12
BYM 1	2001/01/08	1	52.0	52.0	52.0	n.a.	2.2	2.2	2.20	n.a.	1.56	1.56	1.56	n.a.
BYM 2	2000/12/15	17	42.0	78.0	53.5	9.63	1.2	7.0	2.66	1.79	0.97	3.00	1.59	0.46
BYM 2	2001/01/11	10	38.0	78.0	56.5	11.71	0.9	6.6	2.82	1.63	1.20	1.98	1.44	0.23
BYM 2	2001/02/08	2	62.0	68.0	65.0	4.24	3.5	3.8	3.65	0.21	1.21	1.47	1.34	0.18
BYM 2	2001/03/08	4	40.0	64.0	49.5	10.21	1.0	2.9	1.55	0.90	1.06	1.56	1.22	0.23
BYM 3	2000/12/14	1	62.0	62.0	62.0	n.a.	4.0	4.0	4.00	n.a.	1.68	1.68	1.68	n.a.
BYM 3	2001/01/11	6	44.0	53.0	46.3	3.33	1.1	1.9	1.35	0.28	1.28	1.43	1.35	0.07
BYM 3	2001/02/08	5	41.0	70.0	56.6	12.82	0.5	4.3	2.40	1.55	0.73	1.32	1.13	0.23
BYM 3	2001/03/08	3	46.0	70.0	59.3	12.22	1.2	3.5	2.33	1.15	0.97	1.23	1.07	0.14
McQ 1	2000/12/05	2	65.0	71.0	68.0	4.24	2.2	3.3	2.75	0.78	0.80	0.92	0.86	0.09
RIC 1	2000/12/18	1	52.0	52.0	52.0	n.a.	2.0	2.0	2.00	n.a.	1.42	1.42	1.42	n.a.
RIC 1	2001/01/17	6	51.0	85.0	62.0	12.46	2.4	7.9	3.87	2.07	1.29	1.86	1.57	0.27
RIC 1	2001/02/14	2	44.0	46.0	45.0	1.41	1.3	1.3	1.30	0.00	1.34	1.53	1.43	0.13
RIC 2	2000/12/05	1	75.0	75.0	75.0	n.a.	4.7	4.7	4.70	n.a.	1.11	1.11	1.11	n.a.
RIC 2	2001/01/08	15	46.0	61.0	52.9	4.57	1.1	2.9	2.01	0.53	1.13	1.81	1.33	0.17
RIC 2	2001/02/05	46	44.0	68.0	51.0	4.74	1.1	3.9	1.84	0.53	1.10	2.02	1.36	0.19
RIC 2	2001/03/05	23	47.0	100.0	56.0	10.35	1.1	10.4	2.05	1.86	0.80	1.36	1.05	0.11
RIC 3	2000/12/18	27	46.0	112.0	64.4	16.58	1.1	19.2	4.39	4.19	0.83	1.85	1.36	0.26
RIC 3	2001/01/17	30	44.0	89.0	56.1	11.19	1.3	9.4	2.74	2.11	1.06	2.00	1.37	0.18
RIC 3	2001/02/14	19	49.0	73.0	54.5	5.55	1.5	5.1	2.26	0.84	0.97	2.32	1.38	0.31
RIC 3	2001/03/14	7	48.0	69.0	56.9	8.07	1.0	3.2	1.93	0.86	0.83	1.14	0.99	0.10
RIC 4	2000/12/18	5	46.0	77.0	58.0	11.87	1.5	6.1	3.02	1.81	1.34	1.54	1.44	0.10
RIC 4	2001/01/17	5	50.0	62.0	54.8	5.72	1.8	3.5	2.54	0.76	1.30	1.88	1.52	0.24
RIC 4	2001/02/14	18	49.0	91.0	57.6	10.14	1.3	9.6	2.62	1.92	0.98	1.77	1.24	0.20
RIC 4	2001/03/14	2	65.0	71.0	68.0	4.24	2.9	3.9	3.40	0.71	1.06	1.09	1.07	0.02
RIC 5	2000/12/18	4	49.0	60.0	52.8	4.92	1.9	3.5	2.48	0.73	1.43	1.88	1.66	0.19
RIC 5	2001/01/17	12	40.0	62.0	50.4	5.30	0.9	3.2	1.81	0.72	1.10	1.77	1.35	0.20
RIC 5	2001/02/14	6	47.0	57.0	51.5	4.09	1.3	2.5	1.92	0.42	1.10	1.73	1.40	0.26
RIC 5	2001/03/14	5	44.0	55.0	49.6	4.51	0.8	1.8	1.26	0.38	0.94	1.08	1.00	0.05
UBR 2	2001/01/11	3	46.0	58.0	50.7	6.43	1.5	2.6	2.17	0.59	1.33	2.17	1.68	0.44
UBR 2	2001/02/08	11	50.0	71.0	58.9	6.27	1.3	5.1	2.69	1.09	0.97	1.42	1.25	0.15
UBR 2	2001/03/08	11	54.0	76.0	63.4	7.66	1.7	4.3	2.80	0.94	0.91	1.28	1.07	0.11
UBR 9	2000/12/05	1	71.0	71.0	71.0	n.a.	4.9	4.9	4.90	n.a.	1.37	1.37	1.37	n.a.
UBR 11	2001/02/15	2	65.0	65.0	65.0	0.00	2.5	3.7	3.10	0.85	0.91	1.35	1.13	0.31
TOB 1	2000/12/20	31	33.0	89.0	54.9	11.48	0.4	10.6	2.58	1.91	0.61	1.85	1.39	0.28
TOB 1	2001/01/22	18	41.0	65.0	49.2	6.88	1.0	3.7	1.88	0.66	1.19	2.67	1.57	0.34
TOB 1	2001/02/19	10	38.0	68.0	53.0	8.76	0.7	4.0	2.09	1.05	0.89	1.56	1.30	0.20
TOB 1	2001/03/19	5	45.0	55.0	49.8	3.90	1.0	2.0	1.42	0.40	1.06	1.21	1.12	0.07
TOB 2	2000/12/20	33	37.0	88.0	57.1	12.90	0.9	9.3	3.12	1.94	0.93	2.50	1.54	0.33
TOB 2	2001/01/22	13	48.0	70.0	56.9	7.11	1.4	4.5	2.66	0.97	1.26	1.54	1.39	0.09
TOB 2	2001/02/19	11	53.0	77.0	62.5	7.02	1.9	6.6	3.38	1.35	1.07	1.50	1.33	0.13
TOB 2	2001/03/19	7	50.0	73.0	61.7	8.75	1.4	5.0	2.97	1.21	1.02	1.51	1.21	0.16
TOB 5	2000/12/20	5	53.0	101.0	87.4	19.73	1.7	13.3	9.54	4.65	1.14	1.32	1.26	0.07
TOB 5	2001/02/19	4	60.0	76.0	68.8	7.54	1.9	4.7	3.65	1.34	0.88	1.20	1.08	0.14
TOB 6	2000/12/20	3	53.0	56.0	54.3	1.53	2.4	2.7	2.57	0.15	1.52	1.75	1.60	0.12
TOB 6	2001/01/22	1	58.0	58.0	58.0	n.a.	2.6	2.6	2.60	n.a.	1.33	1.33	1.33	n.a.
TOB 7	2001/03/09	13	51.0	118.0	69.4	19.68	1.3	15.1	4.11	3.96	0.78	1.30	1.02	0.13
TOB 8	2000/12/20	22	45.0	65.0	52.5	5.07	1.3	3.8	2.35	0.59	1.27	2.74	1.63	0.33
TOB 8	2001/01/22	4	43.0	50.0	47.0	3.56	1.6	2.2	1.93	0.28	1.68	2.26	1.86	0.27
TOB 8	2001/02/19	20	46.0	98.0	59.6	13.95	0.9	10.9	3.02	2.73	0.84	1.62	1.22	0.22
TOB 8	2001/03/19	4	68.0	75.0	72.8	3.20	3.2	4.0	3.58	0.35	0.84	1.02	0.93	0.07

Plate 14. Fork length, weight and condition factor data for rainbow trout/steelhead captured at sites sampled during the upper Bulkley Overwintering study.

Site	Date	N	Fork Length (mm)				Weight (g)				Fulton's Condition Factor (K)			
			Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD
BAR 1	2000/12/05	9	76.0	120.0	95.4	14.14	5.0	17.3	10.1	4.27	0.9	1.3	1.11	0.15
BAR 1	2001/01/08	1	46.0	46.0	46.0	n.a.	1.8	1.8	1.8	n.a.	1.9	1.9	1.85	n.a.
BUC 1	2000/12/14	4	88.0	93.0	89.8	2.22	9.3	11.4	10.1	0.91	1.4	1.4	1.39	0.02
BUC 1	2001/01/11	7	48.0	108.0	84.4	18.27	1.7	16.5	9.1	4.40	1.3	1.5	1.39	0.10
BUC 1	2001/02/08	2	81.0	82.0	81.5	0.71	7.6	7.7	7.7	0.07	1.4	1.4	1.41	0.02
BUC 1	2001/03/08	2	91.0	111.0	101.0	14.14	7.9	11.9	9.9	2.83	0.9	1.0	0.96	0.13
BUC 2	2000/12/14	6	74.0	92.0	81.5	5.52	4.8	11.1	8.2	1.78	1.1	1.5	1.34	0.12
BUC 2	2001/01/11	13	71.0	95.0	84.4	9.01	5.2	12.5	8.2	2.70	1.4	1.5	1.3	0.02
BUC 2	2001/02/08	5	80.0	95.0	85.2	6.30	6.3	13.5	8.9	2.78	1.2	1.6	1.41	0.15
BUC 2	2001/03/08	5	77.0	111.0	90.2	12.68	5.8	15.0	8.9	3.53	1.0	1.3	1.18	0.12
BUC 5	2000/12/14	15	68.0	112.0	84.9	13.27	5.1	19.5	9.9	4.41	1.3	2.0	1.55	0.19
BUC 5	2001/01/11	43	51.0	124.0	84.6	17.38	1.1	26.2	9.5	5.53	0.8	1.9	1.44	0.21
BUC 5	2001/02/08	22	65.0	110.0	78.4	11.25	4.1	18.6	7.5	3.33	1.2	1.8	1.49	0.14
BUC 5	2001/03/08	11	71.0	91.0	80.5	5.85	5.2	8.6	6.5	1.14	1.1	1.5	1.23	0.13
BUC 6	2000/12/14	9	58.0	84.0	72.1	8.10	2.9	8.9	5.7	1.87	1.3	1.7	1.49	0.12
BUC 6	2001/01/11	13	51.0	99.0	71.2	14.32	2.3	12.5	5.9	3.20	1.2	1.9	1.53	0.17
BUC 6	2001/02/08	6	45.0	65.0	52.5	7.50	1.1	3.4	2.1	0.99	1.2	1.7	1.38	0.19
BUC 6	2001/03/08	8	51.0	82.0	72.3	12.28	1.0	7.6	5.0	2.39	0.8	1.4	1.19	0.19
BUC 7	2001/01/09	11	74.0	125.0	96.5	14.90	5.5	24.1	12.0	5.62	1.1	1.4	1.27	0.09
BUC 7	2001/02/06	2	79.0	105.0	92.0	18.38	7.1	15.5	11.3	5.94	1.3	1.4	1.39	0.07
BUC 7	2001/03/06	4	82.0	109.0	97.0	11.22	5.7	13.2	9.7	3.08	1.0	1.1	1.04	0.06
BUC 8	2000/12/06	9	80.0	112.0	95.6	10.79	6.2	15.5	9.6	3.10	0.9	1.2	1.07	0.09
BUC 8	2001/01/04	2	72.0	89.0	80.5	12.02	5.1	9.4	7.3	3.04	1.3	1.4	1.35	0.02
BUC 8	2001/02/06	8	62.0	86.0	77.9	8.06	3.7	9.0	6.9	1.92	1.3	1.6	1.43	0.12
BYM 1	2000/12/15	5	76.0	126.0	93.4	20.83	5.0	20.9	9.5	6.48	0.8	1.3	1.09	0.18
BYM 1	2001/01/08	14	44.0	118.0	79.9	19.92	1.1	20.0	7.9	5.53	1.1	1.7	1.35	0.15
BYM 2	2001/02/05	6	61.0	130.0	86.3	24.70	3.5	28.2	10.5	9.16	1.3	1.5	1.40	0.12
BYM 3	2001/03/05	8	49.0	131.0	82.0	24.94	1.4	22.5	7.5	6.70	1.0	1.2	1.12	0.08
BYM 2	2000/12/15	17	56.0	98.0	76.9	11.72	2.7	14.2	7.0	3.01	1.2	1.7	1.47	0.16
BYM 2	2001/01/11	11	41.0	83.0	66.4	12.53	0.9	7.1	4.5	1.87	1.2	1.9	1.45	0.23
BYM 2	2001/02/08	8	44.0	103.0	69.6	19.78	1.0	15.3	5.8	4.55	1.2	1.6	1.41	0.15
BYM 2	2001/03/08	10	45.0	106.0	72.7	16.65	1.3	12.5	5.1	3.18	1.0	1.4	1.20	0.13
BYM 3	2000/12/14	2	68.0	84.0	76.0	11.31	5.4	8.4	6.9	2.12	1.4	1.7	1.57	0.21
BYM 3	2001/01/11	7	39.0	78.0	53.4	16.49	0.9	6.8	2.7	2.48	1.3	1.6	1.46	0.14
BYM 3	2001/02/08	12	39.0	76.0	53.1	15.73	0.6	6.3	2.6	2.43	0.8	1.5	1.30	0.21
BYM 3	2001/03/08	5	38.0	76.0	55.0	18.06	0.8	5.2	2.5	2.12	1.1	1.5	1.24	0.13
McQ 1	2000/12/05	13	49.0	97.0	75.2	15.40	1.2	8.4	4.6	2.37	0.9	1.1	0.97	0.07
McQ 1	2001/01/08	15	39.0	88.0	58.9	17.62	1.2	8.8	3.6	2.54	1.2	2.6	1.60	0.48
McQ 1	2001/02/05	3	44.0	71.0	53.3	15.31	1.0	4.1	2.2	1.66	1.1	1.6	1.32	0.28
McQ 1	2001/03/05	3	41.0	73.0	53.0	17.44	1.0	3.8	2.0	1.59	1.0	1.5	1.21	0.24
RIC 1	2000/12/18	3	68.0	105.0	86.3	18.50	4.7	16.6	10.0	6.06	1.4	1.5	1.43	0.06
RIC 1	2001/01/17	6	40.0	91.0	67.8	17.61	0.8	12.4	5.3	4.05	1.2	1.6	1.41	0.17
RIC 1	2001/02/14	3	45.0	68.0	59.0	12.29	1.5	4.8	3.2	1.66	1.3	1.6	1.49	0.18
RIC 1	2001/03/14	4	45.0	76.0	65.3	13.82	1.2	6.2	3.8	2.05	1.1	1.4	1.25	0.14
RIC 2	2000/12/05	6	76.0	133.0	95.8	24.28	4.6	24.3	11.2	8.20	1.0	1.2	1.11	0.08
RIC 2	2001/01/08	7	44.0	105.0	72.1	26.45	1.3	16.5	6.8	6.11	1.2	1.5	1.41	0.16
RIC 2	2001/02/05	12	41.0	80.0	63.3	13.31	1.1	7.6	3.9	1.94	1.2	2.0	1.45	0.20
RIC 2	2001/03/05	5	66.0	92.0	74.8	10.26	3.0	8.6	4.9	2.17	1.0	1.2	1.12	0.07
RIC 3	2000/12/18	32	42.0	124.0	73.6	18.37	1.0	25.3	6.6	5.39	1.0	1.6	1.41	0.13
RIC 3	2001/01/17	22	41.0	89.0	63.4	15.41	1.1	9.1	4.1	2.63	1.0	1.9	1.39	0.19
RIC 3	2001/02/14	11	40.0	71.0	51.5	11.84	0.8	5.3	2.3	1.73	0.9	1.8	1.46	0.22
RIC 3	2001/03/14	8	41.0	78.0	55.3	12.07	0.8	3.4	1.9	1.05	0.6	1.3	1.06	0.26
RIC 4	2000/12/18	10	58.0	86.0	73.6	8.83	3.8	9.4	6.3	1.97	1.2	2.3	1.57	0.29
RIC 4	2001/01/17	21	42.0	100.0	68.7	15.86	1.1	13.2	5.0	3.16	0.9	1.6	1.35	0.13
RIC 4	2001/02/14	17	42.0	85.0	65.4	14.82	0.8	7.5	4.2	2.23	1.1	1.8	1.34	0.18
RIC 4	2001/03/14	2	41.0	55.0	48.0	9.90	1.1	1.9	1.5	0.57	1.1	1.6	1.37	0.32
RIC 5	2000/12/18	16	61.0	92.0	77.6	10.69	3.6	10.1	7.0	2.41	1.3	2.0	1.46	0.17
RIC 5	2001/01/17	14	39.0	118.0	67.4	21.49	0.9	23.0	5.8	5.62	1.1	2.6	1.54	0.34
RIC 5	2001/02/14	14	39.0	94.0	61.9	20.22	0.7	11.3	4.0	3.32	1.0	1.4	1.30	0.10
RIC 5	2001/03/14	9	38.0	110.0	63.9	24.50	0.6	12.9	3.9	4.07	0.7	1.6	1.10	0.26
UBR 1	2000/12/18	1	73.0	73.0	73.0	n.a.	6.5	6.5	6.5	n.a.	1.7	1.7	1.67	n.a.
UBR 1	2001/01/17	2	81.0	105.0	93.0	16.97	8.3	12.8	10.6	3.18	1.1	1.6	1.33	0.32
UBR 2	2001/01/11	14	56.0	104.0	75.9	13.43	2.9	13.2	6.5	3.28	1.2	2.2	1.42	0.24
UBR 2	2001/02/08	2	71.0	110.0	90.5	27.58	4.8	15.3	10.1	7.42	1.1	1.3	1.25	0.14
UBR 2	2001/03/08	2	89.0	102.0	95.5	9.19	8.1	12.8	10.5	3.32	1.1	1.2	1.18	0.04
UBR 9	2000/12/05	4	91.0	111.0	101.3	10.21	8.7	16.6	12.3	4.00	1.1	1.2	1.15	0.05
UBR 9	2001/01/08	2	81.0	90.0	85.5	6.36	7.3	10.6	9.0	2.33	1.4	1.5	1.41	0.06
UBR 9	2001/02/05	2	94.0	106.0	100.0	8.49	9.6	16.2	12.9	4.67	1.2	1.4	1.26	0.14
UBR 9	2001/03/05	2	77.0	93.0	85.0	11.31	5.0	8.7	6.9	2.62	1.1	1.1	1.09	0.01
UBR 11	2000/12/18	4	100.0	121.0	115.3	10.18	15.0	26.0	21.6	4.75	1.2	1.5	1.40	0.11
UBR 11	2001/02/15	3	93.0	98.0	95.3	2.52	9.5	12.2	10.7	1.37	1.2	1.3	1.23	0.06
TOB 1	2000/12/20	12	42.0	86.0	67.0	15.09	0.9	9.5	4.7	2.75	0.6	2.0	1.41	0.33
TOB 1	2001/01/22	2	70.0	84.0	77.0	9.90	5.6	6.9	6.3	0.92	1.2	1.6	1.40	0.33
TOB 1	2001/02/19	2	73.0	80.0	76.5	4.95	5.4	7.1	6.3	1.20	1.4	1.4	1.39	0.00
TOB 1	2001/03/19	3	79.0	86.0	81.7	3.79	4.6	7.2	5.6	1.38	0.9	1.1	1.02	0.10
TOB 2	2000/12/20	4	67.0	76.0	72.3	4.11	4.3	6.0	5.5	0.81	1.4	1.6	1.45	0.08
TOB 2	2001/01/22	5	70.0	100.0	85.4	12.95	4.8	13.3	9.0	3.96	1.3	1.5	1.37	0.10
TOB 2	2001/02/19	4	74.0	89.0	81.8	7.85	5.4	10.5	7.5	2.39	1.2	1.5	1.34	0.11
TOB 7	2001/03/09	2	90.0	93.0	91.5	2.12	7.1	7.8	7.5	0.49	1.0	1.0	0.97	0.00
TOB 8	2000/12/20	1	68.0	68.0	68.0	n.a.	4.6	4.6	4.6	n.a.	1.5	1.5	1.46	n.a.
TOB 8	2001/01/22	1	61.0	61.0	61.0	n.a.	3.9	3.9	3.9	n.a.	1.7	1.7	1.72	n.a.
TOB 8	2001/02/19	2	42.0	70.0	56.0	19.80	0.7	4.6	2.7	2.76	0.9	1.3	1.14	0.28
TOB 8	2001/03/19	1	64.0	64.0	64.0	n.a.	3.3	3.3	3.3	n.a.	1.3	1.3	1.26	n.a.

Plate 15. Fork length, weight and condition factor data for Dolly Varden captured at sites sampled during the upper Bulkley Overwintering study.

Site	Date	N	Fork Length (mm)				Weight (g)				Fulton's Condition Factor (K)			
			Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD
TOB 2	2000/12/20	2	79.0	110.0	94.5	21.9	5.6	12.7	9.2	5.0	1.0	1.1	1.0	0.13
TOB 2	2001/03/19	1	155.0	155.0	155.0	n.a.	26.7	26.7	26.7	n.a.	0.7	0.7	0.7	n.a.
TOB 5	2000/12/20	2	62.0	112.0	87.0	35.4	3.4	17.7	10.6	10.1	1.3	1.4	1.3	0.12
TOB 5	2001/02/19	1	109.0	109.0	109.0	n.a.	13.8	13.8	13.8	n.a.	1.1	1.1	1.1	n.a.
TOB 7	2001/03/09	2	92.0	108.0	100.0	11.3	7.0	10.8	8.9	2.7	0.9	0.9	0.9	0.03
TOB 8	2000/12/20	2	49.0	89.0	69.0	28.3	1.5	8.3	4.9	4.8	1.2	1.3	1.2	0.07

Plate 16. Fork length, weight and condition factor data for chinook captured at sites sampled during the upper Bulkley Overwintering study.

Site	Date	N	Fork Length (mm)				Weight (g)				Fulton's Condition Factor (K)			
			Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD
BUC 2	2001/01/11	2	73.0	76.0	74.5	2.1	5.4	6.4	5.9	0.7	1.4	1.5	1.4	0.05
BUC 5	2001/01/11	3	65.0	66.0	65.3	0.6	3.3	4.3	3.9	0.5	1.2	1.6	1.4	0.18
BUC 5	2001/02/08	2	69.0	69.0	69.0	0.0	4.2	4.6	4.4	0.3	1.3	1.4	1.3	0.09
BUC 6	2001/02/08	3	64.0	78.0	69.3	7.6	3.2	6.2	4.6	1.5	1.2	1.5	1.3	0.14
BUC 6	2001/03/08	4	60.0	81.0	70.8	10.3	2.8	5.5	4.3	1.4	1.0	1.3	1.2	0.12
BUC 7	2001/01/09	4	72.0	83.0	75.8	5.0	4.7	7.5	5.8	1.2	1.1	1.5	1.3	0.16
BUC 7	2001/02/06	1	80.0	80.0	80.0	n.a.	7.2	7.2	7.2	n.a.	1.4	1.4	1.4	n.a.
BUC 7	2001/03/06	1	76.0	76.0	76.0	n.a.	5.6	5.6	5.6	n.a.	1.3	1.3	1.3	n.a.
BUC 8	2000/12/06	4	77.0	86.0	81.0	3.9	4.7	7.6	5.7	1.3	1.0	1.2	1.1	0.10
BUC 8	2001/01/04	3	69.0	85.0	76.3	8.1	4.2	7.4	5.6	1.6	1.2	1.3	1.2	0.04
BUC 8	2001/02/06	2	70.0	78.0	74.0	5.7	4.4	5.7	5.1	0.9	1.2	1.3	1.2	0.06
BUC 8	2001/03/06	3	74.0	81.0	76.3	4.0	4.4	5.3	4.8	0.5	1.0	1.2	1.1	0.09
BYM 2	2001/01/11	3	59.0	67.0	64.3	4.6	2.8	4.7	4.0	1.1	1.4	1.6	1.5	0.11
BYM 3	2001/03/08	1	68.0	68.0	68.0	n.a.	3.2	3.2	3.2	n.a.	1.0	1.0	1.0	n.a.
RIC 1	2001/02/14	1	63.0	63.0	63.0	n.a.	3.5	3.5	3.5	n.a.	1.4	1.4	1.4	n.a.
RIC 2	2001/01/08	3	55.0	71.0	62.0	8.2	2.2	4.8	3.3	1.3	1.3	1.3	1.3	0.01
RIC 2	2001/02/05	3	67.0	68.0	67.7	0.6	3.6	4.4	4.1	0.4	1.2	1.4	1.3	0.10
RIC 2	2001/03/05	4	61.0	71.0	66.5	4.8	2.5	3.9	3.2	0.7	1.0	1.1	1.1	0.03
RIC 3	2000/12/18	6	61.0	73.0	67.7	4.8	2.8	5.9	4.5	1.1	1.1	1.7	1.4	0.26
RIC 3	2001/01/17	9	60.0	72.0	67.7	3.6	3.2	5.2	4.3	0.6	1.2	1.7	1.4	0.16
RIC 3	2001/02/14	1	55.0	55.0	55.0	n.a.	2.5	2.5	2.5	n.a.	1.5	1.5	1.5	n.a.
RIC 3	2001/03/14	1	64.0	64.0	64.0	n.a.	3.1	3.1	3.1	n.a.	1.2	1.2	1.2	n.a.
RIC 4	2000/12/18	7	44.0	76.0	63.3	10.9	1.5	6.3	3.8	1.6	1.1	1.8	1.4	0.18
RIC 4	2001/01/17	6	61.0	74.0	66.7	5.0	3.3	5.3	4.2	0.9	1.3	1.7	1.4	0.16
RIC 4	2001/02/14	5	59.0	69.0	63.6	3.9	3.0	3.7	3.3	0.3	1.1	1.5	1.3	0.13
RIC 5	2001/01/17	1	59.0	59.0	59.0	n.a.	2.7	2.7	2.7	n.a.	1.3	1.3	1.3	n.a.
RIC 5	2001/03/14	1	70.0	70.0	70.0	n.a.	4.0	4.0	4.0	n.a.	1.2	1.2	1.2	n.a.
UBR 1	2001/01/17	2	58.0	78.0	68.0	14.1	3.0	6.8	4.9	2.7	1.4	1.5	1.5	0.07
UBR 1	2001/02/14	5	61.0	65.0	63.8	1.8	3.1	4.0	3.5	0.5	1.1	1.5	1.4	0.14
UBR 2	2001/01/11	9	57.0	69.0	62.7	3.8	2.9	5.1	3.4	0.7	1.2	1.6	1.4	0.17
UBR 2	2001/02/08	17	55.0	71.0	64.5	4.6	2.2	4.7	3.5	0.7	0.9	1.8	1.3	0.21
UBR 2	2001/03/08	8	59.0	67.0	63.3	3.1	2.6	3.7	3.2	0.4	1.2	1.4	1.3	0.05
UBR 9	2000/12/05	1	70.0	70.0	70.0	n.a.	3.8	3.8	3.8	n.a.	1.1	1.1	1.1	n.a.
UBR 9	2001/01/08	4	62.0	72.0	67.8	4.2	3.9	6.2	4.7	1.0	1.3	1.7	1.5	0.19
UBR 9	2001/02/05	4	69.0	86.0	75.0	7.8	4.3	8.6	5.6	2.0	1.2	1.4	1.3	0.09
UBR 9	2001/03/05	4	66.0	73.0	70.0	2.9	3.2	4.0	3.5	0.3	1.0	1.1	1.0	0.06
UBR 10	2001/01/08	1	91.0	91.0	91.0	n.a.	10.7	10.7	10.7	n.a.	1.4	1.4	1.4	n.a.
UBR 10	2001/03/05	2	70.0	78.0	74.0	5.7	3.7	5.3	4.5	1.1	1.1	1.1	1.1	0.03
UBR 11	2000/12/18	5	62.0	78.0	68.4	6.3	3.5	5.3	4.3	0.8	1.1	1.5	1.3	0.15
UBR 11	2001/01/18	1	68.0	68.0	68.0	n.a.	4.1	4.1	4.1	n.a.	1.3	1.3	1.3	n.a.
UBR 11	2001/02/15	1	62.0	62.0	62.0	n.a.	3.1	3.1	3.1	n.a.	1.3	1.3	1.3	n.a.
UBR 12	2001/03/15	4	67.0	74.0	69.8	3.0	3.4	4.3	3.7	0.4	1.0	1.2	1.1	0.06

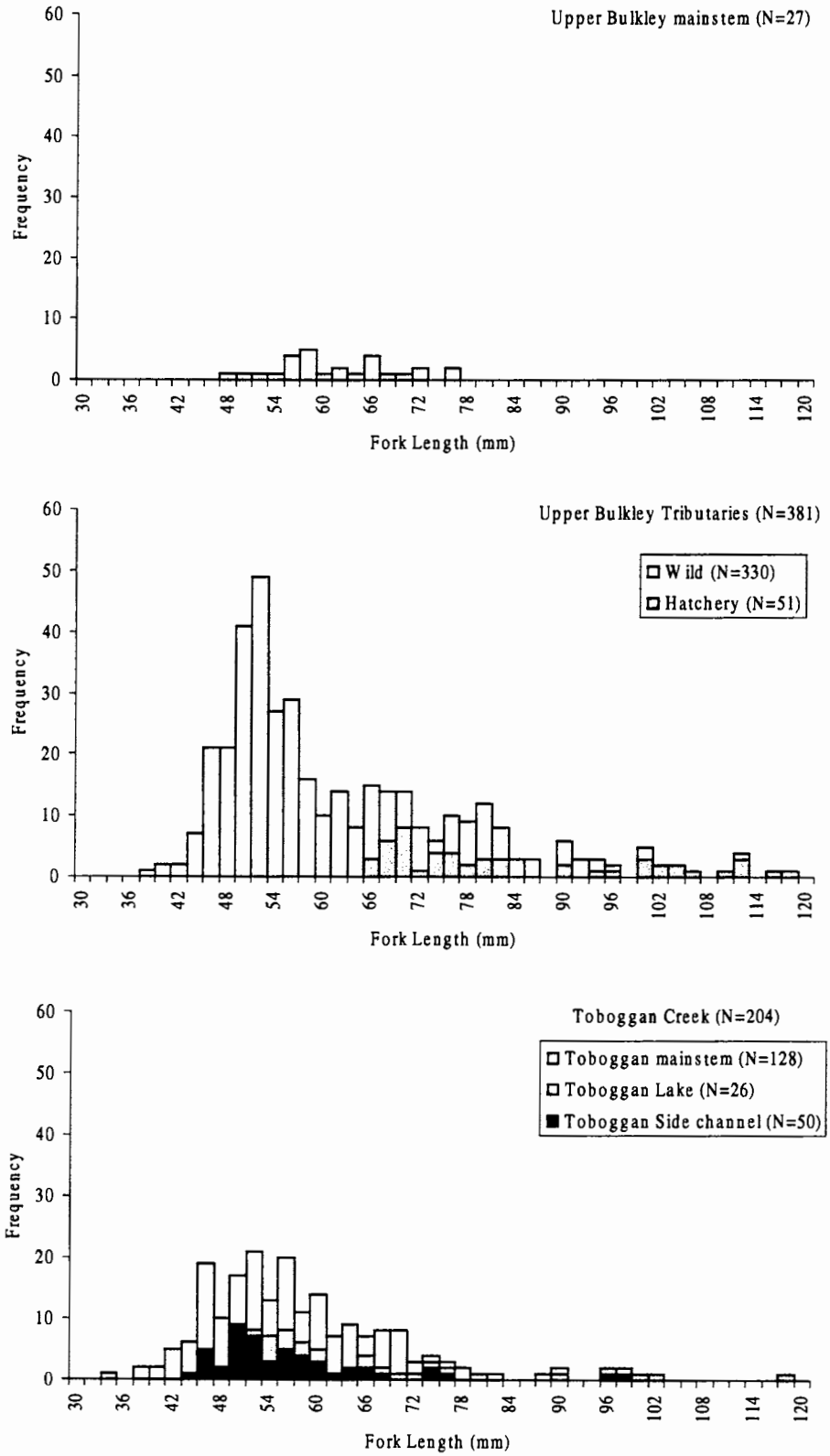

Plate 17. Fork length distribution for coho captured at Upper Bulkley mainstem, Upper Bulkley tributary and Toboggan Creek sites throughout the winter.

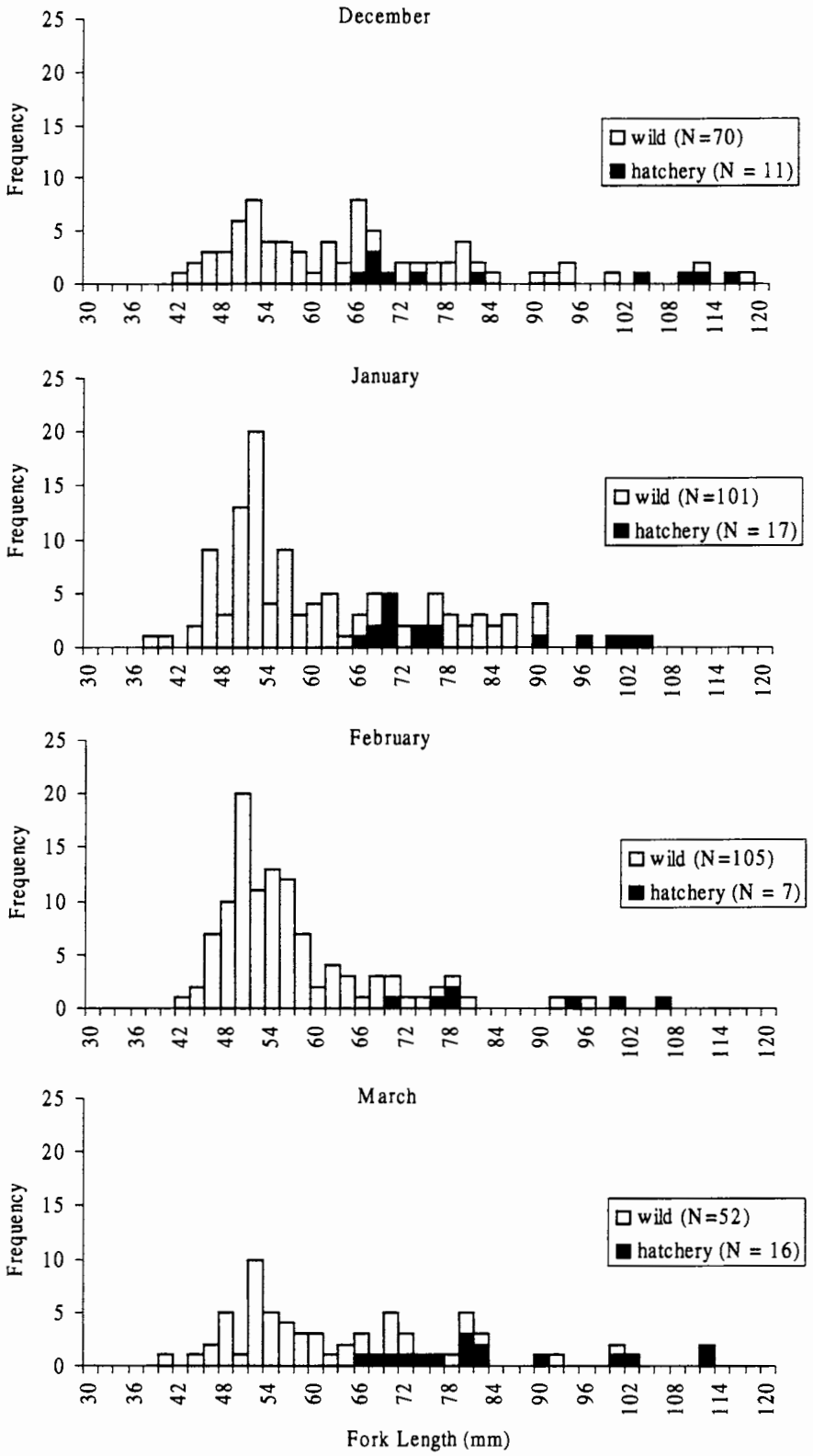

Plate 18. Fork length distribution for coho for December, January, February and March samples obtained in the Upper Bulkley watershed.

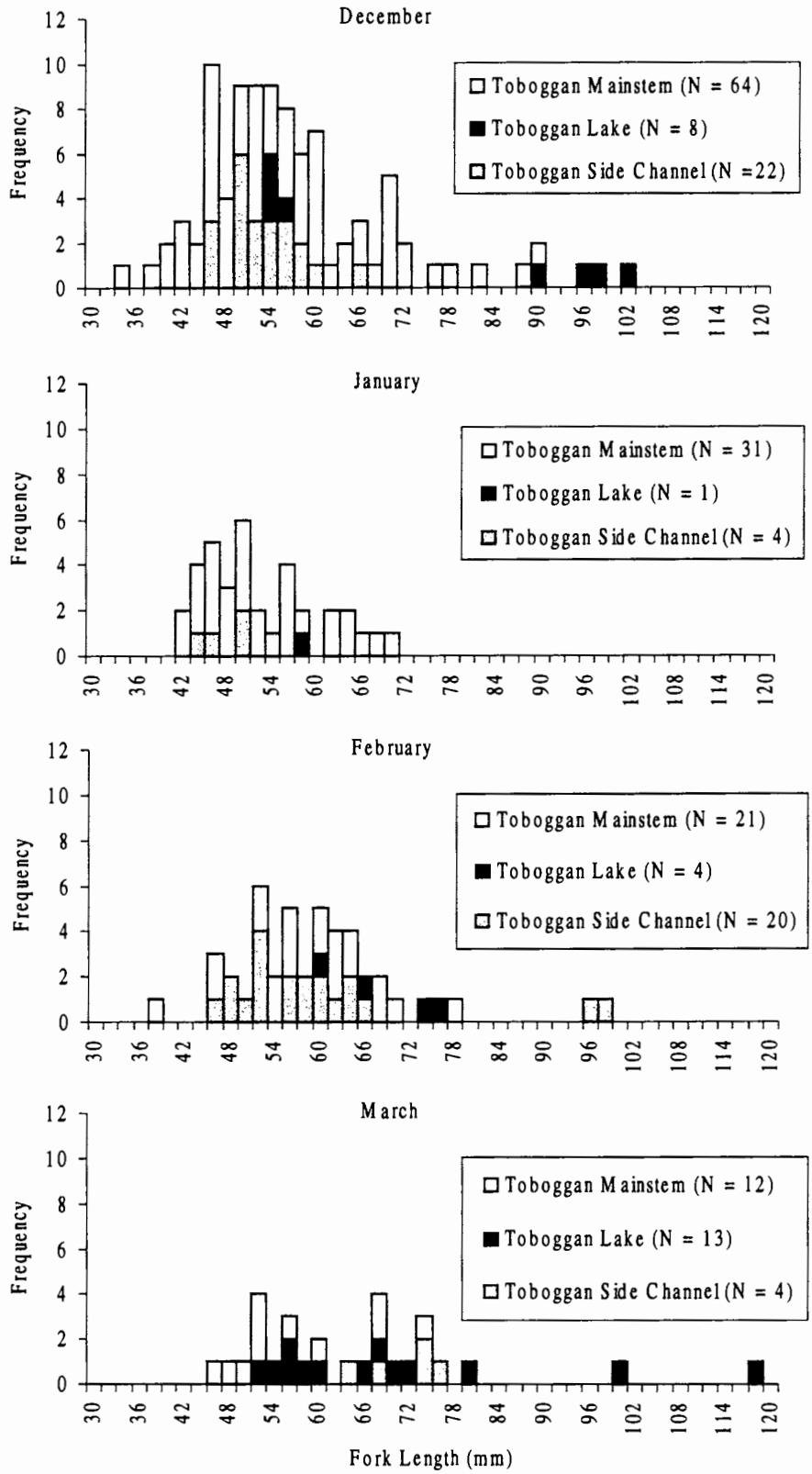

Plate 19. Fork length distribution for coho for December, January, February and March samples obtained in the Toboggan Creek watershed.

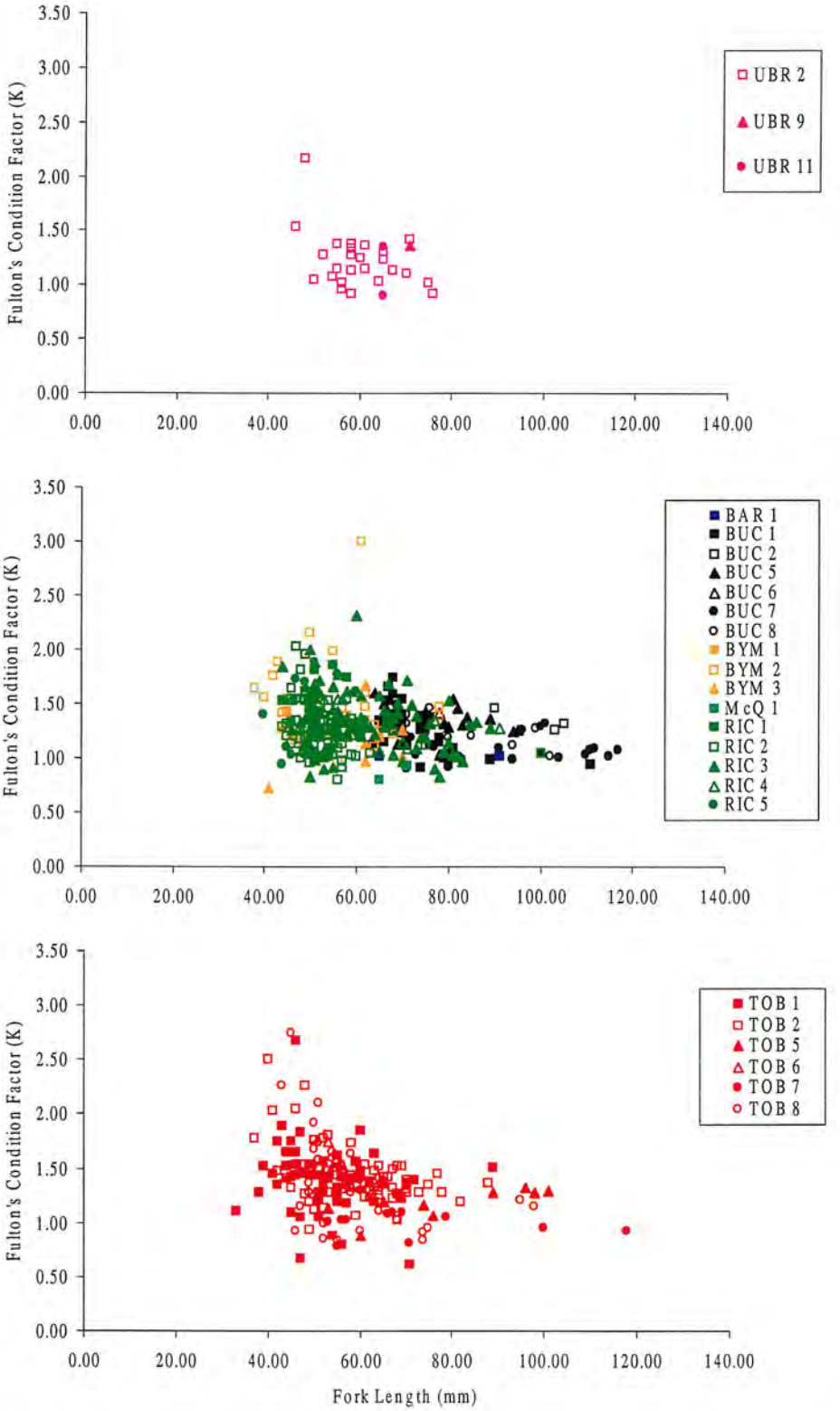

Plate 20. Relationship between Fulton's condition factor and fork length for coho for sites sampled in Upper Bulkley mainstem, tributaries and Toboggan Creek.

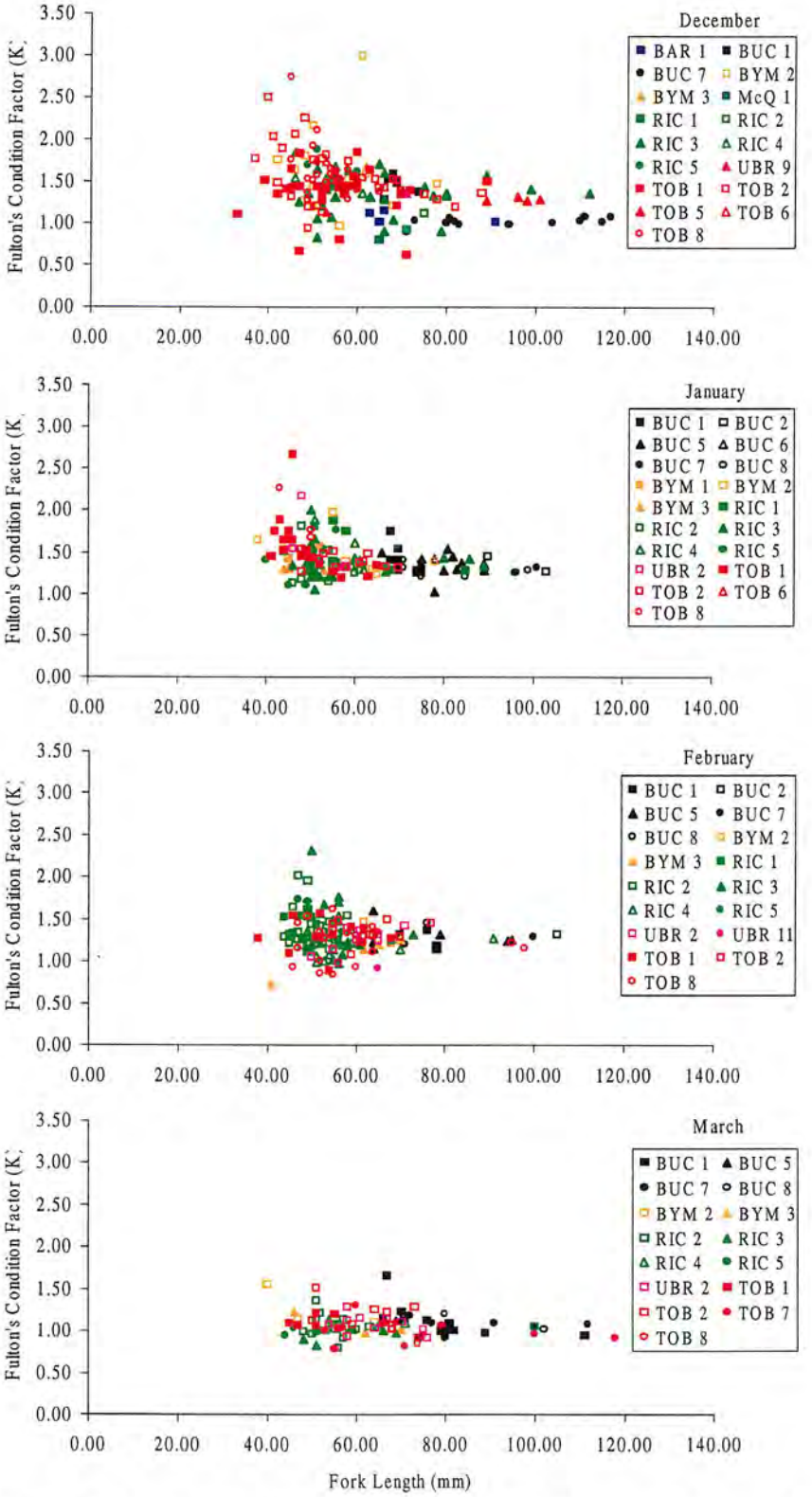

Plate 21. Relationship between Fulton's condition factor and fork length for coho captured in the four months of winter sampling (December, January, February and March).

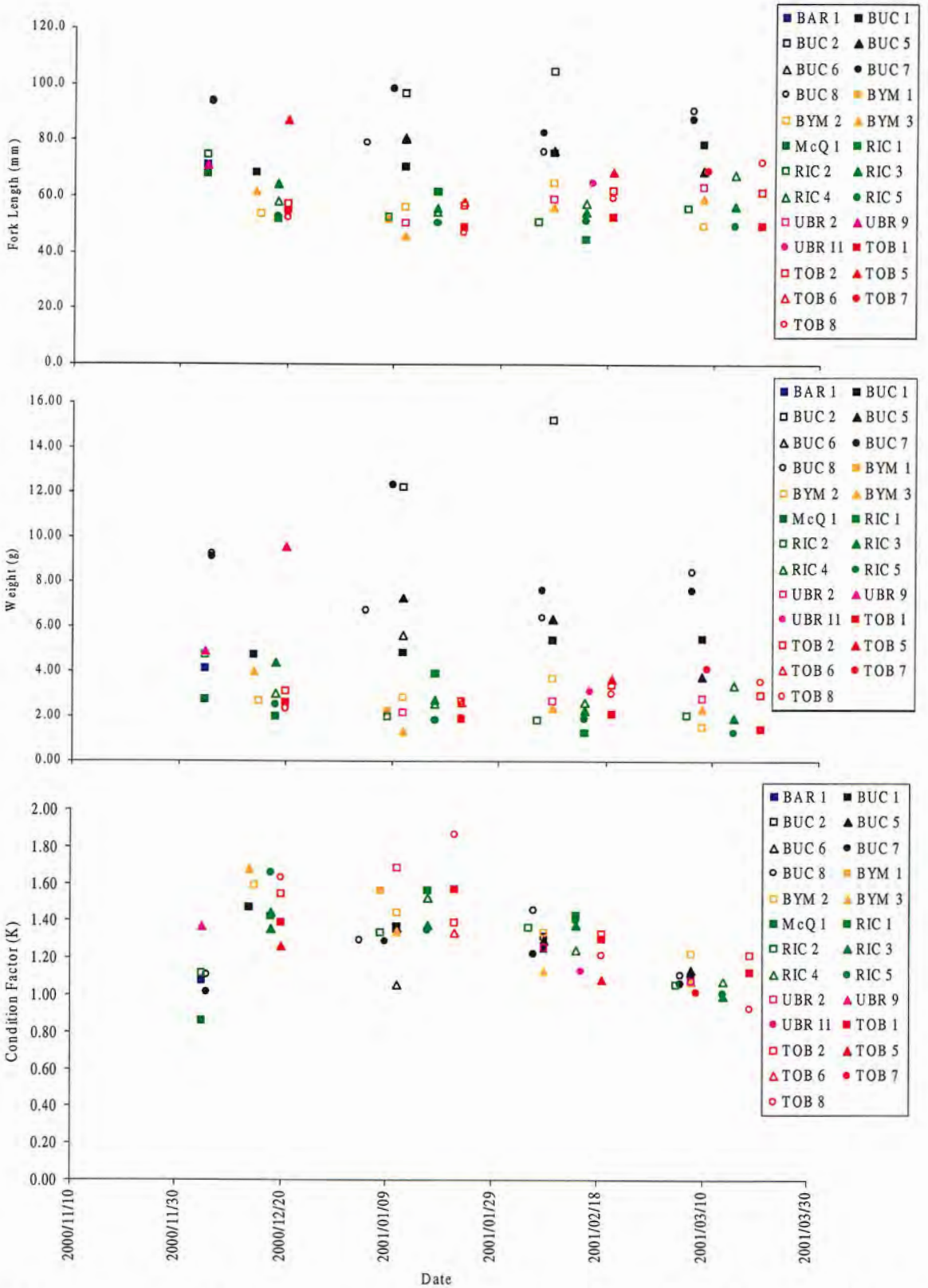

Plate 22. Changes in fork length, weight and condition factor for coho captured during the winter.

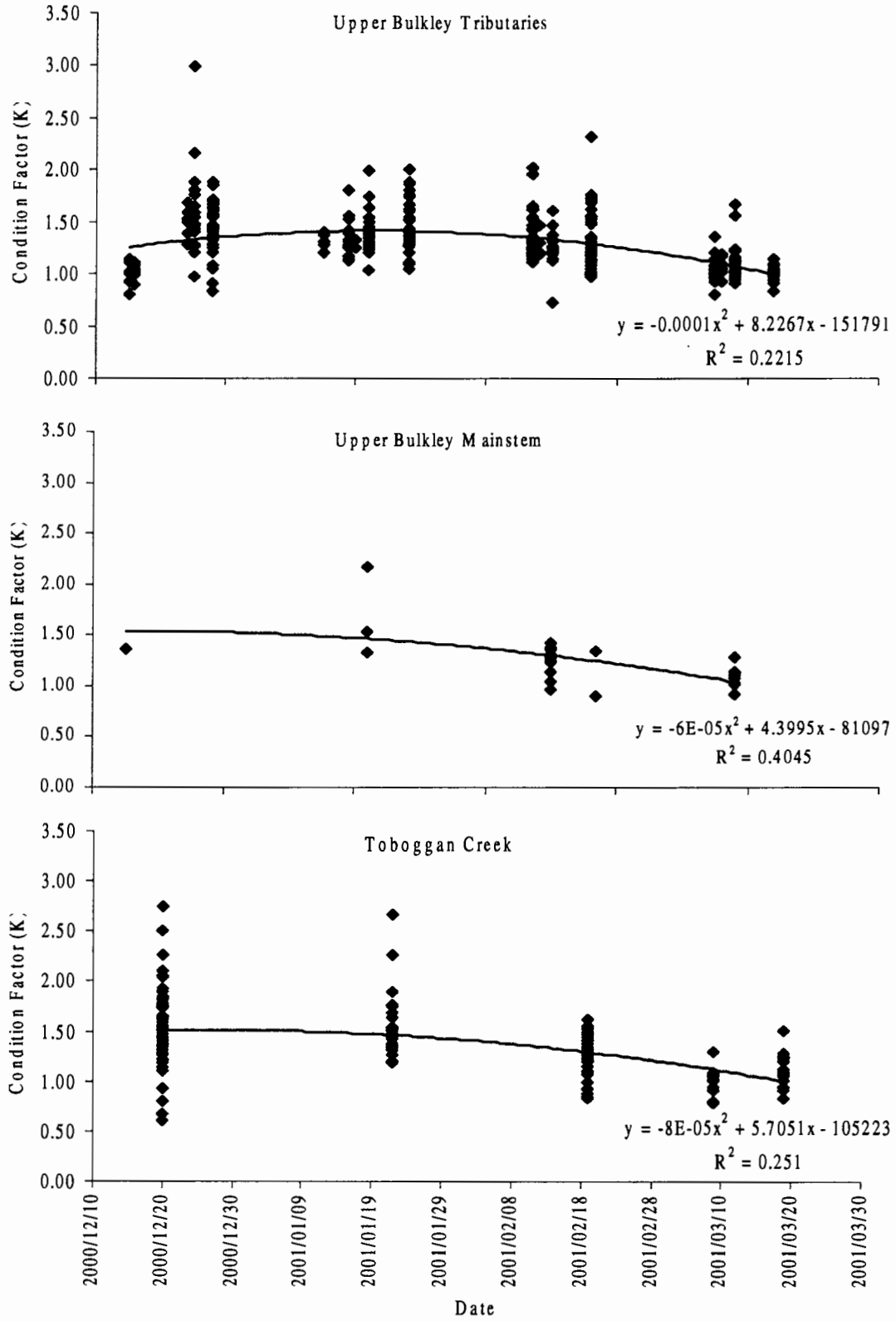

Plate 23. Changes in fork length, weight and condition factor for coho captured during the winter, showing trend lines.

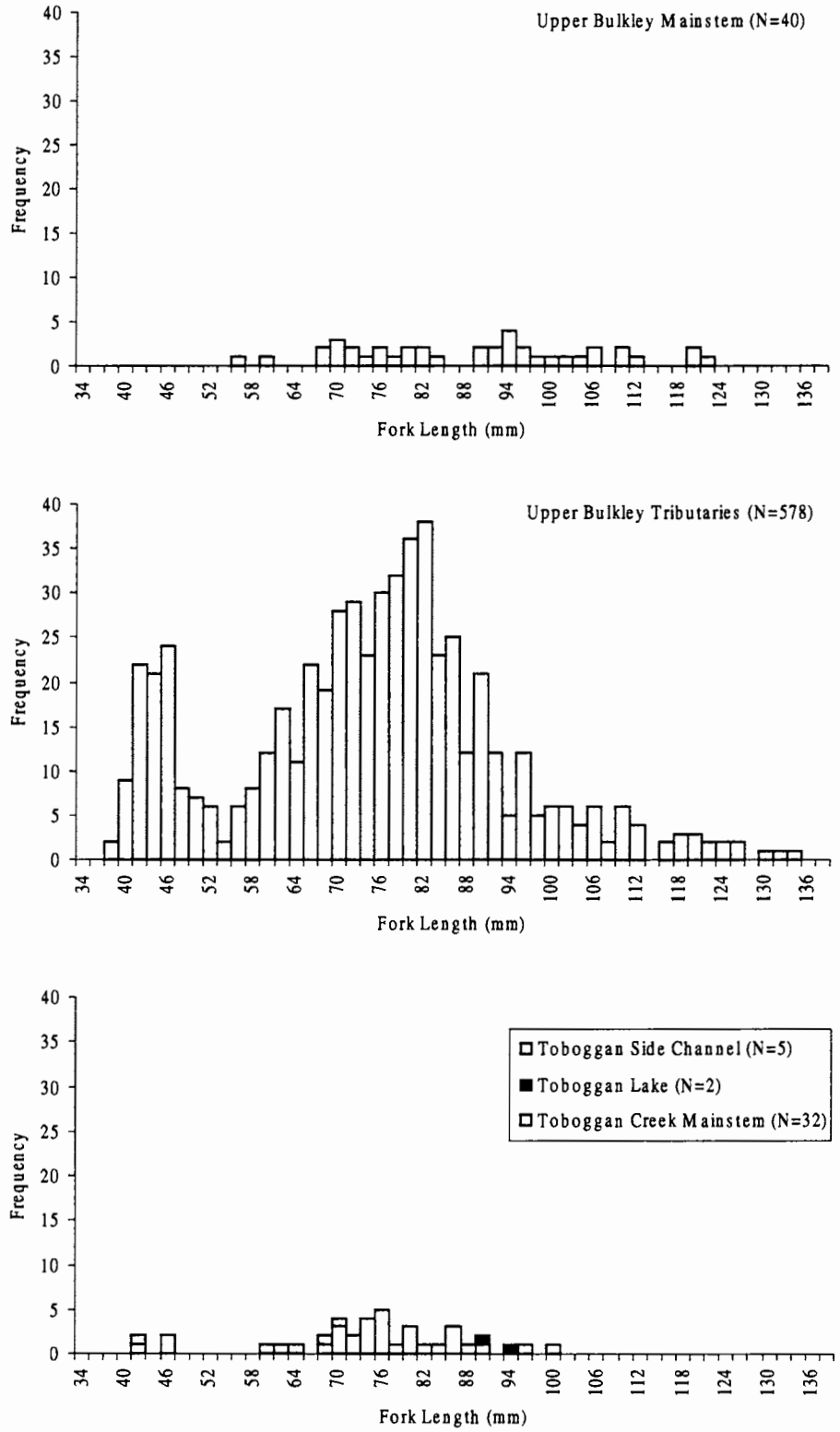

Plate 24. Fork length distribution for rainbow trout captured at Upper Bulkley mainstem, Upper Bulkley tributary and Toboggan Creek sites throughout the winter.

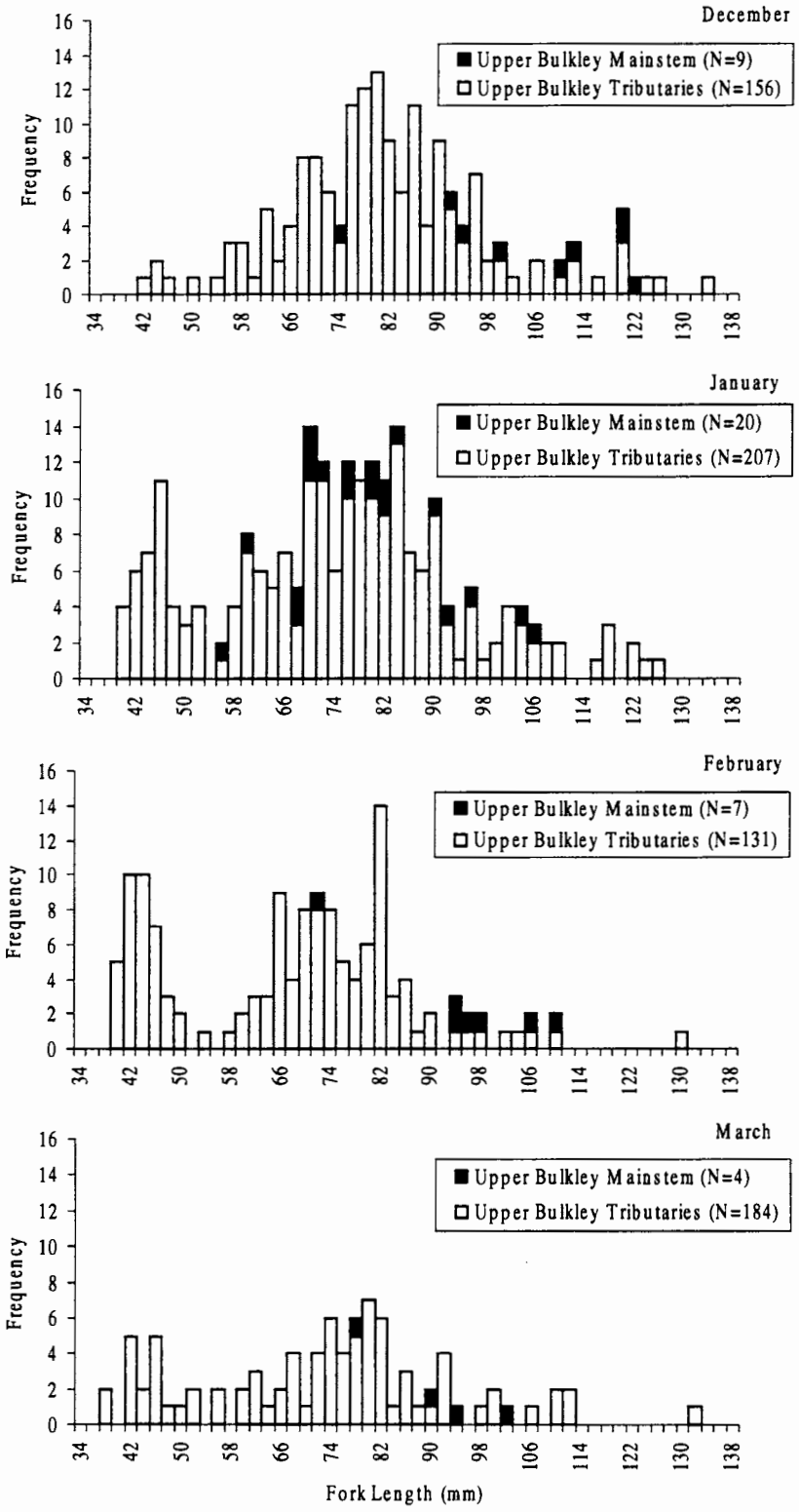

Plate 25. Fork length distribution for rainbow trout for December, January, February and March samples obtained in the Upper Bulkley watershed.

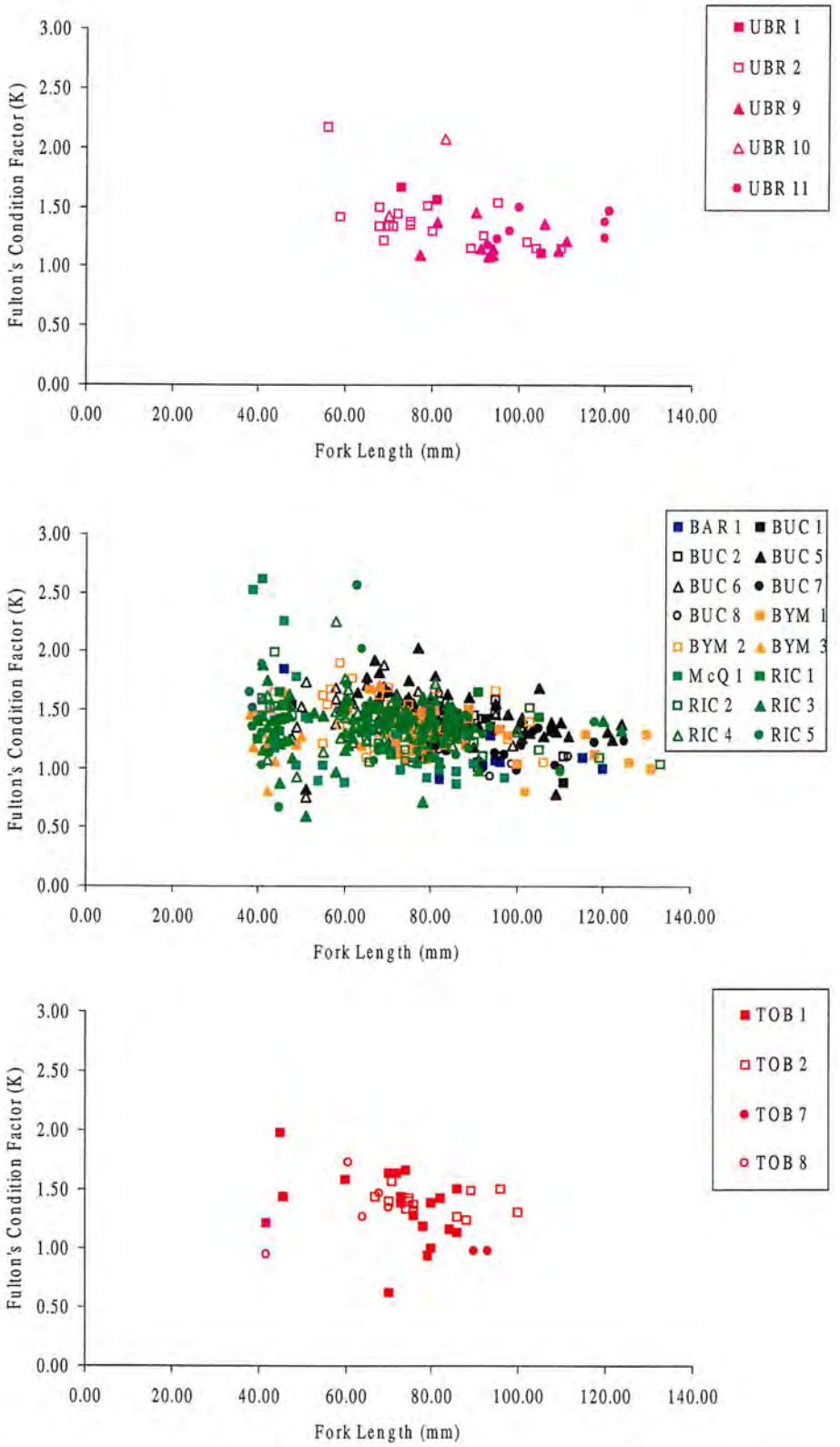

Plate 26. Relationship between Fulton's condition factor and fork length for rainbow trout captured in Upper Bulkley mainstem, tributary and Toboggan Creek.

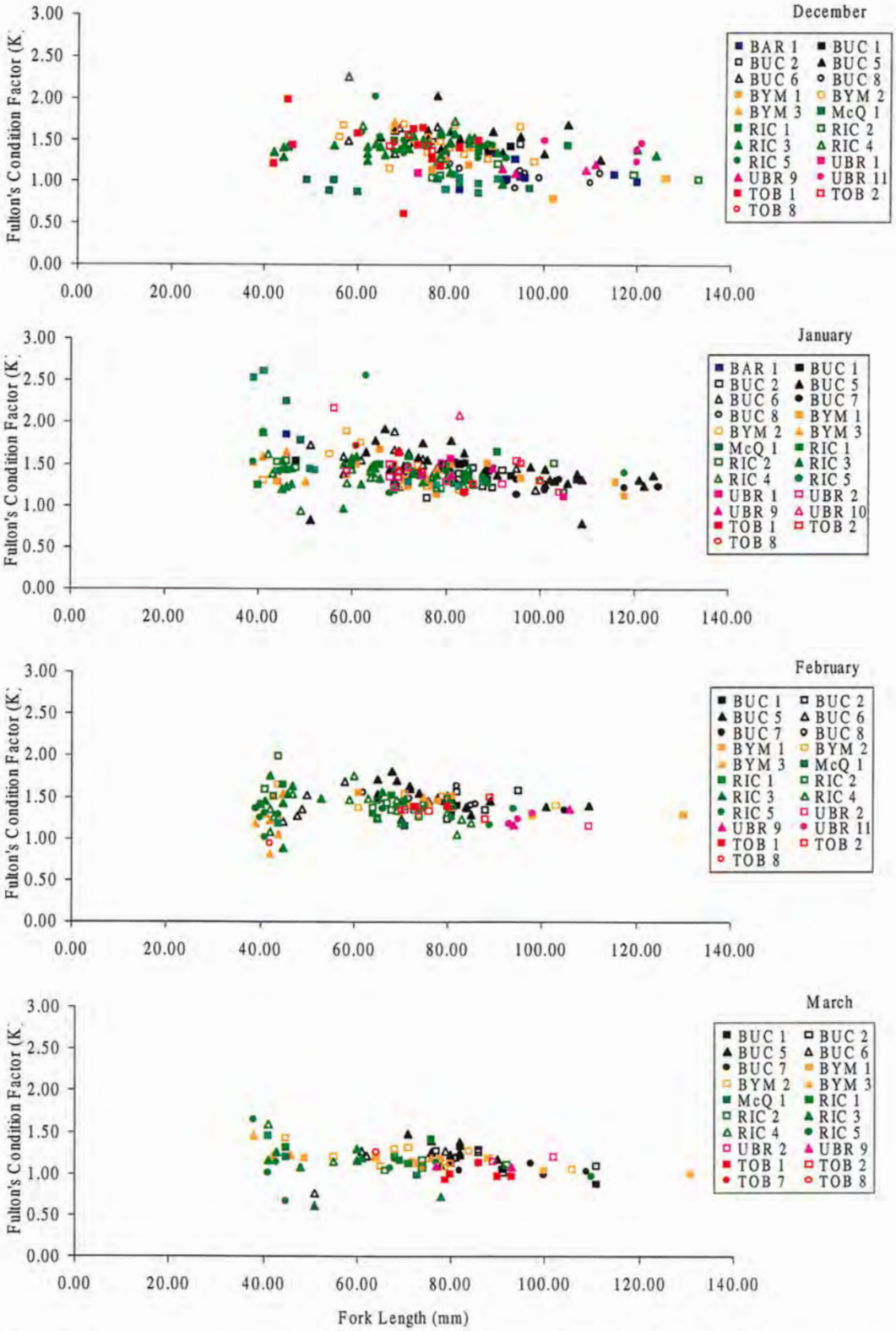

Plate 27. Relationship between Fultons' condition factor and fork length for rainbow trout captured during the four months of the overwintering study (December, January, February and March)

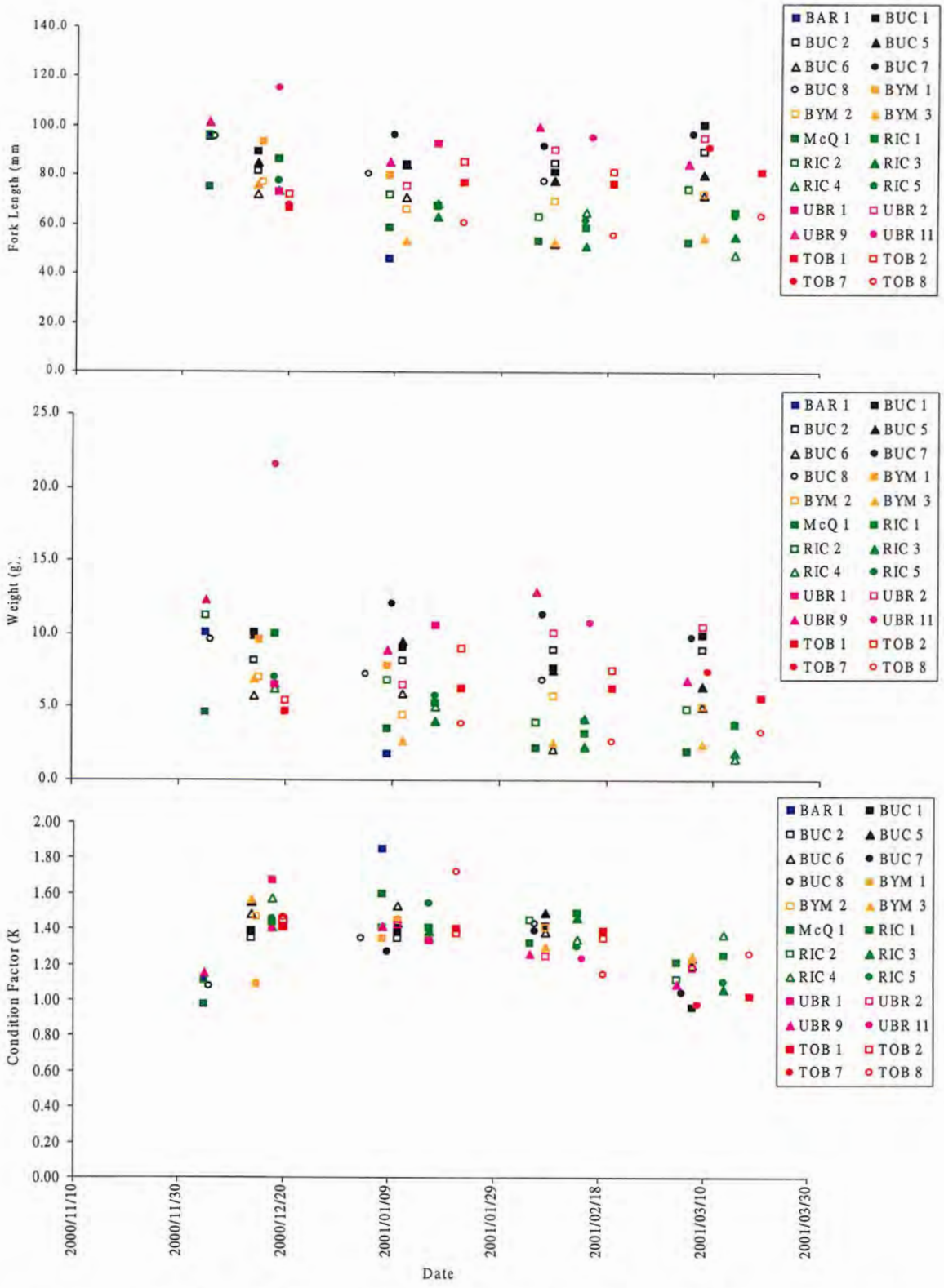

Plate 28. Changes in fork length, weight and condition factor of rainbow trout captured during the overwintering study.

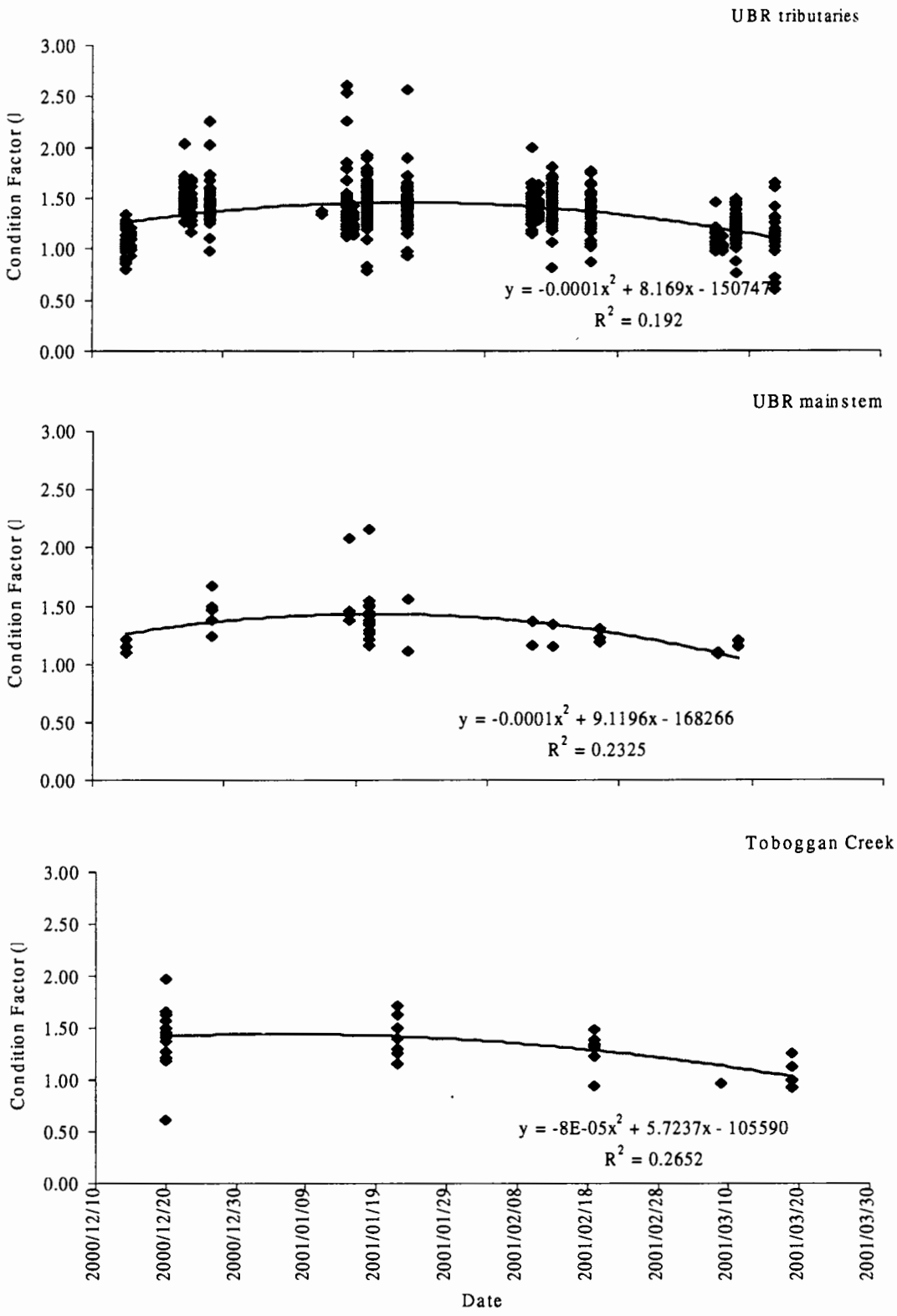

Plate 29. Changes in fork length, weight and condition factor of rainbow trout captured during the overwintering study, showing trend lines.

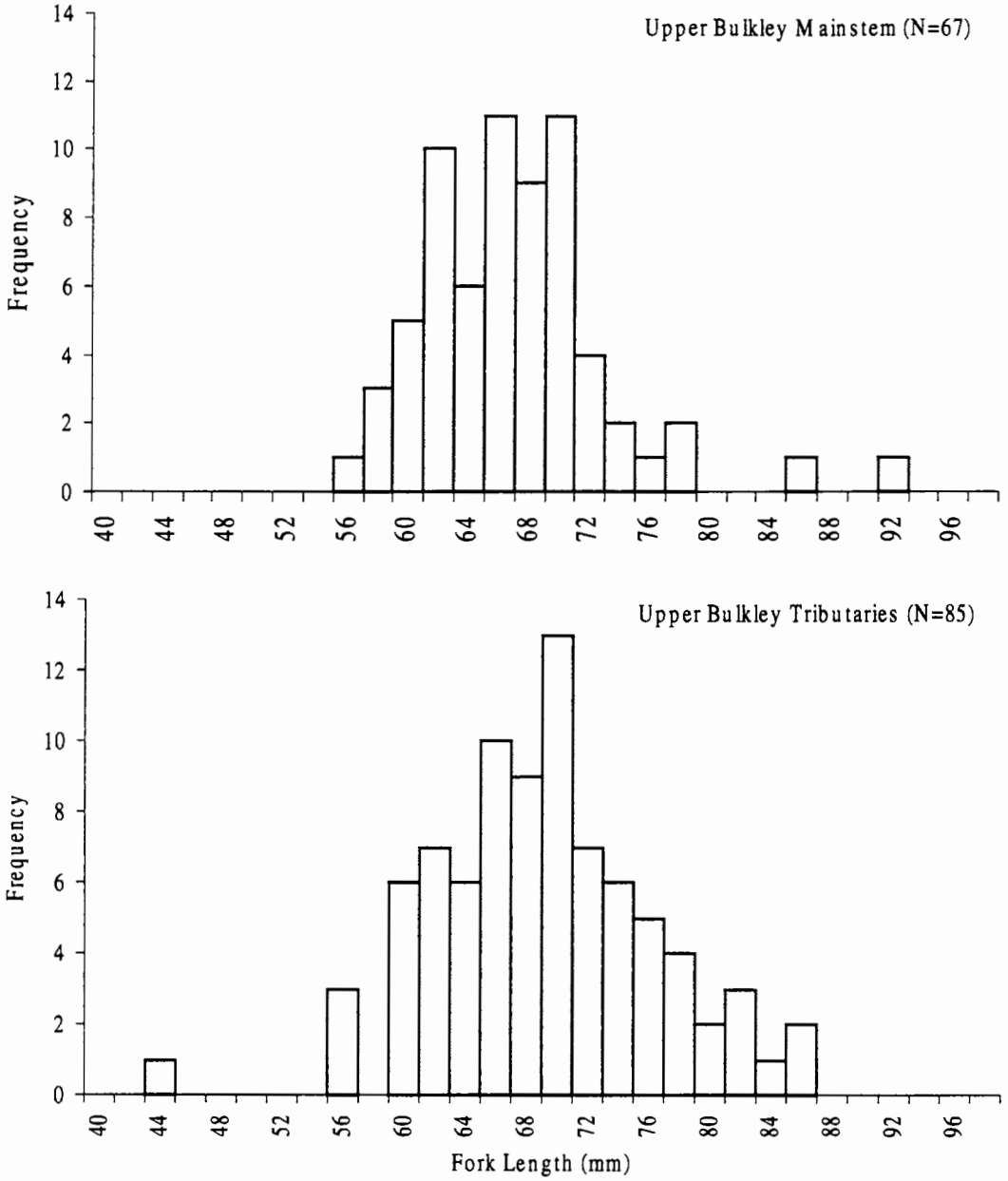

Plate 30. Length frequency histogram for chinook captured in the Upper Bulkley watershed.

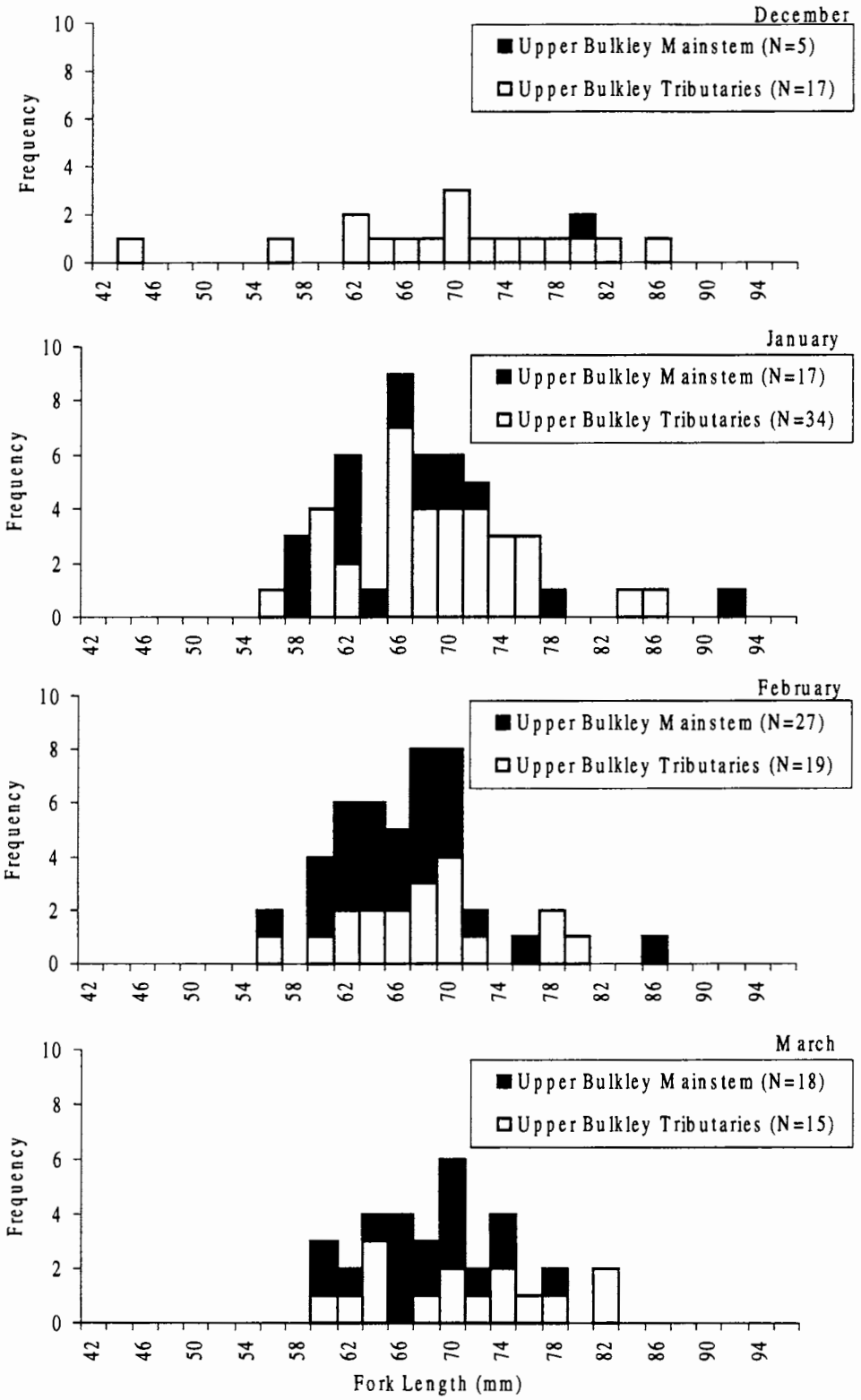

Plate 31. Length frequency histograms for chinook captured during the four months of the overwintering study in the Upper Bulkley watershed.

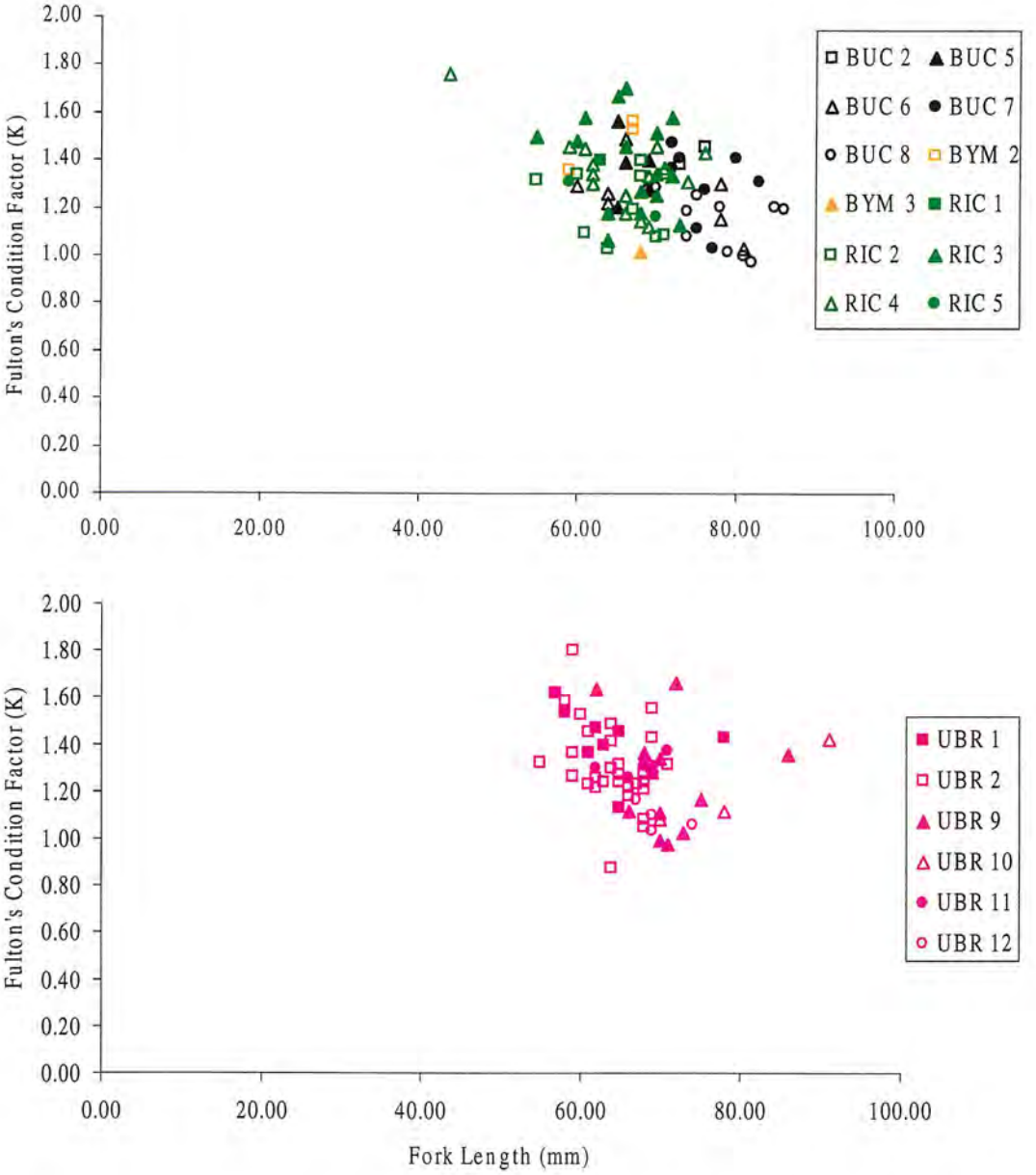

Plate 32. Relationship of Fulton's condition factor and fork length for chinook captured in Upper Bulkley tributary (above) and mainstem sites (below)

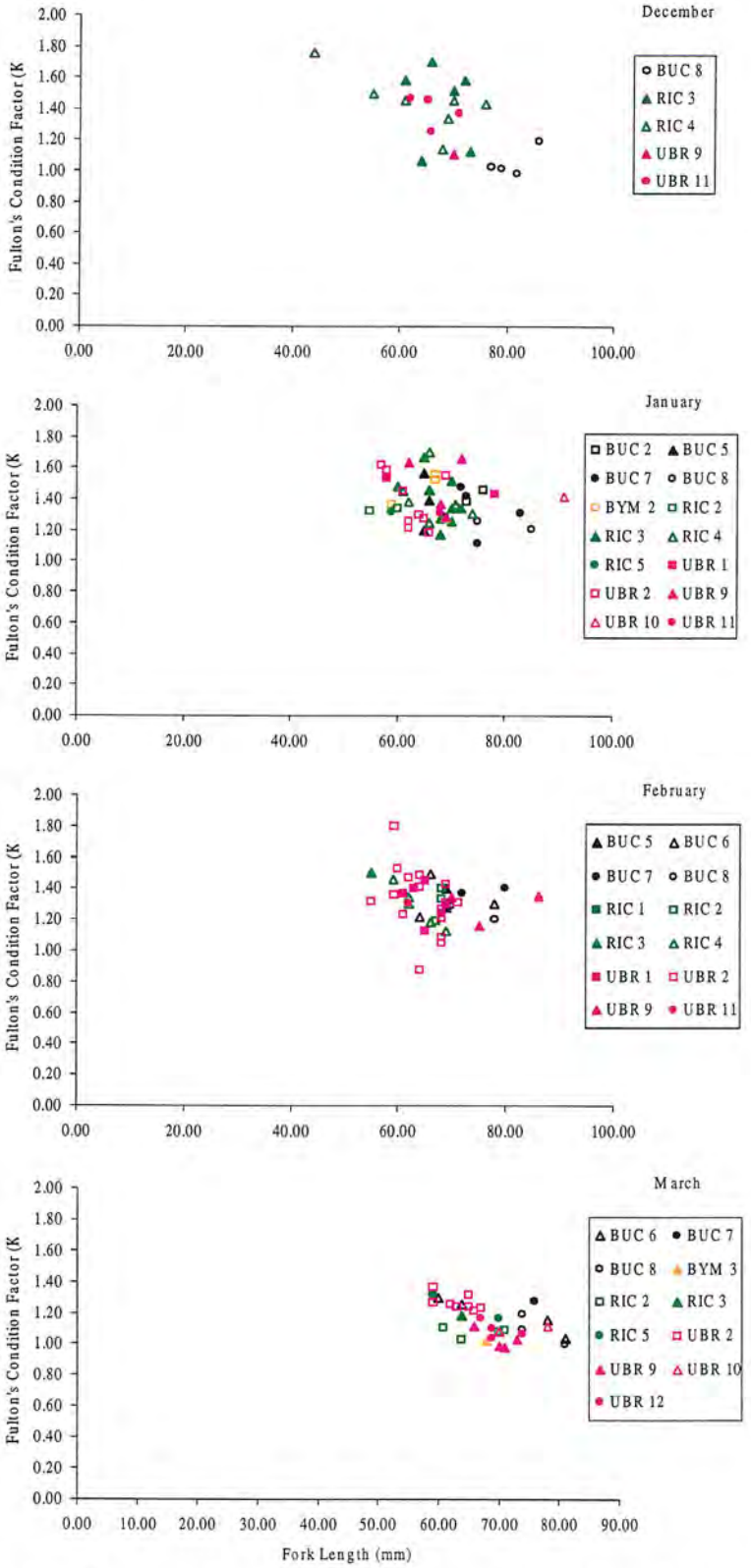

Plate 33. Relationship of Fulton's condition factor and fork length for chinook captured in the four months of the overwintering study.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC- 1 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-17	10:05	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Snowing

Air Temperature -5 ° C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	77
Ice thickness (cm)	40
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	34
Water Temperature	0.8 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	70 uS
Dissolved Oxygen (bottom)	13 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	6	51	85
RB	6	40	91

FISH COLLECTION SUMMARY

Date of Setting	2001-01-17	**Date of Collection**	2001-01-18
Time of Setting	10:10	**Time of Collection**	10:55
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 6 RB / 6

Comments

pH = 7.5

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 1 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	85	7.9	UM	
MT	1	1	CO	55	3.1	UM	
MT	1	2	RB	81	7.3	UM	
MT	1	2	CO	58	3.4	UM	
MT	1	2	RB	91	12.4	UM	
MT	1	2	RB	69	3.9	UM	
MT	1	2	RB	66	4.3	UM	
MT	1	2	RB	40	0.8	UM	
MT	1	2	CO	56	2.4	UM	
MT	1	2	CO	67	4	UM	
MT	1	2	RB	60	3.2	UM	
MT	1	2	CO	51	2.4	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 1 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-14	10:05	TJ<TD<JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Snowing

Air Temperature -2 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	74
Ice thickness (cm)	56
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	43
Water Temperature	0.7 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	80 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	2	44	46
CH	1	63	63
RB	3	45	68

FISH COLLECTION SUMMARY

Date of Setting	2001-02-14	**Date of Collection**	2001-02-15
Time of Setting	10:05	**Time of Collection**	11:20
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 2 CH / 1 RB / 3

Comments

pH = 7.2

Feb. 15/01 Temp + -15

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 1 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	13	Looking down into trap hole
OW4	14	Site view looking dodwnstream.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CH	63	3.5	UM	
MT	1	1	RB	64	3.4	UM	
MT	1	1	CO	44	1.3	UM	
MT	1	2	CO	46	1.3	UM	
MT	1	3	RB	68	4.8	UM	
MT	1	3	RB	45	1.5	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 1 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-14	10:10	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Sunny and clear

Air Temperature -3 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	76
Ice thickness (cm)	69
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	36
Water Temperature	1.2 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	3 ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	4	45	76

FISH COLLECTION SUMMARY

Date of Setting	2001-03-14	**Date of Collection**	2001-03-15
Time of Setting	10:15	**Time of Collection**	9:50
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 4

Comments

pH = 7.3

Air pocket between ice layers.
41cm of ice above water surface.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 1 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	76	6.2	UM	
MT	1	2	RB	71	4	UM	
MT	1	2	RB	69	3.8	UM	
MT	1	3	RB	45	1.2	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 2 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-05	13:55	BD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather High overcast

Air Temperature 4 ° C

Ice Cover (%) 70

Stream Flow H (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	92
Ice thickness (cm)	14
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	1.2 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	60 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	6	75	133
CO	1	75	75

FISH COLLECTION SUMMARY

Date of Setting	2000-12-05	**Date of Collection**	2000-12-06
Time of Setting	13:55	**Time of Collection**	9:30
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				70	CO / 1 RB / 6

Comments

Frazzle ice.
Ice already has layers- some water flowing over ice, traps set in woody debris in middle of site.
On December 6/00 thaw and rain, more water flowing over the ice.

pH = 7.6

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 2 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	76	4.6	UM	
MT	1	1	CO	75	4.7	UM	
MT	1	1	RB	79	5.9	UM	
MT	1	1	RB	133	24.3	UM	
MT	1	1	RB	119	18.3	UM	
MT	1	1	RB	90	8.9	UM	
MT	1	1	RB	78	5.1	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 2 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-08	10:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Clear and sunny.

Air Temperature -4 °C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	73
Ice thickness (cm)	53
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	18
Water Temperature	1 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	80 *uS*
Dissolved Oxygen (bottom)	13 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	15	46	60
CH	3	55	71
RB	7	44	105

FISH COLLECTION SUMMARY

Date of Setting	2001-01-08	**Date of Collection**	2001-01-09
Time of Setting	10:30	**Time of Collection**	10:10
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 15 CH / 3 RB / 7

Comments

Approx. eight layers of ice.

Moved trap hole just behind limno pole as there was not enough water in original hole, new trap hole is less than 1 meter difference from original hole.

pH = 8.2

January 9th temp. = -6 and overcast.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 2 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CH	55	2.2	UM	
MT	1	1	CH	71	4.8	UM	
MT	1	1	RB	79	5.9	UM	
MT	1	1	CO	48	2	UM	
MT	1	1	CO	48	1.4	UM	
MT	1	1	CO	55	2.3	UM	
MT	1	1	CO	54	1.8	UM	
MT	1	1	CO	46	1.1	UM	
MT	1	1	RB	46	1.5	UM	
MT	1	1	CO	48	1.3	UM	
MT	1	1	RB	48	1.6	UM	
MT	1	1	RB	80	7.5	UM	
MT	1	2	RB	44	1.3	UM	
MT	1	2	CO	55	2.2	UM	
MT	1	2	RB	105	13.4	UM	
MT	1	3	RB	103	16.5	UM	
MT	1	3	CO	54	2.4	UM.	
MT	1	3	CO	52	2	UM	
MT	1	3	CO	51	1.7	UM	
MT	1	3	CO	60	2.7	UM	
MT	1	3	CH	60	2.9	UM	
MT	1	3	CO	52	2	UM	
MT	1	3	CO	51	1.7	UM	
MT	1	3	CO	61	2.9	UM	
MT	1	3	CO	59	2.7	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 2 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-05	9:50	TTJ<TD<JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather High overcast.

Air Temperature -10 ° C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	74
Ice thickness (cm)	60
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	29
Water Temperature	0.2 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	60 *uS*
Dissolved Oxygen (bottom)	13 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	46	44	68
CH	3	67	68
RB	12	41	75

FISH COLLECTION SUMMARY

Date of Setting	2001-02-05	**Date of Collection**	2001-02-06
Time of Setting	10:00	**Time of Collection**	9:45
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 46, CH / 3, RB / 12

Comments

pH = 7.4
February 6/01, light snowfall.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 2 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	12	Looking into trap hole.
OW3	13	Site view loooking downstream.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	68	3.9	UM	
MT	1	1	RB	67	4.3	UM	
MT	1	1	CO	47	1.6	UM	
MT	1	1	CO	58	3	UM	
MT	1	1	RB	80	7.6	UM	
MT	1	1	RB	65	3.4	UM	
MT	1	1	CO	47	2.1	UM	
MT	1	1	CO	49	1.4	UM	
MT	1	1	CO	49	1.9	UM	
MT	1	1	RB	73	5.2	UM	
MT	1	1	RB	65	4	UM	
MT	1	1	CO	54	1.9	UM	
MT	1	1	CO	54	1.8	UM	
MT	1	1	CO	51	1.9	UM	
MT	1	1	CO	54	1.9	UM	
MT	1	1	CO	56	2.3	UM	
MT	1	1	CO	45	1.1	UM	
MT	1	1	CO	49	1.8	UM.	
MT	1	1	CO	46	1.6	UM	
MT	1	1	RB	41	1.1	UM	
MT	1	1	RB	44	1.7	UM	
MT	1	1	CO	50	1.8	UM	
MT	1	2	CO	49	1.3	UM	
MT	1	2	RB	68	4.2	UM	
MT	1	2	CO	59	2.8	UM	
MT	1	2	CH	68	4.4	UM	
MT	1	2	CH	67	3.6	UM	
MT	1	2	CO	61	2.8	UM	
MT	1	2	CO	52	2	UM	
MT	1	2	CO	45	1.2	UM	
MT	1	2	CO	48	1.4	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC- 2 (first three letters of stream name-site number)

VISIT # 3

MT	1	2	CO	53	1.9	UM	
MT	1	2	CO	48	1.4	UM	
MT	1	2	CO	48	1.7	UM	
MT	1	2	CO	48	1.3	UM	
MT	1	2	CO	47	1.4	UM	
MT	1	1	CO	47	1.3	UM	
MT	1	2	CO	46	1.5	UM	
MT	1	2	CO	50	1.9	UM	
MT	1	2	CO	53	2	UM	
MT	1	2	CO	53	2	UM	
MT	1	2	CO	48	1.4	UM	
MT	1	2	CO	49	2.3	UM	
MT	1	2	CO	50	1.7	UM	
MT	1	2	CO	49	1.5	UM	
MT	1	2	CO	54	2	UM	
MT	1	2	CO	56	2.1	UM	
MT	1	2	RB	43	1.2	UM	
MT	1	2	CO	50	1.7	UM	
MT	1	2	CO	44	1.1	UM	
MT	1	3	CH	68	4.2	UM	
MT	1	3	RB	74	5.1	UM	
MT	1	3	RB	75	5.9	UM	
MT	1	3	CO	54	2	UM	
MT	1	3	RB	64	3.6	UM	
MT	1	3	CO	45	1.2	UM	
MT	1	3	CO	54	2.3	UM	
MT	1	3	CO	57	2.2	UM	
MT	1	3	CO	51	1.7	UM	
MT	1	3	CO	54	2.1	UM	
MT	1	3	CO	49	1.5	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 2 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-05	9:57	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Sunny and clear

Air Temperature -7 ° C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	52
Ice thickness (cm)	73
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	29
Water Temperature	1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	13 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	23	47	100
CH	4	61	71
RB	5	66	92

FISH COLLECTION SUMMARY

Date of Setting	2001-03-05	**Date of Collection**	2001-03-06
Time of Setting	9:57	**Time of Collection**	10:00
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 23 CH / 4 RB / 5 / / /

Comments

pH = 7.8

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 2 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	50	1.2	UM	
MT	1	1	RB	66	3	UM	
MT	1	1	RB	92	8.6	UM	
MT	1	1	RB	68	3.8	UM	
MT	1	1	CO	51	1.5	UM	
MT	1	1	CH	61	2.5	UM	
MT	1	1	CO	55	1.7	UM	
MT	1	1	CO	51	1.4	UM	
MT	1	1	CO	54	1.7	UM	
MT	1	1	CO	57	1.7	UM	
MT	1	2	RB	74	4.7	UM	
MT	1	2	CO	57	1.8	UM	
MT	1	2	CH	71	3.9	UM	
MT	1	2	CO	63	2.6	UM	
MT	1	2	CH	64	2.7	UM	
MT	1	2	CO	51	1.3	UM	
MT	1	2	CO	59	2.1	UM	
MT	1	2	CH	70	3.7	UM	
MT	1	2	CO	51	1.8	UM	
MT	1	2	CO	57	2.1	UM	
MT	1	2	CO	54	1.6	UM	
MT	1	2	CO	54	1.7	UM	
MT	1	2	CO	48	1.1	UM	
MT	1	2	CO	53	1.5	UM	
MT	1	2	CO	51	1.6	UM	
MT	1	3	CO	100	10.4	UM	
MT	1	3	CO	52	1.7	UM	
MT	1	3	CO	56	1.4	UM	
MT	1	3	CO	60	2.2	UM	
MT	1	3	CO	56	1.9	UM	
MT	1	3	CO	47	1.1	UM	
MT	1	3	RB	74	4.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 3 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-18	11:25	TJ,BD,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Overcast with snow flurries

Air Temperature 1 °C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	28	
Ice thickness (cm)	38	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	14	
Water Temperature	0	°C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity	80	*uS*
Dissolved Oxygen (bottom)	11	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	4	49	60
RB	16	64	92

FISH COLLECTION SUMMARY

Date of Setting	2000-12-18	**Date of Collection**	2000-12-19
Time of Setting	11:25	**Time of Collection**	11:45
Number of traps set	4	**Number of traps collected**	4

Comments

One cluster of four traps set at limno and spread out..

At all sites we are taking water depth to the bottom surface of the ice, water comes right up to the bottom of the ice surface, last year there was an air space.

pH = 7.5

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 3 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	88	9.9	UM	
MT	1	1	RB	86	8.6	UM	
MT	1	1	RB	70	4.6	UM	
MT	1	1	RB	70	5.1	UM	
MT	1	1	RB	70	5.1	UM	
MT	1	1	RB	74	5.9	UM	
MT	1	1	RB	86	9	UM	
MT	1	2	RB	65	4.2	UM	
MT	1	2	CO	49	2	UM	
MT	1	3	RB	89	10.1	UM	
MT	1	3	RB	86	8.2	UM	
MT	1	3	RB	92	10	UM	
MT	1	3	RB	86	8.7	UM	
MT	1	3	RB	61	3.6	UM	
MT	1	3	CO	51	1.9	UM	
MT	1	3	CO	51	2.5	UM	
MT	1	3	CO	60	3.5	UM	
MT	1	3	RB	64	5.3	UM	
MT	1	3	RB	68	4.3	UM	
MT	1	3	RB	87	9.4	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 3 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-17	10:45	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Snowing

Air Temperature -5 ° C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	52	
Ice thickness (cm)	32	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	34	
Water Temperature	0.1	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity	80	*uS*
Dissolved Oxygen (bottom)	12	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	12	40	62
CH	1	59	59
RB	14	39	118
LNC	1	90	90

FISH COLLECTION SUMMARY

Date of Setting	2001-01-17	**Date of Collection**	2001-01-18
Time of Setting	10:50	**Time of Collection**	11:20
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 11 CH / 5 RB / 14
MT	2				100	CO / 19 CH / 4 RB / 8
MT	1				100	CO / 12 CH / 1 RB / 14 LNC / 1

Comments

pH = 8.1

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 3 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	86	9	UM	
MT	1	1	RB	65	4	UM	
MT	1	1	RB	72	6	UM	
MT	1	1	CO	61	3.2	UM	
MT	1	1	CO	49	1.5	UM	
MT	1	1	CH	65	4.6	UM	
MT	1	1	RB	61	3.6	UM	
MT	1	1	CO	50	2	UM	
MT	1	1	CO	52	2	UM	
MT	1	1	CO	67	3.8	UM	
MT	1	1	RB	45	1.1	UM	
MT	1	1	RB	41	1.3	UM	
MT	1	1	RB	45	1.4	UM	
MT	1	1	RB	58	1.9	UM	
MT	1	2	RB	84	7.8	UM	
MT	1	2	CO	80	7.3	UM	
MT	1	2	RB	86	8	UM	
MT	1	2	CO	89	9.4	UM	
MT	1	2	CH	70	4.6	UM	
MT	1	2	RB	66	3.8	UM	
MT	1	2	RB	78	6.5	UM	
MT	1	2	CO	49	1.6	UM	
MT	1	2	CH	60	3.2	UM	
MT	1	2	CH	68	4	UM	
MT	1	2	RB	46	1.2	UM	
MT	1	3	RB	89	9.1	UM	
MT	1	3	CO	46	1.3	UM	
MT	1	3	RB	75	5.4	UM	
MT	1	3	CO	68	4.1	UM	
MT	1	3	CH	70	4.3	UM	
MT	2	1	CO	50	1.7	UM	
MT	2	1	CO	54	1.9	UM	
MT	2	1	CO	50	2.5	UM	
MT	2	1	RB	47	1.3	UM	
MT	2	1	CH	68	3.7	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 3 (first three letters of stream name-site number)

VISIT # 2

MT	2	2	CO	51	1.6	UM	
MT	2	2	CO	49	1.5	UM	
MT	2	2	CH	70	5.2	UM	
MT	2	3	CO	50	1.8	UM	
MT	2	3	CO	60	3.1	UM	
MT	2	3	CO	51	1.9	UM	
MT	2	3	RB	45	1.4	UM	
MT	2	3	RB	85	8.3	UM	
MT	2	3	RB	64	3.8	UM	
MT	2	3	CH	66	4.2	UM	
MT	2	3	CO	52	1.7	UM	
MT	2	3	CO	52	1.9	UM	
MT	2	3	CO	51	1.4	UM	
MT	2	3	RB	47	1.5	UM	
MT	2	3	CO	51	2.2	UM	
MT	2	3	CO	51	1.7	UM	
MT	2	3	CO	55	2	UM	
MT	2	3	CO	58	2.6	UM	
MT	2	4	RB	62	3	UM	
MT	2	4	CO	53	2.3	UM	
MT	2	4	RB	60	3.4	UM	
MT	2	4	CO	44	1.3	UM	
MT	2	4	RB	73	5.4	UM	
MT	2	4	CH	72	5	UM	
MT	2	4	CO	50	1.5	UM	
MT	2	4	CO	55	2.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 3 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-14	10:45	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Snowing.

Air Temperature -4 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	52
Ice thickness (cm)	38
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	45
Water Temperature	0.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	80 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	6	47	57
RB	14	39	94

FISH COLLECTION SUMMARY

Date of Setting	2001-02-14	**Date of Collection**	2001-02-15
Time of Setting	10:45	**Time of Collection**	11:56
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 6 RB / 14

Comments

pH = 7.2

Temperature on February 15 = -13.

Fell through the ice.

Trap # 3 lots of mayfly and caddis larva.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 3 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	17	Site view looking downstream
OW4	18	Limno hole showing sunken banks ie dropping water level.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	52	1.7	UM	
MT	1	1	CO	61	2.7	UM	
MT	1	1	CO	49	1.9	UM	
MT	1	1	CO	50	1.6	UM	
MT	1	1	RB	46	1.5	UM	
MT	1	1	CO	56	1.7	UM	
MT	1	1	CO	55	1.7	UM	
MT	1	2	RB	45	1.3	UM	
MT	1	2	RB	70	5	UM	
MT	1	2	CO	52	2.2	UM	
MT	1	2	CO	53	2.5	UM	
MT	1	2	CO	55	2.5	UM	
MT	1	2	CO	52	1.8	UM	
MT	1	2	RB	53	2.2	UM	
MT	1	2	CO	50	2.9	UM	
MT	1	2	SUC	113	16	UM	
MT	1	3	CO	58	2.3	UM	
MT	1	3	CO	57	2	UM	
MT	1	3	CO	50	1.5	UM	
MT	1	3	CO	51	1.7	UM	
MT	2	1	CO	56	3	UM	
MT	2	1	RB	66	4.5	UM	
MT	2	2	CO	56	2.6	UM	
MT	2	2	CO	50	1.6	UM	
MT	2	3	CH	55	2.5	UM	
MT	2	3	RB	45	0.8	UM	
MT	2	3	RB	40	0.9	UM	
MT	2	4	RB	47	1.7	UM	
MT	2	4	RB	71	5.3	UM	
MT	2	4	RB	42	1.3	UM	
MT	2	4	RB	41	1	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 3 (first three letters of stream name-site number)

VISIT # 3

MT	2	4	CO	73	5.1	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 3 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-14	10:45	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code

Weather Sunny and Clear

Air Temperature -3 °C

Ice Cover (%) 85

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	54
Ice thickness (cm)	40
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	31
Water Temperature	0.6 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	5	44	55
RB	9	38	110

FISH COLLECTION SUMMARY

Date of Setting	2001-03-14	**Date of Collection**	2001-03-15
Time of Setting	10:45	**Time of Collection**	10:20
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				85	CO / 5 RB / 9

Comments

pH = 7.4

Ice thickness above water surface is 9cm.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 3 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	78	3.4	UM	
MT	1	1	CO	69	3.2	UM	
MT	1	1	CO	48	1	UM	
MT	1	2	RB	60	2.5	UM	
MT	1	2	RB	43	1	UM	
MT	1	2	CO	51	1.1	UM	
MT	1	2	CO	54	1.8	UM	
MT	1	3	RB	61	2.7	UM	
MT	1	4	LNC				
MT	1	4	RB	51	0.8	UM	
MT	1	4	CO	51	1.4	UM	
MT	1	4	CH	64	3.1	UM	
MT	2	1	NFC				
MT	2	2	RB	60	2.8	UM	
MT	2	3	RB	41	0.8	UM	
MT	2	3	CO	66	2.9	UM	
MT	2	3	CO	59	2.1	UM	
MT	2	3	RB	48	1.2	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 4 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-18	10:00	BD,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Overcast with snow flurries

Air Temperature 1 ° C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	26
Ice thickness (cm)	31
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	14
Water Temperature	0.2 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	80 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	5	46	77
RB	10	58	86
CH	7	44	76

FISH COLLECTION SUMMARY

Date of Setting	2000-12-18	**Date of Collection**	2000-12-09
Time of Setting	11:00	**Time of Collection**	11:30
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 5 RB / 10 CH / 7

Comments

Limno station appears to have filled in a little more so we couldn't set traps at the limno, ie: couldn't set near the boulder cluster.

Set all four traps just downstream of cutbank. Water depth at set location is 81 cm. Ice thickness here is 14cm.

pH = 7.6

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 4 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	58	4.4	UM	
MT	1	1	RB	86	9.4	UM	
MT	1	1	RB	81	9.2	UM	
MT	1	1	RB	80	8.2	UM	
MT	1	1	CH	69	4.4	UM	
MT	1	1	CH	68	3.6	UM	
MT	1	2	CO	53	2.3	UM	
MT	1	2	CO	77	6.1	UM	
MT	1	2	CH	76	6.3	UM	
MT	1	2	CH	70	5	UM	
MT	1	2	CO	61	3.1	UM	
MT	1	2	CO	53	2.1	UM	
MT	1	2	CO	46	1.5	UM	
MT	1	2	CH	61	3.3	UM	
MT	1	2	CH	44	1.5	UM	
MT	1	3	RB	61	3.8	UM	
MT	1	4	RB	78	6.1	UM	
MT	1	4	RB	77	5.7	UM	
MT	1	4	CH	55	2.5	UM	
MT	1	4	RB	71	5.6	UM	
MT	1	4	RB	74	5.9	UM	
MT	1	4	RB	70	4.8	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 4 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-17	11:15	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Snowing

Air Temperature -5 °C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	79	
Ice thickness (cm)	27	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	32	
Water Temperature	0.1	°C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity	80	*uS*
Dissolved Oxygen (bottom)	12	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	5	50	60
CH	6	61	74
RB	21	42	100

FISH COLLECTION SUMMARY

Date of Setting	2001-01-17	**Date of Collection**	2001-01-18
Time of Setting	11:20	**Time of Collection**	11:35
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 5 CH / 6 RB / 21

Comments

pH = 7.3

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 4 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	2	RB	84	8.1	UM	
MT	1	2	CO	51	2.5	UM	
MT	1	2	RB	85	8.9	UM	
MT	1	2	CH	74	5.3	UM	
MT	1	2	RB	80	6.7	UM	
MT	1	2	CH	66	3.6	UM	
MT	1	2	RB	58	2.9	UM	
MT	1	2	CH	66	4.9	UM	
MT	1	2	RB	77	6.1	UM	
MT	1	2	RB	69	4.1	UM	
MT	1	2	RB	64	3.7	UM	
MT	1	2	RB	59	2.6	UM	
MT	1	2	RB	42	1.2	UM	
MT	1	2	RB	85	8.9	UM	
MT	1	2	CO	62	3.1	UM	
MT	1	2	RB	60	3.1	UM	
MT	1	2	RB	49	1.1	UM	
MT	1	3	RB	69	4.7	UM	
MT	1	3	CH	71	4.9	UM	
MT	1	3	RB	78	5.8	UM	
MT	1	3	RB	84	7.4	UM	
MT	1	3	RB	100	13.2	UM	
MT	1	3	RB	46	1.4	UM	
MT	1	3	CH	61	3.3	UM	
MT	1	3	CH	62	3.3	UM	
MT	1	3	RB	64	3.5	UM	
MT	1	3	RB	43	1.1	UM	
MT	1	3	CO	51	1.8	UM	
MT	1	3	CO	60	3.5	UM	
MT	1	3	RB	65	3.7	UM	
MT	1	4	RB	81	6.9	UM	
MT	1	4	CO	50	1.8	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 4 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-14	11:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather High overcast.

Air Temperature -4 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	69
Ice thickness (cm)	15
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	11
Water Temperature	0.1 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	80 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	18	49	91
CH	5	59	69
RB	17	42	85
SUC	1	96	96

FISH COLLECTION SUMMARY

Date of Setting	2001-02-14	**Date of Collection**	2001-02-15
Time of Setting	11:10	**Time of Collection**	12:11
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 18 CH / 5 RB / 17 SUC / 1 /

Comments

pH = 7.1

February 15/01 temperature = -13.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 4 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	16	Site view , limno and trap hole visible.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	56	3.1	UM	
MT	1	1	RB	47	1.6	UM	
MT	1	1	CO	56	2.7	UM	
MT	1	1	RB	81	7.5	UM	
MT	1	1	RB	59	3	UM	
MT	1	1	RB	80	6.7	UM	
MT	1	1	CH	62	3.1	UM	
MT	1	1	RB	63	3.7	UM	
MT	1	1	CO	55	1.9	UM	
MT	1	1	CO	59	2.5	UM	
MT	1	1	CO	68	4	UM	
MT	1	1	CO	58	2.4	UM	
MT	1	1	RB	42	1	UM	
MT	1	1	CO	51	1.6	UM	
MT	1	1	CO	50	1.9	UM	
MT	1	2	CO	49	1.6	UM	
MT	1	2	RB	42	0.8	UM	
MT	1	2	RB	69	4.4	UM	
MT	1	2	CO	56	2.2	UM	
MT	1	2	CO	50	1.4	UM	
MT	1	2	CO	51	1.3	UM	
MT	1	2	SUC	96	12.8	UM	
MT	1	3	NFC				
MT	1	4	CO	70	3.9	UM	
MT	1	4	RB	60	3.8	UM	
MT	1	4	RB	69	4.8	UM	
MT	1	4	CH	62	3.2	UM	
MT	1	4	CO	91	9.6	UM	
MT	1	4	CH	66	3.4	UM	
MT	1	4	RB	83	7	UM	
MT	1	4	CO	53	1.5	UM	
MT	1	4	CO	51	1.4	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 4 (first three letters of stream name-site number)

VISIT # 3

MT	1	4	CH	69	3.7	UM	
MT	1	4	CH	59	3	UM	
MT	1	4	CO	58	2.4	UM	
MT	1	4	RB	82	5.8	UM	
MT	1	4	RB	43	1	UM	
MT	1	4	CO	54	1.7	UM	
MT	1	4	RB	70	4.1	UM	
MT	1	4	RB	71	5	UM	
MT	1	4	RB	85	7.3	UM	
MT	1	4	RB	65	3.4	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 4 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-14	11:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather sunny and clear

Air Temperature -3 °C

Ice Cover (%) 75

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	64
Ice thickness (cm)	22
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	0.3 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	2	65	71
RB	2	41	55

FISH COLLECTION SUMMARY

Date of Setting	2001-03-14	**Date of Collection**	2001-01-03
Time of Setting	11:00	**Time of Collection**	10:35
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				75	CO / 2 RB / 2

Comments

pH = 7.3

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC- 4 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	55	1.9	UM	
MT	1	2	NFC				
MT	1	3	CO	65	2.9	UM	
MT	1	3	RB	41	1.1	UM	
MT	1	4	CO	71	3.9	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 5 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-18	10:50	BD,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Overcast

Air Temperature 1 °C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	74
Ice thickness (cm)	39
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	14
Water Temperature	0.2 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	80 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	27	46	112
RB	32	42	120
CH	6	61	73

FISH COLLECTION SUMMARY

Date of Setting	2000-12-18	**Date of Collection**	2000-12-19
Time of Setting	10:50	**Time of Collection**	10:55
Number of traps set	7	**Number of traps collected**	7

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster											
MT	1				100	RB	8	CO	9	CH	1						
MT	2				100	RB	24	CO	18	CH	5						
MT	1				100	CO	4	RB	16								

Comments

Two clusters set 1) 3 traps set at limno station
2) 4 traps set at beaver lodge (small woody debris).

pH = 7.6

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 5 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	2	RB	44	1.2	UM	
MT	1	2	CO	66	4.6	UM	
MT	1	2	CO	75	6.1	UM	
MT	1	2	CO	49	1.6	UM	
MT	1	2	CO	66	3.7	UM	
MT	1	2	RB	42	1	UM	
MT	1	2	RB	78	7.6	UM	
MT	1	2	RB	45	1.3	UM	
MT	1	2	CO	47	1.3	UM	
MT	1	2	RB	84	8.7	UM	
MT	1	3	CH	72	5.9	UM	
MT	1	3	CO	65	4.7	UM	
MT	1	3	CO	58	3.2	UM	
MT	1	3	CO	46	1.8	UM	
MT	1	3	CO	89	11.1	UM	
MT	1	3	RB	72	5.8	UM	
MT	1	3	RB	80	7.5	UM	
MT	1	3	RB	75	6.2	UM	
MT	2	4	CO	80	7	UM	
MT	2	4	CO	80	6.8	UM	
MT	2	4	CO	68	3.3	UM	
MT	2	4	CH	70	5.2	UM	
MT	2	4	CO	55	2.8	UM	
MT	2	4	RB	120	24.2	UM	
MT	2	4	RB	62	3.2	UM	
MT	2	4	RB	64	3.8	UM	
MT	2	4	RB	69	4.6	UM	
MT	2	4	RB	80	5.7	UM	
MT	2	4	RB	90	9.9	UM	
MT	2	4	RB	55	2.4	UM	
MT	2	4	RB	71	5	UM	
MT	2	5	CH	64	2.8	UM	
MT	2	5	CH	73	4.4	UM	
MT	2	5	CO	51	1.4	UM	
MT	2	5	CO	54	2.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 5 (first three letters of stream name-site number)

VISIT # 1

MT	2	5	CO	51	2.2	UM	
MT	2	5	RB	78	7.5	UM	
MT	2	5	CH	61	3.6	UM	
MT	2	5	RB	79	6.8	UM	
MT	2	5	RB	74	6.1	UM	
MT	2	5	RB	81	8.4	UM	
MT	2	5	RB	62	3.4	UM	
MT	2	5	RB	78	6.3	UM	
MT	2	6	CO	112	19.2	UM	
MT	2	6	CO	99	13.6	UM	
MT	2	6	CH	66	4.9	UM	
MT	2	6	RB	70	5	UM	
MT	2	6	RB	85	9.4	UM	
MT	2	6	RB	80	7.6	UM	
MT	2	6	RB	65	3.9	UM	
MT	2	6	RB	124	25.3	UM	
MT	2	6	RB	66	3.8	UM	
MT	2	6	RB	84	9.1	UM	
MT	2	7	CO	79	4.5	UM	
MT	2	7	CO	66	2.6	UM	
MT	2	7	CO	63	3.3	UM	
MT	2	7	RB	91	7.4	UM	
MT	2	7	CO	51	1.1	UM	
MT	2	7	CO	52	2	UM	
MT	2	7	CO	52	1.7	UM	
MT	2	7	CO	55	2.6	UM	
MT	2	7	CO	54	1.7	UM	
MT	2	7	CO	55	2.2	UM	
MT	2	7	RB	44	1.1	UM	
MT	2	7	RB	62	3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 5 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-17	11:00	tj,td,jd

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Heavy snowfall

Air Temperature -5 °C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	64
Ice thickness (cm)	14
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	33
Water Temperature	0.1 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	70 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	30	44	89
CH	9	65	72
RB	22	45	89

FISH COLLECTION SUMMARY

Date of Setting	2001-01-17	**Date of Collection**	2001-01-18
Time of Setting	11:05	**Time of Collection**	12:00
Number of traps set	7	**Number of traps collected**	7

Comments

pH = 7.6

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 5 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CH	59	2.7	UM	
MT	1	1	CO	62	3.2	UM	
MT	1	1	LNC	90	8.4	UM	
MT	1	2	RB	73	5.5	UM	
MT	1	2	RB	65	4.1	UM	
MT	1	2	RB	88	9.1	UM	
MT	1	2	CO	51	2	UM	
MT	1	2	CO	51	1.9	UM	
MT	1	2	RB	68	3.6	UM	
MT	1	2	CO	40	0.9	UM	
MT	1	2	RB	45	1.3	UM	
MT	1	2	CO	51	1.7	UM	
MT	1	2	CO	50	1.8	UM	
MT	1	2	RB	39	0.9	UM	
MT	1	2	CO	50	1.9	UM	
MT	1	2	CO	49	1.3	UM	
MT	1	2	CO	51	1.6	UM	
MT	1	2	CO	45	1	UM	
MT	1	2	RB	46	1.4	UM	
MT	1	3	RB	61	3.9	UM	
MT	1	3	RB	72	5.5	UM	
MT	1	3	CO	56	3.1	UM	
MT	1	3	RB	63	6.4	UM	
MT	1	3	RB	80	7.2	UM	
MT	1	3	CO	49	1.3	UM	
MT	1	3	RB	41	1.3	UM	
MT	1	4	RB	118	23	UM	
MT	1	4	RB	84	8.2	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 5 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-14	11:15	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Snowing and extremely windy

Air Temperature -4 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	41	
Ice thickness (cm)	10	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	34	
Water Temperature	0.7	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity		*uS*
Dissolved Oxygen (bottom)	11	ppm
Dissolved Oxygen (surface)	3	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	19	49	73
CH	1	55	55
RB	11	40	71
SUC	1	113	113

FISH COLLECTION SUMMARY

Date of Setting	2001-02-14	**Date of Collection**	2001-02-15
Time of Setting	11:20	**Time of Collection**	12:36
Number of traps set	7	**Number of traps collected**	7

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster											
MT	1				100	CO	15	RB	4	SUC	1						
MT	2				100	CO	4	RB	7	CH	1						

Comments

pH = 8.1

February 15/01 temperature = -13

No conductivity reading taken as meter is not working.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 5 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	15	Site view looking downstrraam.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	44	1.1	UM	
MT	1	2	RB	41	0.7	UM	
MT	1	3	RB	75	5.7	UM	
MT	1	3	RB	73	5.3	UM	
MT	1	3	RB	89	8.2	UM	
MT	1	3	RB	81	6.6	UM	
MT	1	3	CO	47	1.8	UM	
MT	1	3	CO	57	2.5	UM	
MT	1	3	RB	66	3.9	UM	
MT	1	3	CO	56	2.2	UM	
MT	1	4	RB	39	0.8	UM	
MT	1	4	RB	69	4.5	UM	
MT	1	4	RB	40	0.8	UM	
MT	1	4	RB	94	11.3	UM	
MT	1	4	RB	74	5.4	UM	
MT	1	4	CO	49	1.3	UM	
MT	1	4	CO	51	1.7	UM	
MT	1	4	RB	41	0.9	UM	
MT	1	4	CO	49	2	UM	
MT	1	4	RB	40	0.9	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 5 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-02-14	11:10	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Sunny and clear

Air Temperature -3 °C

Ice Cover (%) 95

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	50
Ice thickness (cm)	4
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	1.1 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	7	48	69
CH	1	64	64
RB	8	41	78
LNC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-03-14	**Date of Collection**	2001-03-15
Time of Setting	11:10	**Time of Collection**	10:45
Number of traps set	7	**Number of traps collected**	7

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				95	CO / 5, CH / 1, RB / 5, LNC / 1
MT	2				95	CO / 2, RB / 3

Comments

pH = 7.2

Lnc not sampled

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 5 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	44	0.8	UM	
MT	1	2	CO	51	1.3	UM	
MT	1	2	RB	110	12.9	UM	
MT	1	2	RB	41	0.7	UM	
MT	1	2	RB	68	3.7	UM	
MT	1	3	CO	46	1	UM	
MT	1	3	RB	67	3.2	UM	
MT	1	3	CH	70	4	UM	
MT	1	4	RB	38	0.9	UM	
MT	1	4	RB	77	5.2	UM	
MT	1	4	CO	52	1.4	UM	
MT	1	4	CO	55	1.8	UM	
MT	1	4	RB	43	0.9	UM	
MT	1	4	RB	45	0.6	UM	
MT	1	4	RB	86	7.1	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 1 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-06	11:45	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River Side Channel		

Weather Overcast

Air Temperature 2 ° C

Ice Cover (%) 80

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	100
Ice thickness (cm)	8
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	1.5 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	180 *uS*
Dissolved Oxygen (bottom)	9 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
PCC	2		
SUC	2		

FISH COLLECTION SUMMARY

Date of Setting	2000-12-20
Time of Setting	11:45
Number of traps set	6
Date of Collection	2000-12-07
Time of Collection	9:56
Number of traps collected	6

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				80	SUC / 2 PCC / 1
MT	2				80	PCC / 1

Comments

pH = 7.8

fish not sampled

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 1 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 1 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-09	12:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River Side Channel		

Weather Snowing

Air Temperature -5 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	101
Ice thickness (cm)	34
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	27
Water Temperature	0.4 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	160 *uS*
Dissolved Oxygen (bottom)	9 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

FISH COLLECTION SUMMARY

Date of Setting	2001-01-09	**Date of Collection**	2001-01-10
Time of Setting	12:30	**Time of Collection**	10:50
Number of traps set	6	**Number of traps collected**	6

Comments

January 10th, overcast.

NO FISH CAUGHT AT THIS SITE.

pH = 7.4

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID- 1 (first three letters of stream name-site number) **VISIT #** 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 1 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-06	11:10	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River Side Channel		

Weather High overcast, light snowfall.

Air Temperature -10 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	99
Ice thickness (cm)	45
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	20
Water Temperature	0.5 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	140 *uS*
Dissolved Oxygen (bottom)	9 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-02-06	**Date of Collection**	2001-02-07
Time of Setting	11:10	**Time of Collection**	10:05
Number of traps set	6	**Number of traps collected**	6

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	NFC / / / / /

Comments

pH = 7.6

February 07/01. Temperature + -16.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 1 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	20	Site view looking from highway.

INDIVIDUAL FISH DATA

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 1 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-06	11:50	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River Side Channel		

Weather High overcast

Air Temperature -2 °C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	97
Ice thickness (cm)	36
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	28
Water Temperature	1.7 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	9 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-03-06	**Date of Collection**	2001-03-07
Time of Setting	11:50	**Time of Collection**	10:00
Number of traps set	6	**Number of traps collected**	6

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	NFC / / / / /
MT	2				100	NFC / / / / /

Comments

pH = 6.9

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 1 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	NFC				
MT	1	3	NFC				
MT	2	1	NFC				
MT	2	2	NFC				
MT	2	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 2 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-06	11:20	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River Side Channel		

Weather Overcast

Air Temperature 2 ° C

Ice Cover (%) 0

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	0
Ice thickness (cm)	0
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	2.9 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	170 *uS*
Dissolved Oxygen (bottom)	6 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

FISH COLLECTION SUMMARY

Date of Setting	2000-12-06	**Date of Collection**	2000-12-07
Time of Setting	11:20	**Time of Collection**	9:40
Number of traps set	3	**Number of traps collected**	3

Comments

pH = 7.6

No fish caught

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 2 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 2 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-09	12:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River Side Channel		

Weather Snowing.

Air Temperature -5 ° C

Ice Cover (%) 50

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	49
Ice thickness (cm)	4
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	L
Snow Depth (cm)	0
Water Temperature	1.5 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	180 *uS*
Dissolved Oxygen (bottom)	7 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

FISH COLLECTION SUMMARY

Date of Setting	2001-01-09	**Date of Collection**	2001-01-10
Time of Setting	12:00	**Time of Collection**	10:30
Number of traps set	3	**Number of traps collected**	3

Comments

NO FISH CAUGHT AT THIS SITE.

Broke through 4 cm of ice to get to limno.

January 10/01, All ice has melted from this site.

pH = 7.3

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 2 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 2 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-06	11:40	TJ,td,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River Side Channel		

Weather High overcast, light snowfall.

Air Temperature -10 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	42	
Ice thickness (cm)	5	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	0	
Water Temperature	1.9	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity	130	*uS*
Dissolved Oxygen (bottom)	7	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
PCC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-02-06	**Date of Collection**	2001-02-07
Time of Setting	11:40	**Time of Collection**	9:40
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	PMC / / / / / / / / /

Comments

pH = 8.1

February 16/01
Temperature = -16

Peamouth Chub not sampled.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 2 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	18	Site view

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	NFC				
MT	1	3	PCC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID- 2 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-06	11:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River Side Channel		

Weather High overcast

Air Temperature -2 ° C

Ice Cover (%) 10

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	46	
Ice thickness (cm)	0	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)		
Snow Depth (cm)	0	
Water Temperature	3.8	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity		*uS*
Dissolved Oxygen (bottom)	8	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-03-06	**Date of Collection**	2001-03-07
Time of Setting	11:30	**Time of Collection**	9:45
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				10	NFC / / / / / / / / /

Comments

pH = 7.5

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 2 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	2	NFC				
MT	1	2	NFC				
MT	1	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 3 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-06	11:32	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River Side Channel		

Weather Overcast

Air Temperature 2 ° C

Ice Cover (%) 0

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	58
Ice thickness (cm)	0
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	180 *uS*
Dissolved Oxygen (bottom)	8 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

FISH COLLECTION SUMMARY

Date of Setting	2000-12-06	**Date of Collection**	2000-12-07
Time of Setting	11:32	**Time of Collection**	9:46
Number of traps set	6	**Number of traps collected**	6

Comments

pH = 7.3

No fish caught

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 3 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 3 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-09	12:15	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley Side Channel		

Weather Snowing

Air Temperature -5 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	54
Ice thickness (cm)	8
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	1.7 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	180 *uS*
Dissolved Oxygen (bottom)	8 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
PCC	0	0	0
WSU	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-02-09	**Date of Collection**	2001-01-10
Time of Setting	12:15	**Time of Collection**	10:40
Number of traps set	6	**Number of traps collected**	6

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	PMC / 1 WSU / 1

Comments

January 10th, overcast.

pH = 7.2

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 3 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	2	1	PCC	1			
MT	2	1	WSU	1			

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 3 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-06	11:20	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River Side Channel		

Weather High overcast, light snowfall

Air Temperature -10 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	49
Ice thickness (cm)	5
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	0.1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	140 *uS*
Dissolved Oxygen (bottom)	8 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-02-06	**Date of Collection**	2001-02-07
Time of Setting	11:55	**Time of Collection**	9:50
Number of traps set	6	**Number of traps collected**	6

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	NFC / / / / /
MT	2				100	NFC / / / / /

Comments

pH = 7.7

February 7/01, Temperature = -16.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID - 3 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	19	Site view looking down from highway

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	NFC				
MT	1	3	NFC				
MT	2	1	NFC				
MT	2	2	NFC				
MT	2	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID- 3 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-06	11:40	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River Side Channel		

Weather High overcast

Air Temperature -2 ° C

Ice Cover (%) 95

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	51
Ice thickness (cm)	4
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	1.8 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	9 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
SUC	1	0	0
PCC	1	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-03-06	**Date of Collection**	2001-03-07
Time of Setting	11:40	**Time of Collection**	9:50
Number of traps set	6	**Number of traps collected**	6

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				95	NFC /
MT	2				95	PCC / 2 SUC / 1

Comments

pH = 7.3

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) SID- 3 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	NFC				
MT	1	3	NFC				
MT	2	1	PCC				
MT	2	1	SUC				
MT	2	2	PCC				
MT	2	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 1 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-18	12:05	BD,TJ,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Overcast with snow flurries.

Air Temperature 1 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	51
Ice thickness (cm)	27
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	14
Water Temperature	0.2 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	160 uS
Dissolved Oxygen (bottom)	9 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	1	73	73

FISH COLLECTION SUMMARY

Date of Setting	2000-12-18	**Date of Collection**	2000-12-19
Time of Setting	12:05	**Time of Collection**	12:30
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 1

Comments

3 traps set in 1 cluster off of large woody debris piece.

Limno re-established with landscape stick.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 1 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	2	RB	73	6.5	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 1 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-17	11:50	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Snowing

Air Temperature -5 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	129
Ice thickness (cm)	22
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	11
Water Temperature	0.1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	150 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CH	2	58	78
RB	2	81	105

FISH COLLECTION SUMMARY

Date of Setting	2001-01-17	**Date of Collection**	2001-01-18
Time of Setting	11:50	**Time of Collection**	13:55
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CH / 2 RB / 2

Comments

pH = 7.7

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 1 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CH	78	6.8	UM	
MT	1	1	CH	58	3	UM	
MT	1	2	RB	105	12.8	UM	
MT	1	3	RB	81	8.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 1 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-14	12:40	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Overcast, part sun

Air Temperature -4 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	74
Ice thickness (cm)	19
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	9
Water Temperature	0.1 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	10 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CH	5	61	65

FISH COLLECTION SUMMARY

Date of Setting	2001-02-14	**Date of Collection**	2001-02-15
Time of Setting	12:20	**Time of Collection**	13:27
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CH / 5

Comments

pH = 7.3

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 1 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	NFC				
MT	1	3	CH	65	4	UM	
MT	1	3	CH	65	3.1	UM	
MT	1	3	CH	65	4	UM	
MT	1	3	CH	63	3.5	UM	
MT	1	3	CH	61	3.1	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 1 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-14	11:45	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Sunny

Air Temperature -3 °C

Ice Cover (%) 80

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	111
Ice thickness (cm)	13
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	1.3 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

FISH COLLECTION SUMMARY

Date of Setting	2001-03-14	**Date of Collection**	2001-03-15
Time of Setting	11:45	**Time of Collection**	11:20
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				80	NFC / / / / / / / / /

Comments

pH = 7.1

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 1 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	NFC				
MT	1	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 2 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-14	10:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
UPPER BULKLEY RIVER		

Weather Clear and cold.

Air Temperature -16 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	100
Ice thickness (cm)	39
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	0.1 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	140 uS
Dissolved Oxygen (bottom)	10 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	26		
CO	4		
CH	1		

FISH COLLECTION SUMMARY

Date of Setting	2000-12-14	**Date of Collection**	2000-12-15
Time of Setting	10:30	**Time of Collection**	10:30
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Denth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 26 CO / 4 CH / 1 / / /

Comments

December 24 air temp was -24, could not sample fish as truck was too far away and too cold to sample fish outside.

pH = 8.0

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 2 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 2 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-11	10:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather High overcast

Air Temperature -7 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	64
Ice thickness (cm)	42
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	39
Water Temperature	0.1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	70 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	3	46	58
CH	9	57	69
RB	14	56	104

FISH COLLECTION SUMMARY

Date of Setting	2001-01-11	**Date of Collection**	2001-01-12
Time of Setting	10:30	**Time of Collection**	10:30
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 3, CH / 9, RB / 14

Comments

Ph = 7.8

River is open upstream and downstream of the site.

January 12th, temp. = -16

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 2 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	92	9.8	UM	
MT	1	1	RB	104	13	UM	
MT	1	1	RB	80	6.6	UM	
MT	1	1	CH	66	3.4	UM	
MT	1	1	CH	62	3	UM	
MT	1	2	CH	64	3.4	UM	
MT	1	2	RB	68	4.7	UM	
MT	1	2	RB	56	3.8	UM	
MT	1	2	CO	46	1.5	UM	
MT	1	2	CH	61	3.3	UM	
MT	1	3	RB	79	7.4	UM	
MT	1	3	RB	68	4.2	UM	
MT	1	3	RB	75	5.8	UM	
MT	1	3	RB	75	5.7	UM	
MT	1	3	RB	95	13.2	UM	
MT	1	3	RB	72	5.4	UM	
MT	1	3	CH	65	3.5	UM	
MT	1	3	CH	62	2.9	UM	
MT	1	3	CH	57	3	UM	
MT	1	3	RB	69	4	UM	
MT	1	3	RB	59	2.9	UM	
MT	1	3	CH	69	5.1	UM	
MT	1	3	RB	70	4.6	UM	
MT	1	3	CO	58	2.6	UM	
MT	1	3	CH	58	3.1	UM	
MT	1	3	CO	48	2.4	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 2 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-08	10:25	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Light snowfall.

Air Temperature -7 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	36
Ice thickness (cm)	57
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	21
Water Temperature	0.1 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	140 *uS*
Dissolved Oxygen (bottom)	10 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	11	50	71
CH	16	55	71
RB	2	71	110

FISH COLLECTION SUMMARY

Date of Setting	2001-02-08	**Date of Collection**	2001-02-09
Time of Setting	10:30	**Time of Collection**	10:20
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 11, CH / 16, RB / 2

Comments

Several layers of ice, total ice thickness at limno = 57cm, water depth = 36 cm. Could not set traps at original hole (not enough water depth) we had to move trap hole 135cm toward middle of river. Lots of woody debris at new location.

Ice is very slushy at new location measuring only ~ 4cm..

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 2 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	2	Site view showing both the original trap hole as well as the new one.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	56	1.7	UM	
MT	1	2	CH	59	2.8	UM	
MT	1	2	RB	71	4.8	UM	
MT	1	2	CH	59	3.7	UM	
MT	1	2	RB	110	15.3	UM	
MT	1	2	CH	69	4.7	UM	
MT	1	2	CH	68	3.9	UM	
MT	1	2	CO	55	1.9	UM	
MT	1	2	CO	71	5.1	UM	
MT	1	2	CH	68	3.4	UM	
MT	1	2	CO	60	2.7	UM	
MT	1	2	CH	55	2.2	UM	
MT	1	2	CH	69	4.3	UM	
MT	1	2	CO	65	3.4	UM	
MT	1	2	CH	68	3.8	UM	
MT	1	2	CH	64	3.7	UM	
MT	1	2	CH	62	3.5	UM	
MT	1	2	CO	65	3.6	UM	
MT	1	2	CH	61	2.8	UM	
MT	1	2	CO	55	2.3	UM	
MT	1	2	CH	64	3.9	UM	
MT	1	2	CO	58	2.7	UM	
MT	1	2	CH	60	3.3	UM	
MT	1	2	CH	68	3.3	UM	
MT	1	2	CH	64	2.3	UM	
MT	1	2	CH	71	4.7	UM	
MT	1	2	CH	68	4	UM	
MT	1	2	CO	52	1.8	UM	
MT	1	2	CO	50	1.3	UM	
MT	1	3	CO	61	3.1	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 2 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-08	10:15	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Sunny and clear

Air Temperature -2 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	82
Ice thickness (cm)	23
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	19
Water Temperature	0.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CH	8	59	66
CO	11	54	76
RB	2	89	102

FISH COLLECTION SUMMARY

Date of Setting	2001-03-08	**Date of Collection**	2001-03-09
Time of Setting	10:10	**Time of Collection**	10:15
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CH / 8, CO / 11, RB / 2

Comments

pH= 7.5

Ijce is thick at trap hole but Jim fell through about 1.5 meters from traphole. A moose also went through the ice not far from hole.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR- 2 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CH	65	3.4	UM	
MT	1	1	CH	62	3	UM	
MT	1	1	CH	65	3.6	UM	
MT	1	1	RB	102	12.8	UM	
MT	1	1	CH	67	3.7	UM	
MT	1	1	CH	66	3.5	UM	
MT	1	2	CO	76	4	UM	
MT	1	2	CO	61	2.6	UM	
MT	1	2	CO	75	4.3	UM	
MT	1	2	CO	67	3.4	UM	
MT	1	2	CO	58	2.5	UM	
MT	1	2	CH	63	3.1	UM	
MT	1	2	RB	89	8.1	UM	
MT	1	2	CO	56	1.8	UM	
MT	1	2	CH	59	2.8	UM	
MT	1	2	CH	59	2.6	UM	
MT	1	2	CO	70	3.8	UM	
MT	1	2	CO	64	2.7	UM	
MT	1	2	CO	58	2.2	UM	
MT	1	3	CO	58	1.8	UM	
MT	1	3	CO	54	1.7	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 9 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-05	14:20	BD,TJ,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather High overcast

Air Temperature - °C

Ice Cover (%) 70

Stream Flow H (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	122
Ice thickness (cm)	5
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	0.5 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	120 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	4	91	111
CO	1	71	71
CH	1	70	70

FISH COLLECTION SUMMARY

Date of Setting	2000-12-05	**Date of Collection**	2000-12-06
Time of Setting	14:20	**Time of Collection**	10:00
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				70	RB / 4 CO / 1 CH / 1

Comments

Ice is too dangerous and water is too deep to set more traps. Would like to have set 6 traps but ice is too thin to walk on.

Due to weird ice, water is flowing over ice in some spots at trap area.

pH = 7.6

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 9 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	94	9.1	UM	
MT	1	1	RB	111	16.6	UM	
MT	1	3	RB	109	14.8	UM	
MT	1	3	CO	71	4.9	UM	
MT	1	3	CH	70	3.8	UM	
MT	1	3	RB	91	8.7		

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 9 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-08	10:50	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Sunny and Clear

Air Temperature -4 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	96	
Ice thickness (cm)	23	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	28	
Water Temperature	0.3	°C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity	150	*uS*
Dissolved Oxygen (bottom)	11	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CH	4	62	72
RB	2	81	90

FISH COLLECTION SUMMARY

Date of Setting	2001-01-08	**Date of Collection**	2001-01-09
Time of Setting	10:50	**Time of Collection**	10:35
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CH / 4 RB / 2

Comments

pH = 7.3

January 9th, overcast and cold.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 9 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	CH	72	6.2	UM	
MT	1	2	CH	69	4.2	UM	
MT	1	2	CH	68	4.3	UM	
MT	1	2	RB	81	7.3	UM	
MT	1	2	CH	62	3.9	UM	
MT	1	2	RB	90	10.6	UM	
MT	1	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 9 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-05	10:20	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather High overcast

Air Temperature -10 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	112
Ice thickness (cm)	38
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	4
Water Temperature	0.3 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	100 *uS*
Dissolved Oxygen (bottom)	10 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	2	94	106
CH	4	69	86

FISH COLLECTION SUMMARY

Date of Setting	2001-02-05	**Date of Collection**	2001-02-06
Time of Setting	10:20	**Time of Collection**	10:20
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Denth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CH / 4 RB / 2 / / / /

Comments

pH = 7.8
February 6/01 Temp = -11 with light snowfall.

Traps covered in rust coloured slime

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 9 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	RB	106	16.2	UM	
MT	1	2	RB	94	9.6	UM	
MT	1	3	CH	70	4.6	UM	
MT	1	3	CH	86	8.6	UM	
MT	1	3	CH	69	4.3	UM	
MT	1	3	CH	75	4.9	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 9 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-05	10:25	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Sunny and clear

Air Temperature -7 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	98
Ice thickness (cm)	54
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	12
Water Temperature	0.4 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	10 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CH	4	66	73
RB	2	77	93

FISH COLLECTION SUMMARY

Date of Setting	2001-03-05	**Date of Collection**	2001-03-06
Time of Setting	10:25	**Time of Collection**	10:30
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CH / 4 RB / 2

Comments

pH = 7.0

Rust coloured slime on traps again same as last month.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 9 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	NFC				
MT	1	3	RB	77	5	UM	
MT	1	3	RB	93	8.7	UM	
MT	1	3	CH	66	3.2	UM	
MT	1	3	CH	70	3.4	UM	
MT	1	3	CH	73	4	UM	
MT	1	3	CH	71	3.5	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 10 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-05	14:25	BD,TJ, TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather High overcast

Air Temperature 4 ° C

Ice Cover (%) 70

Stream Flow H (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	102	
Ice thickness (cm)	0	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)		
Snow Depth (cm)		
Water Temperature	0.1	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity	120	*uS*
Dissolved Oxygen (bottom)	12	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2000-12-05	**Date of Collection**	2000-12-06
Time of Setting	14:25	**Time of Collection**	10:10
Number of traps set	3	**Number of traps collected**	3

Comments

Would have liked to set 6 traps but due to unsafe ice conditions, could only set 3 traps.
Traps set near woody debris.

pH = 7.6

No fish caught.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR- 10 first three letters of stream name-site number

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 10 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-08	11:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Sunny and clear

Air Temperature -4 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	84
Ice thickness (cm)	24
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	25
Water Temperature	0.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	130 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CH	1	91	91
RB	2	70	83

FISH COLLECTION SUMMARY

Date of Setting	2001-01-08	**Date of Collection**	2001-01-09
Time of Setting	11:00	**Time of Collection**	13:45
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CH / 1 RB / 2 / / / / /

Comments

pH = 7.6

January 9th, overcast

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 10 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	CH	91	10.7	UM	
MT	1	3	RB	83	11.9	UM	
MT	1	3	RB	70	4.9	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR- 10 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-05	10:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather High overcast

Air Temperature -10 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	93
Ice thickness (cm)	11
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	15
Water Temperature	0.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	100 *uS*
Dissolved Oxygen (bottom)	10 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
LND	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-02-05	**Date of Collection**	2001-02-06
Time of Setting	10:35	**Time of Collection**	10:35
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	LND / 1

Comments

pH = 7.9

February 6/01, light snowfall high overcast

No measurement taken on longnose dace.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR- 10 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	NFC				
MT	1	3	LND				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 10 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-05	10:45	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Sunny

Air Temperature -7 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	62
Ice thickness (cm)	12
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	5
Water Temperature	0.1 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CH	2	70	78
LNC	1	55	55

FISH COLLECTION SUMMARY

Date of Setting	2001-03-05	**Date of Collection**	2001-03-06
Time of Setting	10:25	**Time of Collection**	10:40
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CH / 2 LNC / 1 / / / / /

Comments

pH = 7.5

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 10 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	LNC	55	2.1	UM	
MT	1	3	CH	78	5.3	UM	
MT	1	3	CH	70	3.7	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 11 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-18	13:20	BD,TJ,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Overcast with snow flurries.

Air Temperature 1 ° C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	65
Ice thickness (cm)	42
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	13
Water Temperature	0.1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	170 *uS*
Dissolved Oxygen (bottom)	10 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	4	100	121
CH	4	62	71

FISH COLLECTION SUMMARY

Date of Setting	2000-12-18	**Date of Collection**	2000-12-19
Time of Setting	13:20	**Time of Collection**	13:40
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 4 CH / 4

Comments

Set three traps in one cluster off of limno station about 1.5 metrs away from rip rap.
The entire river is iced over.

Caudel erosion on the 21.5g Rainbow.(line #1).

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 11 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	120	21.5	UM	
MT	1	1	RB	120	23.8	UM	
MT	1	2	CH	71	4.9	UM	
MT	1	2	CH	66	3.6	UM	
MT	1	2	RB	100	15	UM	
MT	1	3	CH	62	3.5	UM	
MT	1	3	CH	65	4	UM	
MT	1	3	RB	121	26	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 11 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-18	2:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather High Overcast

Air Temperature -5 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	120
Ice thickness (cm)	51
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	17
Water Temperature	0.9 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	160 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CH	1	68	68

FISH COLLECTION SUMMARY

Date of Setting	2001-01-18	**Date of Collection**	2001-01-19
Time of Setting	14:30	**Time of Collection**	10:10
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CH / 1

Comments

Several layers of ice.

pH = 7.1

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 11 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	CH	68	4.1	UM	
MT	1	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 11 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-15	15:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Sunny and clear

Air Temperature -4 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	105
Ice thickness (cm)	42
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	18
Water Temperature	1.4 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	2	65	65
RB	3	93	95
CH	1	65	65

FISH COLLECTION SUMMARY

Date of Setting	2001-02-15	**Date of Collection**	2001-02-16
Time of Setting	15:00	**Time of Collection**	11:06
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 2, RB / 3, CH / 1

Comments

pH = 7.8

Feb.16/01 temp = -16

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 11 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	14	Site View looking downstream

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	93	9.5	UM	
MT	1	2	CO	65	3.7	UM	
MT	1	3	RB	98	12.2	UM	
MT	1	3	RB	95	10.5	UM	
MT	1	3	CH	62	3.1	UM	
MT	1	3	CO	65	2.5	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 11 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-14	12:40	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Sunny and clear

Air Temperature 0 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	85
Ice thickness (cm)	44
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	1.7 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-03-14	**Date of Collection**	2001-03-15
Time of Setting	12:40	**Time of Collection**	11:40
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	NFC / / / / / / / / /

Comments

pH = 7.4

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 11 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	NFC				
MT	1	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 12 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-18	13:40	BD,TJ,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Overcast with snow flurries.

Air Temperature 1 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	56
Ice thickness (cm)	30
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	13
Water Temperature	0 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	160 *uS*
Dissolved Oxygen (bottom)	10 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

FISH COLLECTION SUMMARY

Date of Setting	2000-12-18	**Date of Collection**	2000-12-19
Time of Setting	13:40	**Time of Collection**	13:55
Number of traps set	3	**Number of traps collected**	3

Comments

3 traps set in one cluster 1 meter from limno station.
River has 100% ice coverage for hundreds of meters upstream and downstream.

pH = 7.4

No fish caught.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 12 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	120	21.5	UM	
MT	1	1	RB	120	23.8	UM	
MT	1	2	CH	71	4.9	UM	
MT	1	2	CH	66	3.6	UM	
MT	1	2	RB	100	15	UM	
MT	1	3	CH	62	3.5	UM	
MT	1	3	CH	65	4	UM	
MT	1	3	RB	121	26	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 12 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-18	1:45	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather High overcast

Air Temperature -5 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	87
Ice thickness (cm)	39
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	20
Water Temperature	0.1 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	160 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-01-18	**Date of Collection**	2001-01-19
Time of Setting	14:45	**Time of Collection**	10:20
Number of traps set	3	**Number of traps collected**	3

Comments

pH = 7.3

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 12 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	NFC				
MT	1	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 12 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-15	15:20	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

Weather Sunny and clear

Air Temperature -4 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	47
Ice thickness (cm)	32
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	22
Water Temperature	0.5 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-02-15	**Date of Collection**	2001-02-16
Time of Setting	15:20	**Time of Collection**	11:30
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	NFC / / / / / / / / /

Comments

pH = 7.8

February 16/01 temprature = -16.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 12 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	15	Site view

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	NFC				
MT	1	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 12 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-14	12:20	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bullkley River		

Weather Clear, sunny and beautiful.

Air Temperature 0 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	100	
Ice thickness (cm)	65	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	0	
Water Temperature	2.2	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity		*uS*
Dissolved Oxygen (bottom)	11	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CH	4	67	74

FISH COLLECTION SUMMARY

Date of Setting	2001-03-14	**Date of Collection**	2001-03-15
Time of Setting	12:20	**Time of Collection**	12:10
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CH / 4

Comments

pH = 7.0

Water is quite a bit more turbid on pick up day, we assume this is due to snow melt.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) UBR - 12 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CH	69	3.6	UM	
MT	1	1	CH	69	3.4	UM	
MT	1	2	CH	67	3.5	UM	
MT	1	2	CH	74	4.3	UM	
MT	1	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 1 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-20	10:50	TJ,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

Weather Sun and part cloud

Air Temperature -12 °C

Ice Cover (%) 19

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	48
Ice thickness (cm)	19
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	14
Water Temperature	1.3 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	90 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	75	39	98
RB	12	42	86

FISH COLLECTION SUMMARY

Date of Setting	2000-12-20	**Date of Collection**	2000-12-21
Time of Setting	10:50	**Time of Collection**	9:50
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 75 RB / 12 / / / / /

Comments

pH = 7.7
Only sampled 31 coho.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 1 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	56	1.4	UM	
MT	1	1	CO	52	1.9	UM	
MT	1	1	CO	45	1.5	UM	
MT	1	1	CO	59	3.2	UM	
MT	1	1	CO	57	2.6	UM	
MT	1	1	CO	53	2.1	UM	
MT	1	1	CO	39	0.9	UM	
MT	1	1	CO	55	2.7	UM	
MT	1	1	CO	56	2.5	UM	
MT	1	1	CO	51	1.9	UM	
MT	1	1	CO	46	1.4	UM	
MT	1	1	CO	42	1	UM	
MT	1	1	RB	86	9.5	UM	
MT	1	1	RB	76	5.6	UM	
MT	1	1	RB	42	0.9	UM	
MT	1	2	CO	72	5.2	UM	
MT	1	2	CO	69	4	UM	
MT	1	2	RB	82	7.8	UM	
MT	1	2	RB	73	5.6	UM	
MT	1	2	CO	89	10.6	UM	
MT	1	2	CO	63	4.1	UM	
MT	1	2	CO	45	1.5	UM	
MT	1	2	RB	78	5.6	UM	
MT	1	2	CO	52	1.8	UM	
MT	1	2	CO	60	3.1	UM	
MT	1	2	CO	60	3.2	UM	
MT	1	2	CO	60	4	UM	
MT	1	2	CO	47	1.9	UM	
MT	1	2	CO	60	3.1	UM	
MT	1	2	CO	70	4.7	UM	
MT	1	2	CO	57	2.5	UM	
MT	1	2	CO	47	1.5	UM	
MT	1	2	CO	44	1.2	UM	
MT	1	2	CO	45	1.3	UM	
MT	1	2	RB	70	2.1	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 1 first three letters of stream name-site number

VISIT # 1

MT	1	2	CO	47	0.7	UM	
MT	1	2	CO	33	0.4	UM	
MT	1	2	CO	71	2.2	UM	
MT	1	2	RB	60	3.4	UM	
MT	1	2	RB	46	1.4	UM	
MT	1	3	RB	74	6.7	UM	
MT	1	3	RB	72	6.1	UM	
MT	1	3	RB	45	1.8	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 1 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-22	10:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

Weather High overcast

Air Temperature -5 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	41
Ice thickness (cm)	2
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	M
Snow Depth (cm)	0
Water Temperature	1.1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	90 *uS*
Dissolved Oxygen (bottom)	13 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	18	41	65
RB	2	70	84

FISH COLLECTION SUMMARY

Date of Setting	2001-01-22	**Date of Collection**	2001-01-23
Time of Setting	10:00	**Time of Collection**	10:10
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 18 RB / 2

Comments

Thin ice cover over entire site.

No snow at limno but, snow depth outside of limno is16cm.

pH = 7.5

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 1 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	63	3	UM	
MT	1	1	CO	65	3.7	UM	
MT	1	1	RB	84	6.9	UM	
MT	1	1	RB	70	5.6	UM	
MT	1	1	CO	55	2.1	UM	
MT	1	1	CO	46	2.6	UM	
MT	1	1	CO	48	1.6	UM	
MT	1	1	CO	49	1.8	UM	
MT	1	1	CO	41	1	UM	
MT	1	1	CO	50	1.8	UM	
MT	1	2	CO	49	1.8	UM	
MT	1	2	CO	44	1.3	UM	
MT	1	2	CO	46	1.6	UM	
MT	1	2	CO	45	1.6	UM	
MT	1	2	CO	43	1.5	UM	
MT	1	3	CO	52	1.9	UM	
MT	1	3	CO	44	1.4	UM	
MT	1	3	CO	57	2.2	UM	
MT	1	3	CO	46	1.6	UM	
MT	1	3	CO	42	1.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 1 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-19	10:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

Weather High overcast.

Air Temperature -3 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	
Ice thickness (cm)	8
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	1.1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	*uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	10	38	68
RB	2	73	80

FISH COLLECTION SUMMARY

Date of Setting	2001-02-19	**Date of Collection**	2001-02-20
Time of Setting	10:05	**Time of Collection**	9:45
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 10 RB / 2

Comments

pH = 7.8

No water depth recorded. Not sure why.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 1 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW5	1	Site view looking downstream, limno visible.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	38	0.7	UM	
MT	1	1	CO	54	1.4	UM	
MT	1	2	CO	55	2.2	UM	
MT	1	2	CO	68	4	UM	
MT	1	2	RB	73	5.4	UM	
MT	1	2	CO	52	2.2	UM	
MT	1	2	CO	46	1.5	UM	
MT	1	2	CO	45	1	UM	
MT	1	3	CO	62	3.3	UM	
MT	1	3	RB	80	7.1	UM	
MT	1	3	CO	59	2.9	UM	
MT	1	3	CO	51	1.7	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 1 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-19	9:23	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

Weather High overcast and windy.

Air Temperature -3 ° C

Ice Cover (%) 20

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	44
Ice thickness (cm)	0
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	1.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	M
Conductivity	uS
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	5	45	55
RB	3	79	86

FISH COLLECTION SUMMARY

Date of Setting	2001-03-19	**Date of Collection**	2001-03-20
Time of Setting	9:23	**Time of Collection**	9:50
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				20	CO / 5 RB / 3

Comments

pH = 7.8

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 1 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	79	4.6	UM	
MT	1	2	RB	86	7.2	UM	
MT	1	2	CO	51	1.6	UM	
MT	1	2	CO	45	1	UM	
MT	1	2	CO	51	1.4	UM	
MT	1	3	RB	80	5.1	UM	
MT	1	3	CO	55	2	UM	
MT	1	3	CO	47	1.1	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 2 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-20	11:08	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

Weather partly cloudy

Air Temperature -12 ° C

Ice Cover (%) 50

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	64
Ice thickness (cm)	0
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	10
Water Temperature	0.6 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	70 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	33	37	88
RB	4	67	76
DV	2	79	110

FISH COLLECTION SUMMARY

Date of Setting	2000-12-20	**Date of Collection**	2000-12-21
Time of Setting	11:08	**Time of Collection**	10:25
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				50	CO / 33 RB / 4 DV / 2 / /

Comments

pH = 7.4

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 2 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	52	1.6	UM	
MT	1	1	CO	53	2.1	UM	
MT	1	1	CO	49	1.1	UM	
MT	1	1	CO	42	1.1	UM	
MT	1	1	CO	41	1.4	UM	
MT	1	1	CO	37	0.9	UM	
MT	1	1	CO	49	1.4	UM	
MT	1	1	CO	45	1.2	UM	
MT	1	2	CO	88	9.3	UM	
MT	1	2	CO	69	5	UM	
MT	1	2	RB	67	4.3	UM	
MT	1	2	CO	78	6.1	UM	
MT	1	2	CO	66	4.1	UM	
MT	1	2	CO	64	4	UM	
MT	1	2	CO	50	2.2	UM	
MT	1	2	CO	46	2	UM	
MT	1	2	RB	71	5.6	UM	
MT	1	2	CO	58	2.8	UM	
MT	1	2	RB	75	6	UM	
MT	1	2	CO	82	6.6	UM	
MT	1	2	CO	70	4.8	UM	
MT	1	2	CO	70	4.6	UM	
MT	1	2	CO	52	2.5	UM	
MT	1	2	CO	65	3.9	UM	
MT	1	2	DV	79	5.6	UM	
MT	1	2	DV	110	12.7	UM	
MT	1	2	CO	68	4.8	UM	
MT	1	2	CO	53	2.7	UM	
MT	1	2	CO	51	1.6	UM	
MT	1	2	RB	76	6	UM	
MT	1	3	CO	75	5.7	UM	
MT	1	3	CO	60	3.2	UM	
MT	1	3	CO	56	2.5	UM	
MT	1	3	CO	58	3.4	UM	
MT	1	3	CO	43	15	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 2 (first three letters of stream name-site number)

VISIT # 1

MT	1	3	CO	40	1.6	UM	
MT	1	3	CO	61	3.5	UM	
MT	1	3	CO	48	2.5	UM	
MT	1	3	CO	45	1.2	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 2 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-22	10:15	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

Weather High overcast

Air Temperature -5 ° C

Ice Cover (%) 0

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	62
Ice thickness (cm)	0
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	C
Snow Depth (cm)	0
Water Temperature	0.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	80 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	13	48	70
RB	5	70	100

FISH COLLECTION SUMMARY

Date of Setting	2001-01-22	**Date of Collection**	2001-01-23
Time of Setting	10:15	**Time of Collection**	10:28
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				0	CO / 13 RB / 5 / / / / /

Comments

Entire site is ice free, no snow at limno but snow depth at shore is 40cm.

pH = 7.3

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 2 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	70	4.5	UM	
MT	1	1	RB	70	4.8	UM	
MT	1	1	RB	75	5.9	UM	
MT	1	1	RB	100	13	UM	
MT	1	1	CO	62	3.3	UM	
MT	1	1	RB	86	8	UM	
MT	1	2	CO	67	4	UM	
MT	1	2	CO	50	1.8	UM	
MT	1	2	CO	63	3.7	UM	
MT	1	2	CO	55	2.1	UM	
MT	1	2	CO	56	2.3	UM	
MT	1	2	CO	48	1.7	UM	
MT	1	3	CO	61	3.1	UM	
MT	1	3	CO	55	2.5	UM	
MT	1	3	RB	96	13.3	UM	
MT	1	3	CO	52	2	UM	
MT	1	3	CO	53	2.2	UM	
MT	1	3	CO	48	1.4	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 2 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-19	10:15	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

Weather High overcast.

Air Temperature -3 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	62	
Ice thickness (cm)	6	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	M	
Snow Depth (cm)	0	
Water Temperature	1.5	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity		*uS*
Dissolved Oxygen (bottom)	12	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	11	53	77
RB	4	74	89

FISH COLLECTION SUMMARY

Date of Setting	2001-02-19	**Date of Collection**	2001-02-20
Time of Setting	10:15	**Time of Collection**	10:00
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 11 RB / 4 / / / / /

Comments

pH = 7.9

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 2 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW5	2	Site view looking dowmstream.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	70	4.4	UM	
MT	1	1	RB	89	10.5	UM	
MT	1	1	CO	61	2.8	UM	
MT	1	1	CO	59	2.2	UM	
MT	1	2	CO	77	6.6	UM	
MT	1	2	CO	55	2.4	UM	
MT	1	2	CO	64	3.4	UM	
MT	1	3	RB	74	5.4	UM	
MT	1	3	CO	67	4.5	UM	
MT	1	3	RB	88	8.4	UM	
MT	1	3	CO	63	3.3	UM	
MT	1	3	CO	62	3.1	UM	
MT	1	3	CO	56	2.6	UM	
MT	1	3	CO	53	1.9	UM	
MT	1	3	RB	76	5.8	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 2 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-19	9:33	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

Weather High overcast and windy

Air Temperature -3 °C

Ice Cover (%) 0

Stream Flow H (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	65
Ice thickness (cm)	0
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	
Snow Depth (cm)	0
Water Temperature	0.9 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	M
Conductivity	uS
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	7	50	73
DV	1	155	155

FISH COLLECTION SUMMARY

Date of Setting	2001-03-19	**Date of Collection**	2001-03-20
Time of Setting	9:33	**Time of Collection**	9:58
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				0	CO / 7 DV / 1 / / / / /

Comments

pH = 7.4

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1): TOB - 2 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	DV	155	26.7	UM	
MT	1	3	CO	59	2.2	UM	
MT	1	3	CO	68	3.2	UM	
MT	1	3	CO	73	5	UM	
MT	1	3	CO	67	3.7	UM	
MT	1	3	CO	64	3.3	UM	
MT	1	3	CO	51	2	UM	
MT	1	3	CO	50	1.4	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 3 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-20		TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek Side Channel		

Weather Cloudy

Air Temperature ° C

Ice Cover (%)

Stream Flow (High, Moderate, Limited, None)

Potential for fish migration (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)

Ice thickness (cm)

Clarity of Ice (H,M,L, or N)
(High, Moderate, Limited, None)

Snow Depth (cm)

Water Temperature ° C

Turbidity (H,M, L, or C)
(High, Moderate, Low, or Clear)

Conductivity *uS*

Dissolved Oxygen (bottom) ppm

Dissolved Oxygen (surface) ppm

FISH SUMMARY

FISH COLLECTION SUMMARY

Date of Setting

Time of Setting

Number of traps set

Date of Collection

Time of Collection

Number of traps collected

Comments

Not enough water depth under the ice to set traps. We cut holes in several locations with no luck.

no snow at limno.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 3 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 3 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-22		tj<td<jd

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek side Channel		

Weather

Air Temperature ° C

Ice Cover (%)

Stream Flow (High, Moderate, Limited, None)

Potential for fish migration (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)

Ice thickness (cm)

Clarity of Ice (H,M,L, or N)
(High, Moderate, Limited, None)

Snow Depth (cm)

Water Temperature ° C

Turbidity (H,M, L, or C)
(High, Moderate, Low, or Clear)

Conductivity *uS*

Dissolved Oxygen (bottom) ppm

Dissolved Oxygen (surface) ppm

FISH SUMMARY

FISH COLLECTION SUMMARY

Date of Setting

Time of Setting

Number of traps set

Date of Collection

Time of Collection

Number of traps collected

Comments

NOT ENOUGH WATER DEPTH TO SET TRAPS.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 3 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 5 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-20	12:20	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Lake		

Weather Overcast

Air Temperature -12 °C

Ice Cover (%) 100

Stream Flow H (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	86
Ice thickness (cm)	37
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	6
Water Temperature	0.9 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	70 *uS*
Dissolved Oxygen (bottom)	10 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	5	53	101
DV	2	62	112

FISH COLLECTION SUMMARY

Date of Setting	2000-12-20	**Date of Collection**	2000-12-21
Time of Setting	12:20	**Time of Collection**	11:40
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 5 DV / 2

Comments

Drifting snow.

pH = 8.3

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 5 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	96	11.7	UM	
MT	1	1	CO	53	1.7	UM	
MT	1	2	CO	98	12	UM	
MT	1	4	DV	112	17.7	UM	
MT	1	4	CO	89	9	UM	
MT	1	4	DV	62	3.4	UM	
MT	1	4	CO	101	13.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 5 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-22	11:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Lake		

Weather high overcast

Air Temperature -5 ° C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	84
Ice thickness (cm)	42
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	26
Water Temperature	0.1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	M
Conductivity	100 *uS*
Dissolved Oxygen (bottom)	84 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-01-22	**Date of Collection**	2001-01-23
Time of Setting	11:30	**Time of Collection**	11:05
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	NFC / / / /

Comments

pH = 7.1

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 5 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 5 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-19	11:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Lake		

Weather High overcast.

Air Temperature -3 ° C

Ice Cover (%) 100

Stream Flow (High, Moderate, Limited, None)

Potential for fish migration (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	92
Ice thickness (cm)	48
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	8
Water Temperature	0.2 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	M
Conductivity	uS
Dissolved Oxygen (bottom)	7 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	4	60	76
DV	1	109	109

FISH COLLECTION SUMMARY

Date of Setting	2001-02-19	**Date of Collection**	2001-02-20
Time of Setting	11:00	**Time of Collection**	11:00
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 4 DV / 1

Comments

pH = 7.3

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 5 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW5	4	Site view limno visible

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	DV	109	13.8	UM	
MT	1	2	NFC				
MT	1	3	NFC				
MT	1	4	CO	76	4.7	UM	
MT	1	4	CO	65	3.3	UM	
MT	1	4	CO	74	4.7	UM	
MT	1	4	CO	60	1.9	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 5 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-19	10:40	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Lake		

Weather High overcast

Air Temperature -3 °C

Ice Cover (%) 100

Stream Flow N (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	30
Ice thickness (cm)	53
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	0.7 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	M
Conductivity	uS
Dissolved Oxygen (bottom)	3 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-03-19
Time of Setting	10:40
Number of traps set	

Date of Collection	
Time of Collection	
Number of traps collected	

Comments

pH = 6.8

No traps set, not enough water depth.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 5 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 6 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-20	12:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Lake		

Weather overcast

Air Temperature -12 °C

Ice Cover (%) 100

Stream Flow (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	87
Ice thickness (cm)	36
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	19
Water Temperature	0.6 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	70 *uS*
Dissolved Oxygen (bottom)	10 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	3	53	56

FISH COLLECTION SUMMARY

Date of Setting	2000-12-20	**Date of Collection**	2000-12-21
Time of Setting	12:00	**Time of Collection**	11:40
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 3

Comments

Drifting snow

pH = 8

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 6 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	2	CO	54	2.4	UM	
MT	1	3	CO	56	2.7	UM	
MT	1	4	CO	53	2.6	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 6 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-22	11:45	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Lake		

Weather High overcast

Air Temperature -5 ° C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	81	
Ice thickness (cm)	41	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	23	
Water Temperature	0.1	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	M	
Conductivity	110	*uS*
Dissolved Oxygen (bottom)	6	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	1	158	58

FISH COLLECTION SUMMARY

Date of Setting	2001-01-22	**Date of Collection**	2001-01-23
Time of Setting	11:45	**Time of Collection**	11:10
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 1

Comments

pH = 6.7

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 6 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	3	CO	58	2.6	um	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 6 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-19	11:20	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Lake		

Weather High overcast

Air Temperature -3 °C

Ice Cover (%) 100

Stream Flow (High, Moderate, Limited, None)

Potential for fish migration (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	81
Ice thickness (cm)	47
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	6
Water Temperature	0.2 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	M
Conductivity	uS
Dissolved Oxygen (bottom)	4 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-02-19	**Date of Collection**	2001-02-20
Time of Setting	11:20	**Time of Collection**	11:20
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	NFC / / / / /

Comments

pH = 6.5

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 6 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW5	5	Site view limno visible.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	NFC				
MT	1	3	NFC				
MT	1	4	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 6 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-19	10:35	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Lake		

Weather High overcast and windy

Air Temperature -2 ° C

Ice Cover (%) 100

Stream Flow N (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	35	
Ice thickness (cm)	52	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)		
Snow Depth (cm)	0	
Water Temperature	0.7	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	M	
Conductivity		*uS*
Dissolved Oxygen (bottom)	2	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-03-19	**Date of Collection**	
Time of Setting		**Time of Collection**	
Number of traps set		**Number of traps collected**	

Comments

pH = 7.0

Notraps set, not enough water depth

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 6 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 7 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2001-03-09	10:10	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Lake Outflow		

Weather High overcast and windy

Air Temperature -3 °C

Ice Cover (%) 0

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	130
Ice thickness (cm)	0
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	
Snow Depth (cm)	0
Water Temperature	2 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	M
Conductivity	uS
Dissolved Oxygen (bottom)	6 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	13	51	100
DV	2	92	108
RB	2	90	93

FISH COLLECTION SUMMARY

Date of Setting	2001-03-19	**Date of Collection**	2001-03-20
Time of Setting	10:10	**Time of Collection**	10:45
Number of traps set	4	**Number of traps collected**	4

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				0	CO / 13 DV / 2 RB / 2

Comments

pH = 7.2

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 7 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	93	7.8	UM	
MT	1	1	RB	90	7.1	UM	
MT	1	1	CO	118	15.1	UM	
MT	1	1	CO	100	9.5	UM	
MT	1	1	DV	108	10.8	UM	
MT	1	1	DV	92	7	UM	
MT	1	1	CO	69	3.6	UM	
MT	1	1	CO	71	2.9	UM	
MT	1	1	CO	66	3.1	UM	
MT	1	2	CO	53	1.5	UM	
MT	1	2	CO	56	1.8	UM	
MT	1	3	CO	57	1.9	UM	
MT	1	3	CO	60	2.8	UM	
MT	1	3	CO	55	1.3	UM	
MT	1	4	CO	67	3.3	UM	
MT	1	4	CO	51	1.4	UM	
MT	1	4	CO	79	5.2	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 8 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-20	1:17	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

Weather Cloudy

Air Temperature -12 ° C

Ice Cover (%) 60

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	99
Ice thickness (cm)	17
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	8
Water Temperature	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	30 uS
Dissolved Oxygen (bottom)	ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	22	45	65
RB	1	68	68
DV	2	49	89

FISH COLLECTION SUMMARY

Date of Setting	2000-12-20	**Date of Collection**	2000-12-21
Time of Setting	13:17	**Time of Collection**	11:00
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				60	CO / 22 RB / 1 DV / 2 / / /

Comments

Site is under CNR bridge on Eric Johnsons property.

Oxygen meter quit , couldn't get a reading.

pH = 8.2

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 8 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	58	2.5	UM	
MT	1	1	CO	60	3	UM	
MT	1	1	RB	68	4.6	UM	
MT	1	1	CO	54	2.5	UM	
MT	1	1	CO	45	2.5	UM	
MT	1	1	CO	55	2.6	UM	
MT	1	1	CO	54	2.6	UM	
MT	1	1	CO	51	2.3	UM	
MT	1	1	CO	50	1.9	UM	
MT	1	1	CO	51	2.1	UM	
MT	1	1	CO	50	2.4	UM	
MT	1	1	CO	65	3.8	UM	
MT	1	1	CO	49	1.8	UM	
MT	1	1	DV	89	8.3	UM	
MT	1	1	CO	45	1.6	UM	
MT	1	1	DV	49	1.5	UM	
MT	1	2	CO	53	2.2	UM	
MT	1	2	CO	58	3.2	UM	
MT	1	2	CO	56	2.7	UM	
MT	1	2	CO	50	2.4	UM	
MT	1	3	CO	49	1.6	UM	
MT	1	3	CO	51	2.8	UM	
MT	1	3	CO	56	2.5	UM	
MT	1	3	CO	49	1.5	UM	
MT	1	3	CO	45	1.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 8 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-22	11:07	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

Weather High overcast

Air Temperature -5 °C

Ice Cover (%) 90

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	80
Ice thickness (cm)	20
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	L
Snow Depth (cm)	0
Water Temperature	0.2 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	60 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	4	43	50
RB	1	61	61

FISH COLLECTION SUMMARY

Date of Setting	2001-01-22	**Date of Collection**	2001-01-23
Time of Setting	11:07	**Time of Collection**	11:25
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				90	CO / 4 RB / 1

Comments

Two layers of ice.

pH = 7.7

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 8 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	61	3.9	UM	
MT	1	1	CO	45	1.6	UM	
MT	1	2	CO	43	1.8	UM	
MT	1	3	CO	50	2.1	UM	
MT	1	3	CO	50	2.2	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 8 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-19	10:40	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

Weather High overcast.

Air Temperature -3 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	81
Ice thickness (cm)	11
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	0.2 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	20	46	98
RB	2	42	70

FISH COLLECTION SUMMARY

Date of Setting	2001-02-19	**Date of Collection**	2001-02-20
Time of Setting	10:40	**Time of Collection**	10:30
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 20 RB / 2

Comments

pH = 7.5

Two layers of ice with water between.

Caught one dead Rainbow in trap # 1, Fish was dead long before it flowed into trap.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB - 8 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	49	1.8	UM	
MT	1	2	CO	55	2.7	UM	
MT	1	2	CO	46	0.9	UM	
MT	1	2	CO	47	1.5	UM	
MT	1	2	CO	52	1.8	UM	
MT	1	3	CO	64	2.9	UM	
MT	1	3	CO	62	2.9	UM	
MT	1	3	CO	65	3.7	UM	
MT	1	3	CO	64	3.7	UM	
MT	1	3	CO	60	2.8	UM	
MT	1	3	CO	58	2.6	UM	
MT	1	3	CO	58	2.6	UM	
MT	1	3	RB	70	4.6	UM	
MT	1	3	CO	52	1.4	UM	
MT	1	3	CO	55	1.4	UM	
MT	1	3	CO	98	10.9	UM	
MT	1	3	CO	95	10.4	UM	
MT	1	3	CO	52	1.2	UM	
MT	1	3	CO	60	2	UM	
MT	1	3	CO	52	1.9	UM	
MT	1	3	CO	47	1.2	UM	
MT	1	3	RB	42	0.7	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 8 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-19	11:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

Weather High overcast and windy.

Air Temperature -3 ° C

Ice Cover (%) 10

Stream Flow H (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	71
Ice thickness (cm)	0
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	
Snow Depth (cm)	0
Water Temperature	1.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	M
Conductivity	uS
Dissolved Oxygen (bottom)	10 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	4	68	75
RB	1	64	64

FISH COLLECTION SUMMARY

Date of Setting	2001-03-19	**Date of Collection**	2001-03-20
Time of Setting	11:00	**Time of Collection**	10:25
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				10	CO / 4 RB / 1 / / / / /

Comments

pH = 7.1

Lots of aquatic insects in traps.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) TOB- 8 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	CO	74	3.7	UM	
MT	1	2	CO	68	3.2	UM	
MT	1	2	CO	75	4	UM	
MT	1	3	RB	64	3.3	UM	
MT	1	3	CO	74	3.4	UM	

Appendix 3. Species Richness, Diversity and Evenness

Appendix 1a. Fall Assessment Data Summary Table and Graphs

Plate 1. Table summarizing of fall assessment data.

System	Site	Date (2000)	Distance to nearest pool		Gradient (%)	Site Length (m)	Mean wetted width (m)	approx. surface area (m²)	wetted depth		Instream Cover[1]														out of stream cover[1]		Percent Habitat				Area of Habitat (m²)				Pool substrate[2]				Glide substrate[2]				Riffle substrate[2]			
			up-stream (m)	down-stream (m)					Mean (cm)	maximum (cm)	Total	Functional LWD	LWD- small	LWD-moderate	LWD-large	SWD	Boulder -	Boulder-single	Boulder-cluster	Cobble	Cobble-% area	in-stream vegetation	Cutbanks	Cutbanks length (m)	Cutbanks width (m)	Total	Riparian vegetation	% pool	% glide	% Pool/Glide edge	% riffle	Pool	Glide	Pool/Glide edges	Riffle	Dominant	Sub-Dominant	D90	%embeddedness	Dominant	Sub-Dominant	Glide-D90	%embeddedness	Dominant	Sub-Dominant	Riffle-D90	% embeddedness
BAR	1	11/23			0	4	4	16	61	77	T	N				N	T	5	1	M	40	N	N			N	N	90	5	5	0	14	0.8	0.8	0	C	F	14	10	C	F	14	10				
BUC	1	11/26	200	75	0	14	9.7	135	85	106	T	T		3		T	T	25	4	A		N	M	10	1	T	T	30	60	10	0	41	81	14	0	C	F	31	0	C	F	31	0				
BUC	2	11/26	100	150	0	16	12	188	121	134	T	T			2	T	N			A	70	N	N			T	N	40	50	10	0	75	94	19	0	C	F	24	0	C	F	24	0				
BUC	5	11/26	100	100	0	15	12	174	117	119	T	N				N	M	20	2	M	60	N	N			T	N	40	40	20	0	70	70	35	0	C	F	20	10	C	F	20	10				
BUC	6	11/26	40	150	0	14	8.6	120	92	108	M	M			1	M	N			A	90	N	N			M	T	30	60	10	0	36	72	12	0	C	F	19	5	C	F	19	5				
BUC	7	11/26			0	6	4.7	28	81	84	A	M		10		T	N			A	90	N	N			N	N	90	0	10	0	25	0	2.8	0	C	F	28	0								
BUC	8	11/26			0	7	4.3	30	70	87	T	T		1		N	N			A	85	N	N			N	N	90	0	10	0	27	0	3	0	C	F	28	5								
BYM	1	11/22	500	300	0	13	11	146	70	124	T	N				T	T	15	0	A	90	N	N			T	T	80	10	5	5	117	15	7.3	7.3	C	F	38	1	C	F	38	1	C	F	38	1
BYM	2	11/22	20		0	11	4.8	53	58	89	M	N				M	M	20	1	A	70	N	N			T	N	50	30	10	10	26	16	5.3	5.3	C	F	24	5	C	F	24	5	C	F	24	5
BYM	3	11/23	100	100	0	12	6.8	82	60	90	T	T			1	T	N			A	85	N	N			T	T	75	15	5	5	62	12	4.1	4.1	C	F	19	0	C	F	19	0	C	F	19	0
MCQ	1	11/23	500	200	0	9	5.6	50	64	80	N	N				N	T	10		M	50	T	N			N	N	30	70	0	0	15	35	0	0	C	F	24	50	C	F	24	50				
RIC	1	01/06	6	20	0	12	6	72	98	140	A	T	2	0	0	A	N			A	95	N	T	3	1	A	M	50	45	5	0	36	32	3.6	0	C	F	15	0	C	F	15	0				
RIC	2	10/06				12	6	72	84	92	M	N				M	N			A	80	N	T			M	M	40	40	5	15	29	29	3.6	11	C	F	16	5	C	F	16	25	C	F	16	5
RIC	3	11/22	15		0	11	8.8	96	58	95	T	T		2		T	N			A	90	N	N			T	T	30	40	15	15	29	39	14	14	C	F	19	5	C	F	19	5	C	F	20	5
RIC	3	11/22	20	15	0	13	10	134	54	70	T	T			2	N	N			M	50	N	N			T	T	10	10	10	70	13	13	13	94	F	C	14	15	C	F	14	15	C	F	14	15
RIC	4	11/22	10	5	0	14	8	112	83	109	M	N				T	M	5	1	M		N	T	4	2	T	T	60	20	20	0	67	22	22	0	C	F	13	20	C	F	13	20				
RIC	5	11/22	4	50	0	18	8.3	149	82	105	M	T				M	N			A		N	T			M	M	40	40	20	0	59	59	30	0	C	F	20	5	C	F	21					
SID	1	11/27			0	15	16	240	97	97	A	N				A	N			N		M	N			A	M	100	0	0	0	240	0	0	0	M	M		100								
SID	2	11/27	25	50	0	12	8.7	104	40	50	M	T			1	T	N			N		M	N			M	M	80	0	20	0	83	0	21	0	F	G		95								
SID	3	11/27			0	13	12	156	70	89	M	T		4	2	N	N			T		A	N			T	T	90	0	10	0	140	0	16	0	F	G		95								
UBR	1	11/23																																													
UBR	2	11/23					4	4	96	102	M	M			1	T	T	10		M	70	N	N			T	N	80	10	0	0	3.2	0.4	0	0	C	F	25	20	C	F	25	20				
UBR	3	11/23	150	150	1	11	3.5	39	116	123	T	T			1	T	N			A	90	N	N			N	N	70	25	5	0	27	9.6	1.9	0	C	F	12	0	C	F	12	0				
UBR	9	10/06		0	0	20	12	234	113	147	M	N				M	N			N		N	N			M	T	70	25	5	0	164	59	12	0	F	C	11	100	F	C	11	70				
UBR	10	10/06			0	7	15	103	102	117	M	N				M	N			N		N	N			M	T	70	25	5	0	72	26	5.1	0	F	C	4	90	F	C	4	90				
UBR	11	11/27	300	100	0	19	4	76	108	136	M	N				N	A	50	1	M		N	N			T	T	100	0	0	0	76	0	0	0	B	F	76	15								
UBR	12	11/23	70	100	0	7	9.7	68			T	T		1	1	T	M	20	0	M	50	N	T	2	0	T	T	50	40	10	0	34	27	6.8	0	C	F	27	20	C	F	27	20				
TOB	1	10/03	15	50	2	14	5	70	60	75	M	M			3	M	N			M	80	N	N			M	T	75	0	10	15	53	0	7	11	C	F	7	5					C	P	7	5
TOB	2	10/03	30	75	0	11	9.3	103	69	87	M	N				M	M	50	0	A	95	N	N			T	T	50	0	10	40	51	0	10	41	C	F	28	5					C	F	28	5
TOB	5	11/16						0																																						
TOB	6	12/20						0																																						
TOB	8	12/20						0																																						

[1] N = none, T = trace (< 5%), M = moderate (5-20%), A = abundant (> 20%)
[2] F = fines, G = gravels, C = cobbles, B = Boulders

Plate 7. Table summarizing ranges of species richness, diversity and eveness at each of the sites sampled.

	BAR	1	CO, RB	0-2	0-0.268	0-0.317
	BUC	1	CO,RB	1-2	0-0.292	0-0.346
	BUC	2	CO, RB, CH, LNC	1-3	0-0.308	0-0.364
	BUC	5	CO, RB, CH, LNC	2-3	0.102-0.317	0.120-0.375
	BUC	6	CO, RB, CH, LNC	2	0.112-0.276	0.132-0.327
	BUC	7	CO, RB, CH, LNC	1-4	0-0.474	0-0.560
	BUC	8	CO, RB,CH, LNC	3-4	0.361-0.577	0.427-0.683
	BYM	1	CO, RB, CT	1-2	0-0.178	0-0.211
	BYM	2	CO, RB, CH	2-3	0.217-0.427	0.257-0.505
	BYM	3	CO, RB, CH	2-3	0.263-0.407	0.311-0.481
	MCQ	1	CO, RB	1-2	0-0.171	0-0.202
	RIC	1	CO, RB, CH	1-3	0-0.439	0-0.520
	RIC	2	CO, RB, CH	2-3	0.178-0.398	0.211-0.471
	RIC	5	CO, RB, CH, SUC, LNC	3-4	0.388-0.457	0.459-0.541
	RIC	4	CO, RB, CH, SUC	2-4	0.301-0.466	0.356-0.552
	RIC	3	CO, RB, CH, LNC	2-4	0.217-0.412	0.257-0.487
	SID	1	PCC, SUC	0-2	0-0.301	0-0.356
	SID	2	CT, PCC	0-2	0-0.301	0-0.356
	SID	3	SUC, PCC	0-2	0-3.01	0-0.356
	UBR	1	RB, CH	0-2	0-3.01	0-0.356
	UBR	2	CO, RB, CH	0-3	0-0.412	0-0.488
	UBR	9	CO,RB, CH	2-3	0.276-0.377	0.327-0.446
	UBR	10	RB, CH, LNC	1-2	0-0.276	0-0.327
	UBR	11	CO, RB, CH	0-3	0-0.439	0-0.520
	UBR	12	CH	0-1	0.000	0.000
	TOB	1	CO, RB	2	0.141-0.287	0.167-0.340
	TOB	2	CO, RB, DV	2-3	0.164-0.257	0.194-0.304
	TOB	5	CO, DV	0-2	0-0.260	0-0.307
	TOB	6	CO	0-1	0.000	0.000
	TOB	7	CO, RB, DV	3	0.308	0.364
	TOB	8	CO, RB, DV	2-3	0.132-0.217	0.157-0.257

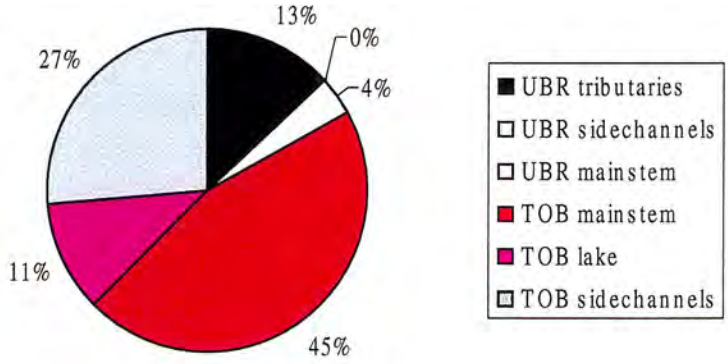

Plate 8. **Comparisons of coho capture rates between Upper Bulkley mainstem, side channel and tributary sites, and Toboggan Creek mainstem, side channels and lake sites. Percentages refer to the average percentage of the total coho catch.**

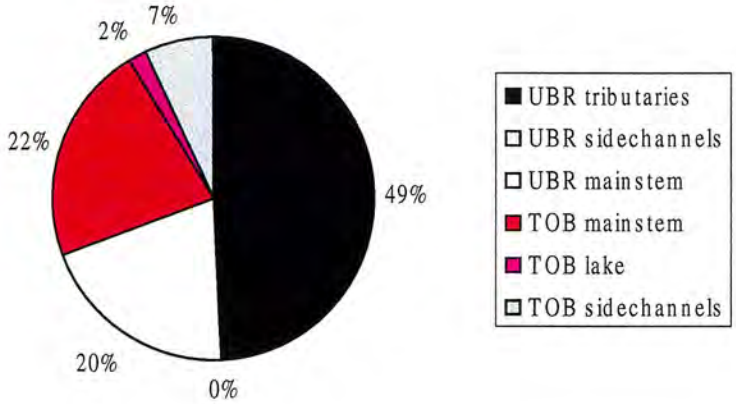

Plate 9. **Comparisons of rainbow trout capture rates between Upper Bulkley mainstem, side channel and tributary sites, and Toboggan Creek mainstem, side channels and lake sites. Percentages refer to the average percentage of the total coho catch.**

Appendix 4. Density Indices

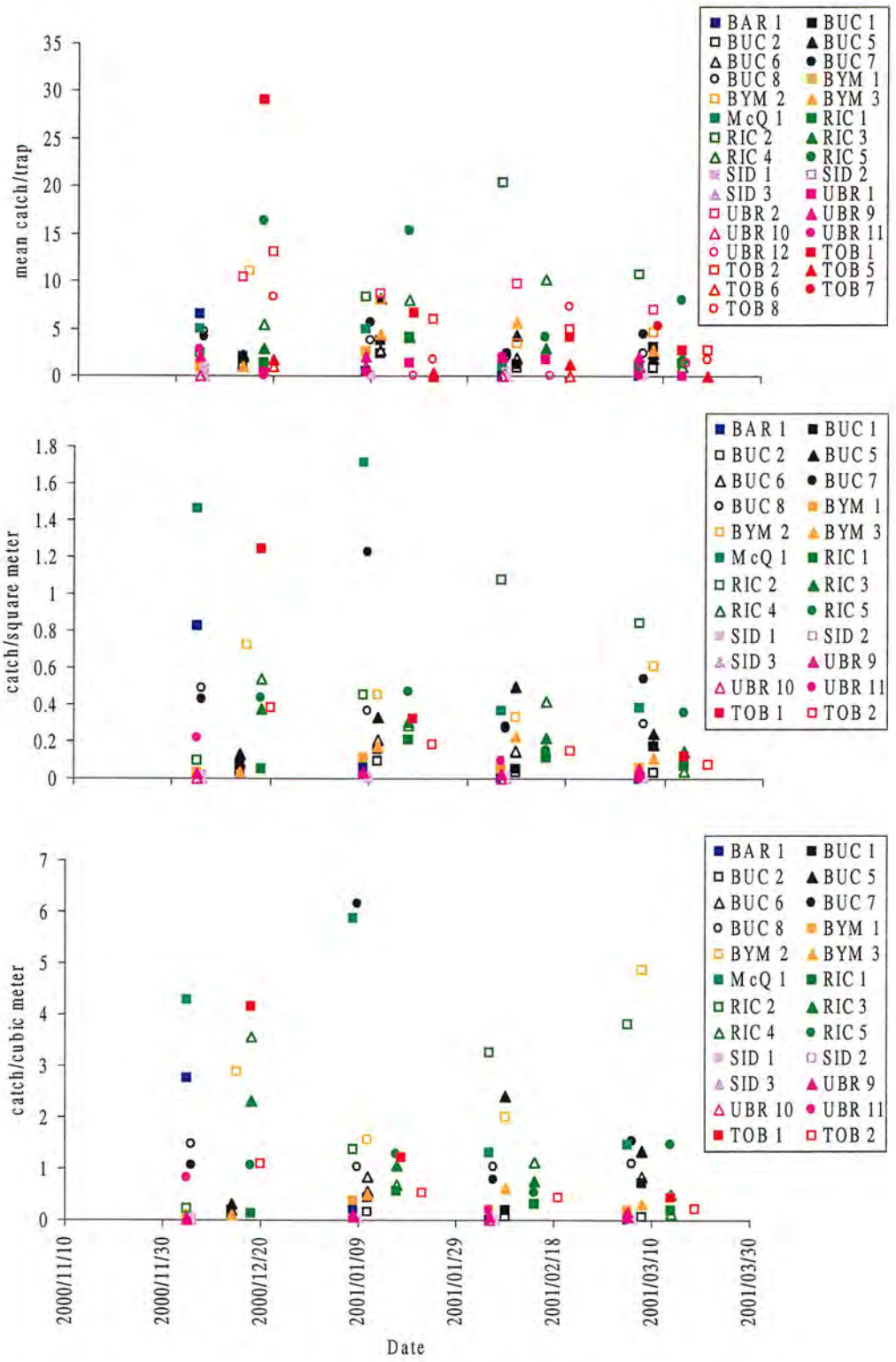

Plate 10. Density indices over time for all species.

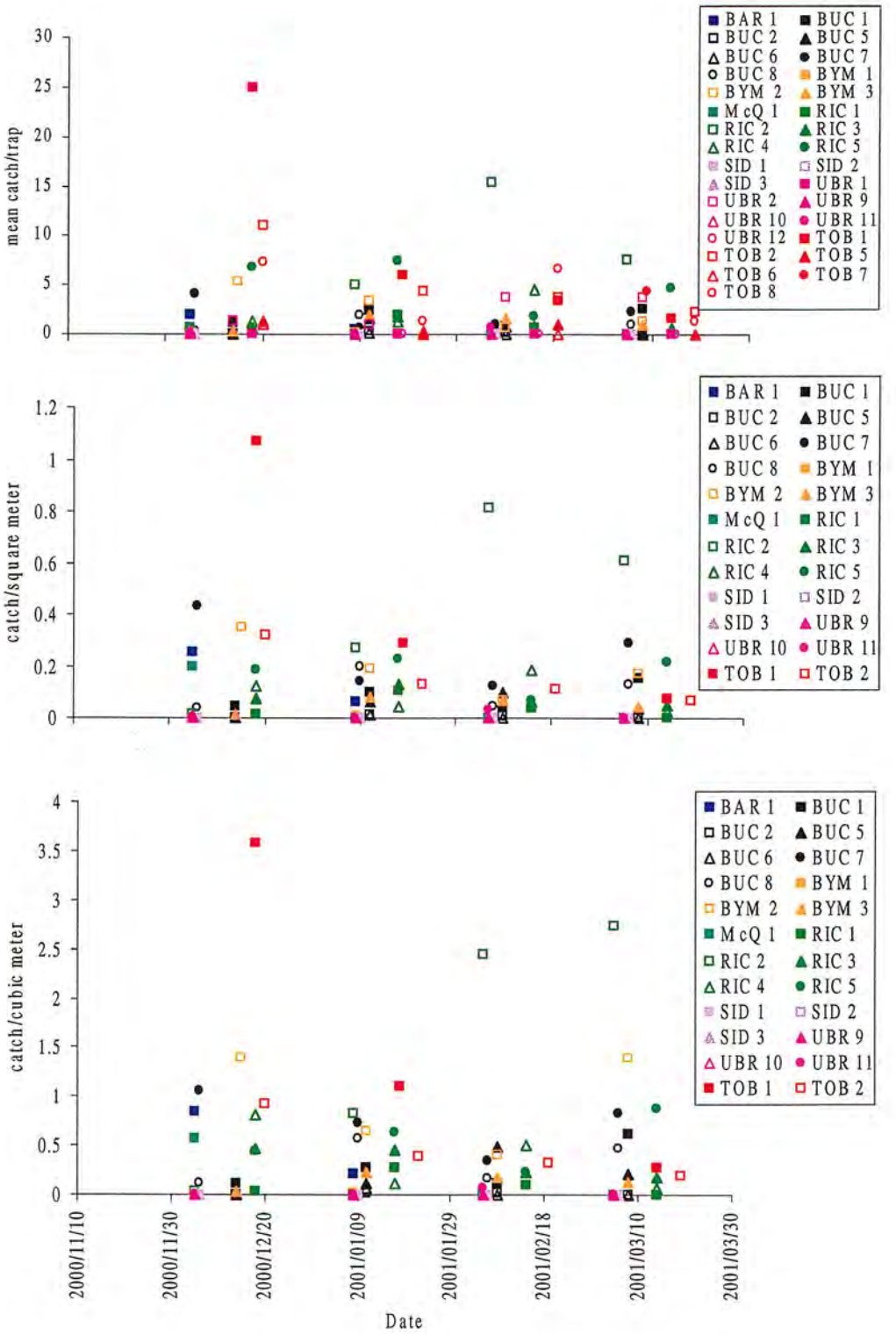

Plate 11. Density indices over time for coho.

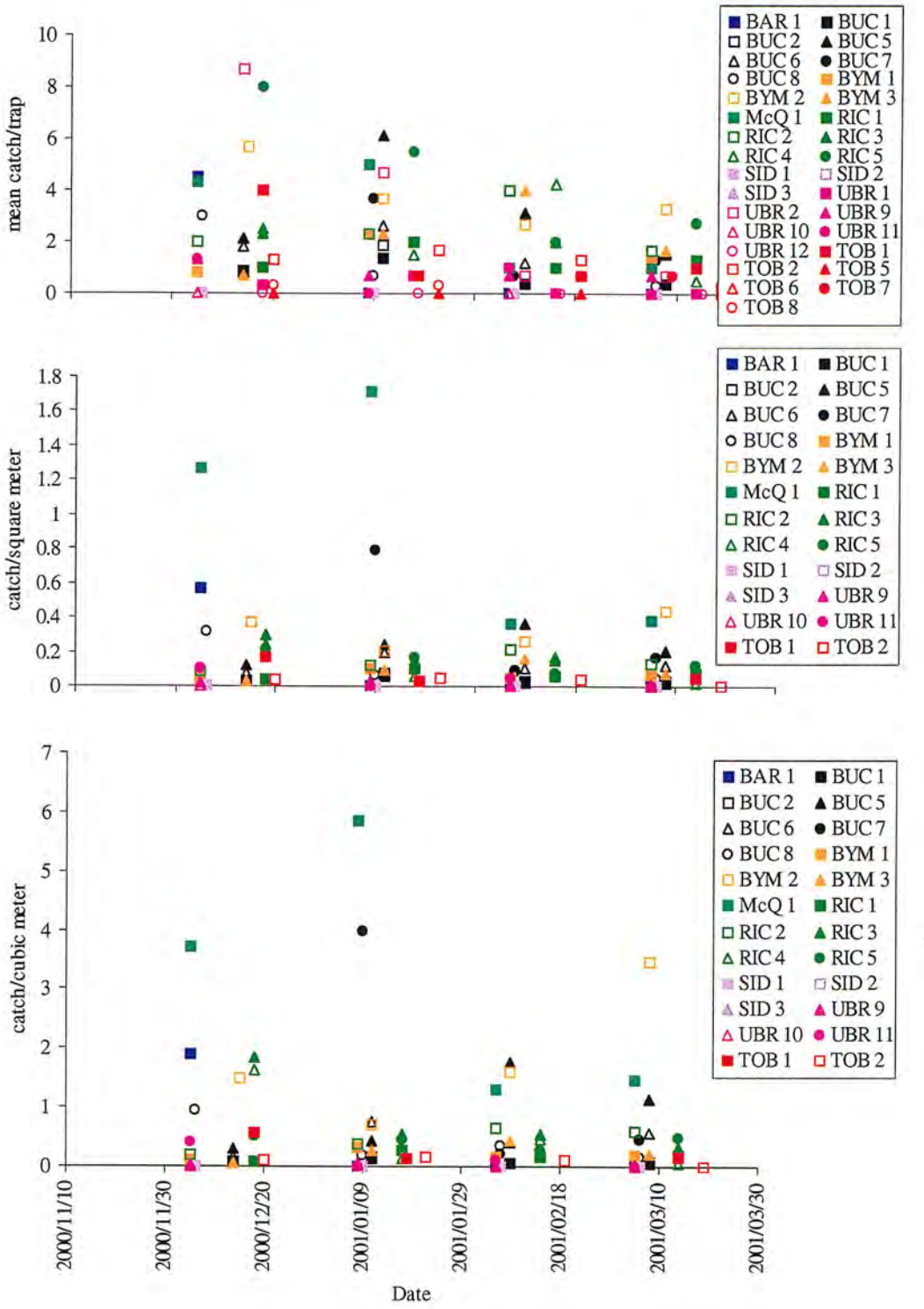

Plate 12. Density indices over time for rainbow trout/steelhead.

Appendix 5. Fork Length, Weight and Condition Factor Data

Appendix 2a. Winter Sampling Data and Graphs

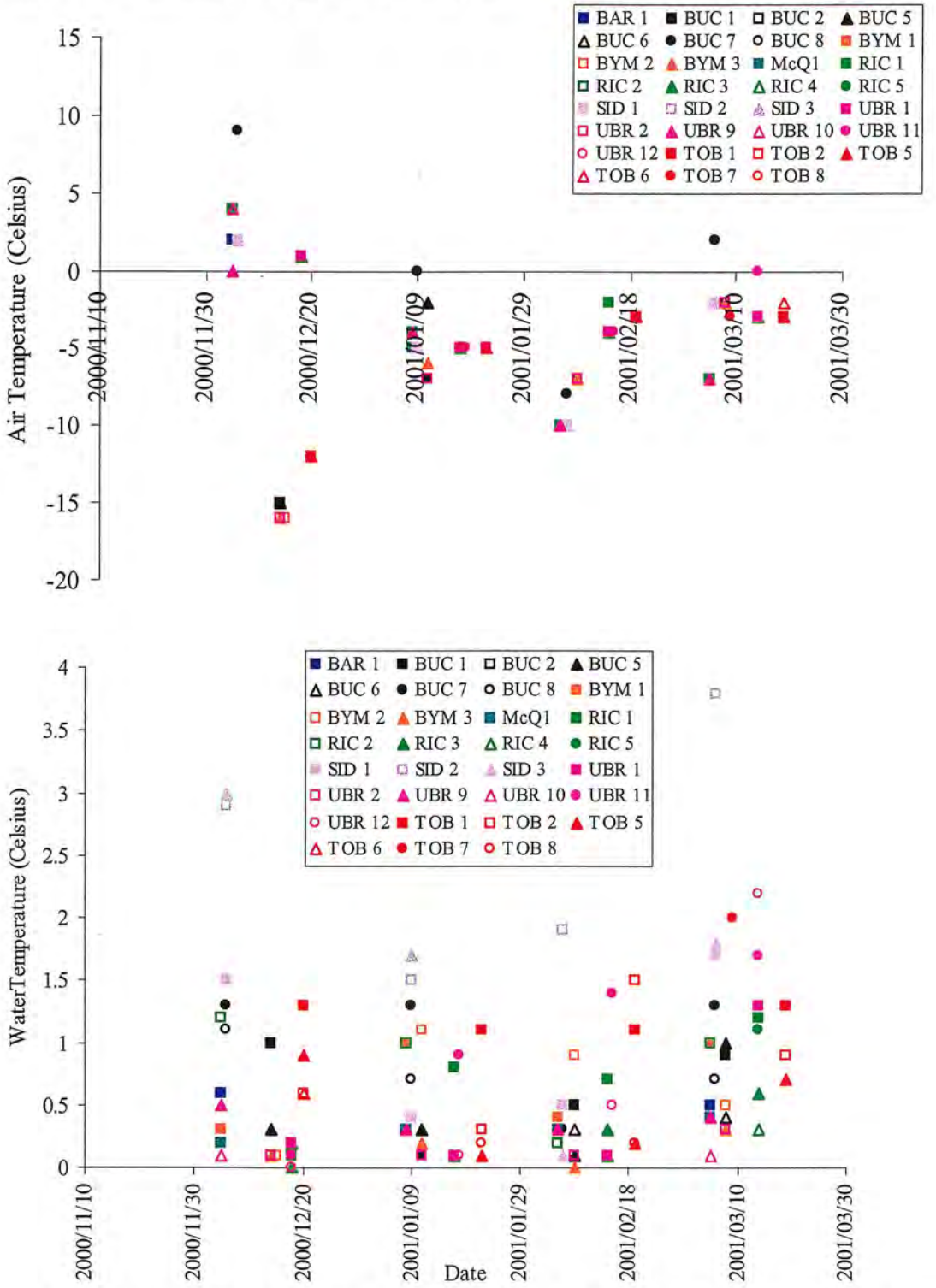

Plate 3. Air temperature and water temperature at the sites sampled during the Upper Bulkley and Toboggan Creek overwintering study.

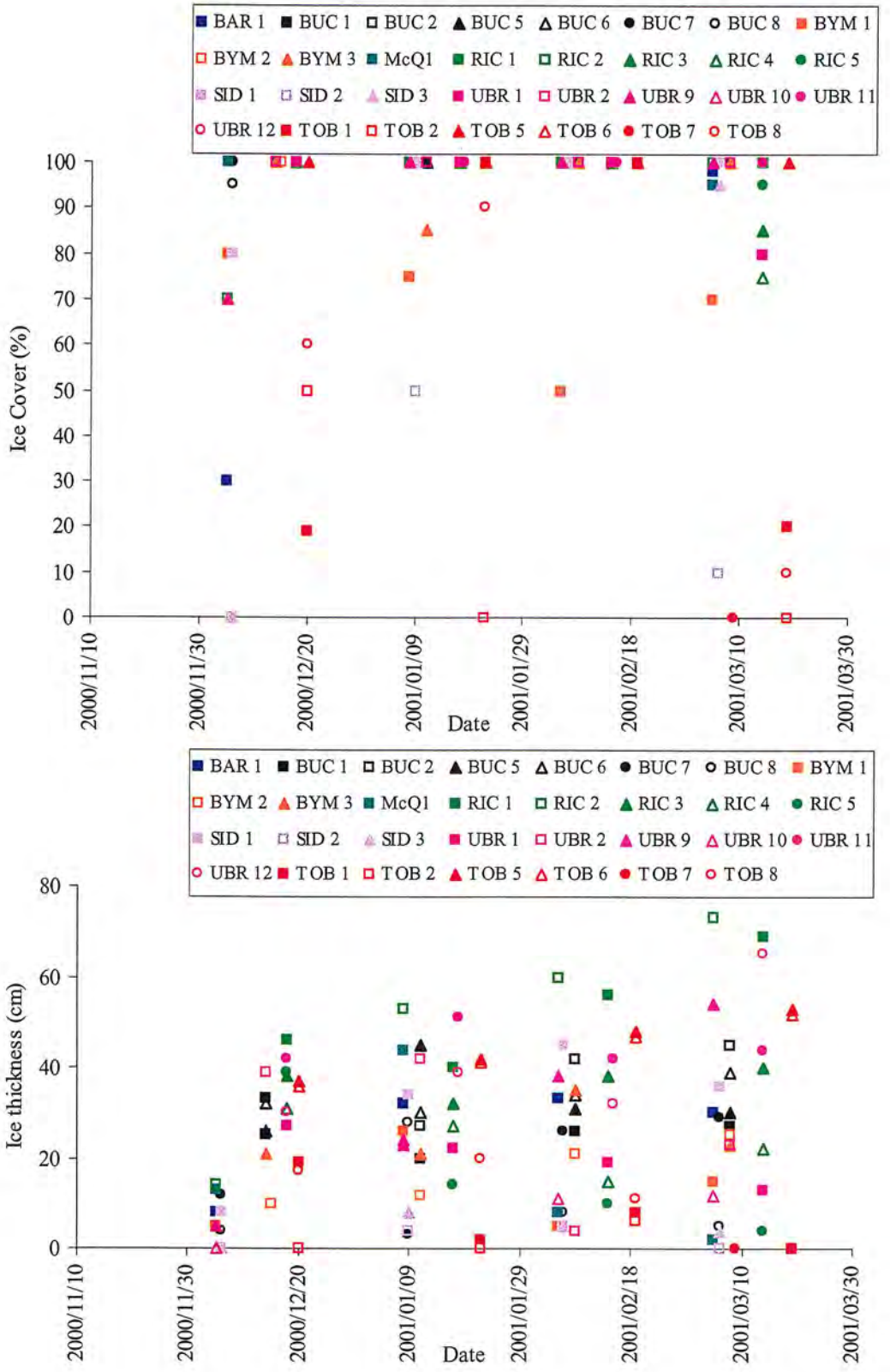

Plate 4. **Percent ice cover and ice thickness at sites sampled during the Upper Bulkley and Toboggan Creek overwintering study.**

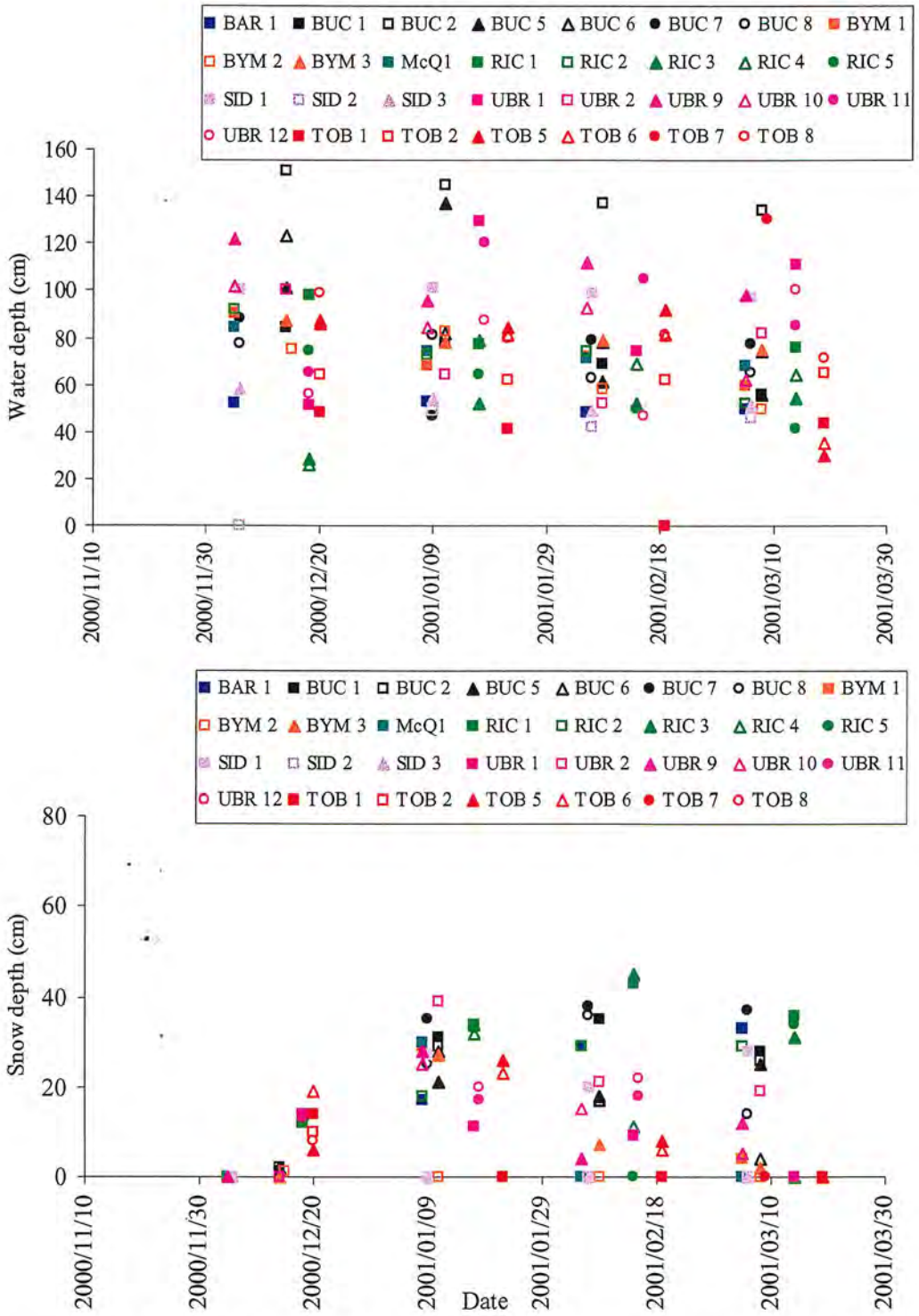

Plate 5. **Water depth (above) and snow depth (below) at sites sampled during the Upper Bulkley and Toboggan Creek overwintering study.**

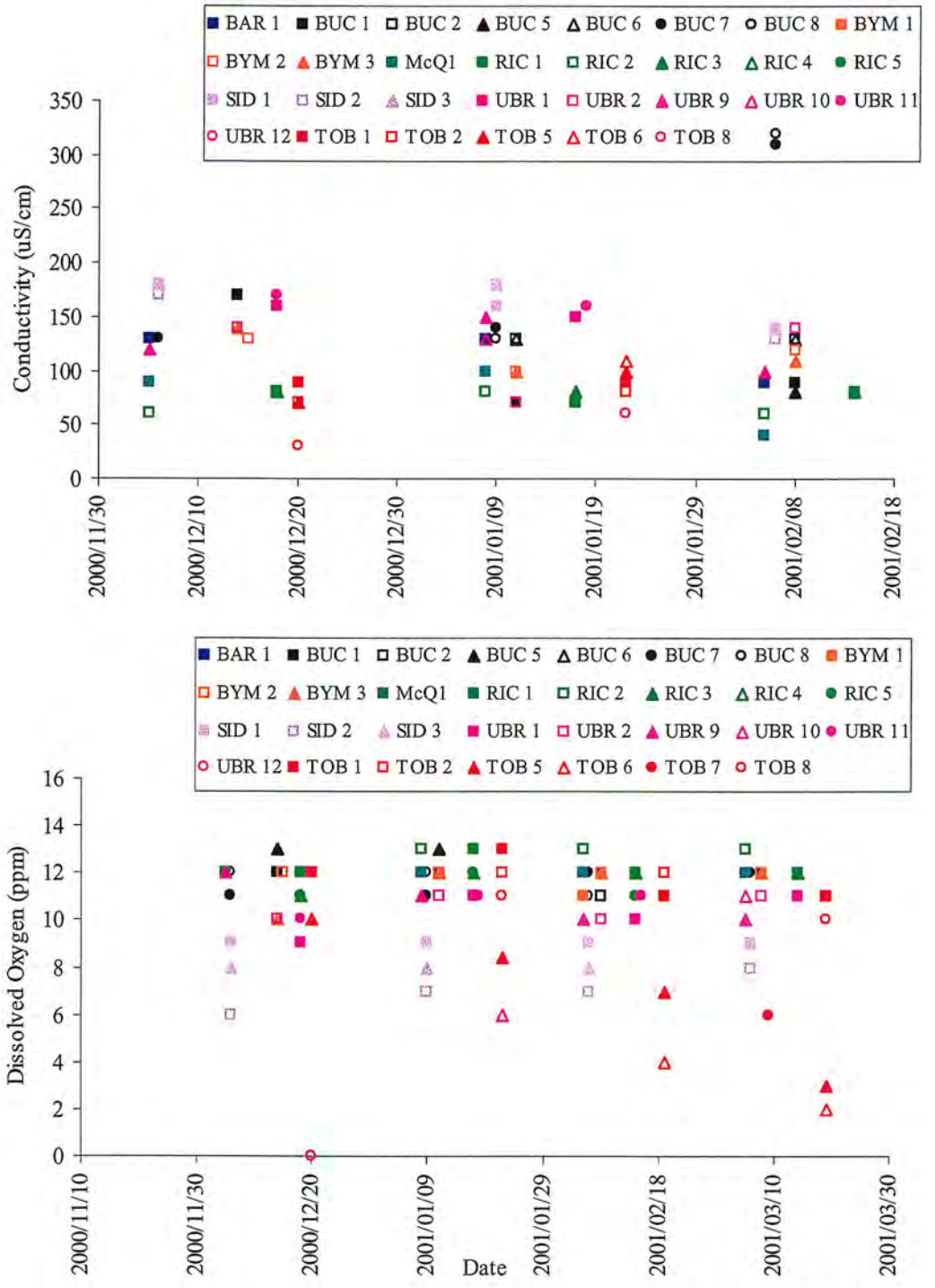

Plate 6. Conductivity (above) and dissolved oxygen (below) at sites sampled during the Upper Bulkley and Toboggan Creek overwintering study.

Appendix 2b. Winter Sampling Data Forms

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BAR - 1 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-05	15:25	BD,TJ,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Barren Creek		

Weather Partially high overcast

Air Temperature 2 ° C

Ice Cover (%) 30

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	52
Ice thickness (cm)	8
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	0.6 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	130 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	4	63	91
RB	9	76	120

FISH COLLECTION SUMMARY

Date of Setting	2000-12-05	**Date of Collection**	2000-12-06
Time of Setting	15:25	**Time of Collection**	11:55
Number of traps set	2	**Number of traps collected**	2

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				30	CO / 4 RB / 9

Comments

pH = 8.1

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BAR- 1 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	115	16.5	UM	
MT	1	1	CO	63	2.8	UM	
MT	1	1	RB	76	5.6	UM	
MT	1	1	RB	92	8	UM	
MT	1	1	RB	94	10.6	UM	
MT	1	1	RB	96	9.3	UM	
MT	1	1	RB	95	9.1	UM	
MT	1	2	RB	89	9.4	UM	
MT	1	2	RB	82	5	UM	
MT	1	2	RB	120	17.3	UM	
MT	1	2	CO	91	7.6	UM	
MT	1	2	CO	65	2.8	UM	
MT	1	2	CO	66	3.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BAR - 1 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-08	12:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Barren Creek		

Weather Sunny and clear

Air Temperature ~~-5~~ ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	53	
Ice thickness (cm)	32	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	17	
Water Temperature	1	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity	130	*uS*
Dissolved Oxygen (bottom)	12	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	1	46	46

FISH COLLECTION SUMMARY

Date of Setting	2001-01-08	**Date of Collection**	2001-01-09
Time of Setting	12:30	**Time of Collection**	13:50
Number of traps set	2	**Number of traps collected**	2

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 1

Comments

~ 14 cm. Of air space between water and bottom of ice.

pH = 7.7

January 9th it was snowing.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BAR- 1 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NA	0	0		
MT	1	2	RB	46	1.8	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BAR - 1 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-05	11:45	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Barren Creek		

Weather High overcast

Air Temperature -~~1~~0 °C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	48
Ice thickness (cm)	33
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	29
Water Temperature	0.3 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	90 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-02-05	**Date of Collection**	2001-02-06
Time of Setting	11:45	**Time of Collection**	12:25
Number of traps set	2	**Number of traps collected**	2

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	NFC / / / / / / / / /

Comments

pH =7.6

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BAR - 1 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	21	Site view, trap hole visible.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	1	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BAR - 1 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-05	11:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Barren Creek		

Weather Sunny and clear

Air Temperature -7 ° C

Ice Cover (%) 98

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	50	
Ice thickness (cm)	30	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	33	
Water Temperature	0.5	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity		*uS*
Dissolved Oxygen (bottom)	12	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
NFC	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-03-05	**Date of Collection**	2001-03-06
Time of Setting	11:30	**Time of Collection**	12:10
Number of traps set	2	**Number of traps collected**	2

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				98	NFC / / / / /

Comments

pH = 7.6
Trap hole was ice free.
Air space between water surface and ice bottom = 8cm.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BAR - 1 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 1 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-14	12:47	TJ, TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather Clear and cold

Air Temperature -15 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	84
Ice thickness (cm)	33
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	1
Water Temperature	1 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	170 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	6	66	74
RB	4	88	93

FISH COLLECTION SUMMARY

Date of Setting	2000-12-14	**Date of Collection**	2000-12-15
Time of Setting	12:47	**Time of Collection**	12:27
Number of traps set	5	**Number of traps collected**	5

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Denth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 6 RB / 4 / / / / /

Comments

December 15 air temp.= -19
pH=7.7
Fish sampled in truck.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 1 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	68	5	A	
MT	1	2	CO	67	4.6	A	
MT	1	3	CO	74	5.6	A	
MT	1	3	RB	93	11.4	UM	
MT	1	3	RB	89	9.8	UM	
MT	1	3	RB	88	9.3	UM	
MT	2	1	CO	66	3.7	A	
MT	2	1	CO	67	4.6	A	
MT	2	1	CO	69	4.9	A	
MT	2	1	RB	89	9.8	UM	
MT	0	0	NA				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC- 1 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-11	11:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather High overcast

Air Temperature ~~-7~~ °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	77
Ice thickness (cm)	20
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	31
Water Temperature	0.1 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	70 uS
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	12	65	75
RB	7	48	108

FISH COLLECTION SUMMARY

Date of Setting	2001-01-11	**Date of Collection**	2001-01-12
Time of Setting	11:30	**Time of Collection**	11:40
Number of traps set	5	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 12 RB / 7

Comments

Ice surface is very slushy.

January 12th, temperature = -5

pH = 7.7
All Coho captured are adipose clipped.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC- 1 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	70	4.5	AD	
MT	1	1	CO	75	5.3	AD	
MT	1	1	RB	82	8.4	UM	
MT	1	1	RB	108	16.5	UM	
MT	1	1	CO	74	5.2	AD	
MT	1	1	RB	89	9.3	UM	
MT	1	1	CO	68	5.5	AD	
MT	1	2	CO	68	4.4	AD	
MT	1	2	RB	94	11.2	UM	
MT	1	2	RB	48	1.7	UM	
MT	1	2	RB	85	8.4	UM	
MT	1	3	CO	65	3.7	AD	
MT	1	3	CO	70	4.4	AD	
MT	1	3	CO	70	4.8	AD	
MT	1	3	CO	75	5.5	AD	
MT	1	3	CO	74	5.1	AD	1
MT	1	3	CO	69	4.2	AD	
MT	1	5	CO	70	5.3	AD	
MT	1	5	RB	85	8	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 1 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-08	11:40	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather Light snowfall

Air Temperature ~~-7~~ °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	69
Ice thickness (cm)	26
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	35
Water Temperature	0.5 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	90 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	4	70	78
RB	2	81	82
NA	0	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-02-08	**Date of Collection**	2001-02-09
Time of Setting	11:40	**Time of Collection**	11:30
Number of traps set	5	**Number of traps collected**	5

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 2 RB / 1
MT	2				100	CO / 2 RB / 1

Comments

pH = 6.9

All Coho captured are adipose clipped.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 1 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	3	Site view looking downstream ,both holes and limno visible.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	76	6	AD	
MT	1	2	RB	81	7.6	UM	
MT	1	3	CO	78	5.6	AD	
MT	2	1	RB	82	7.7	UM	
MT	2	2	CO	78	5.4	AD	
MT	2	2	CO	70	4.5	AD	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 1 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-08	11:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather Sunny and clear

Air Temperature -2 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	56	
Ice thickness (cm)	27	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	28	
Water Temperature	0.9	°C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity		*uS*
Dissolved Oxygen (bottom)	12	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	13	66	111
RB	2	91	111

FISH COLLECTION SUMMARY

Date of Setting	2001-03-08	**Date of Collection**	2001-03-09
Time of Setting	11:00	**Time of Collection**	11:05
Number of traps set	5	**Number of traps collected**	5

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 8 RB / 1
MT	2				100	CO / 5 RB / 1

Comments

pH = 7.6

All coho captured ae adipose clipped.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 1 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	80	4.8	AD	
MT	1	1	CO	79	4.9	AD	
MT	1	2	CO	82	5.5	AD	
MT	1	2	CO	81	5.8	AD	
MT	1	3	CO	66	3.3	AD	
MT	1	3	CO	76	4.9	AD	
MT	1	3	CO	79	5.1	AD	
MT	1	3	CO	70	4.2	AD	
MT	1	3	RB	91	7.9	UM	
MT	2	1	NFC				
MT	2	2	CO	74	3.7	AD	
MT	2	2	CO	67	5	AD	
MT	2	2	CO	89	6.9	AD	
MT	2	2	CO	71	4	AD	
MT	2	2	CO	111	12.8	AD	
MT	2	2	RB	111	11.9	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 2 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-14	1:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather Clear and cold.

Air Temperature -15 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	151	
Ice thickness (cm)	25	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	2	
Water Temperature	0.1	°C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity	170	uS
Dissolved Oxygen (bottom)	12	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	6	71	95

FISH COLLECTION SUMMARY

Date of Setting	2000-12-14	**Date of Collection**	2000-12-15
Time of Setting	1:30	**Time of Collection**	12:45
Number of traps set	7	**Number of traps collected**	7

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 6

Comments

December 15th air temp = -15.
pH=7.5

Fish sampled in truck.

Moved limno to cluster # 2 site.

Coho captured were all adipose clipped.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 2 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	71	5.2	UM	
MT	1	3	RB	76	6.5	UM	
MT	2	2	RB	75	6.2	UM	
MT	2	3	RB	86	9.1	UM	
MT	2	3	RB	86	9.3	UM	
MT	2	3	RB	95	12.5	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 2 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-11	12:05	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather High overcast

Air Temperature ~~-7~~ °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	145	
Ice thickness (cm)	27	
Clarity of Ice (H,M,L, or N) (High. Moderate, Limited, None)	N	
Snow Depth (cm)	29	
Water Temperature	0.1	°C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity	130	uS
Dissolved Oxygen (bottom)	12	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	2	90	103
CH	2	73	76
RB	13	74	92

FISH COLLECTION SUMMARY

Date of Setting	2001-01-11	**Date of Collection**	2001-01-12
Time of Setting	12:05	**Time of Collection**	12:20
Number of traps set	7	**Number of traps collected**	7

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 6
MT	2				100	CO / 2, CH / 2, RB / 7

Comments

Ice surface is slushy.

January 12/01, air temp. = -6

pH = 8.0

Coho that were captured were all adipose clipped.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC- 2 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	86	9.2	UM	
MT	1	1	RB	74	5.6	UM	
MT	1	3	RB	90	10.5	UM	
MT	1	3	RB	90	8.9	UM	
MT	1	3	RB	82	7	UM	
MT	1	3	RB	89	9.3	UM	
MT	2	1	RB	88	8.4	UM	
MT	2	1	RB	84	8.9	UM	
MT	2	1	CO	90	10.6	AD	
MT	2	1	CO	103	13.8	AD	
MT	2	1	RB	76	4.8	UM	
MT	2	1	CH	76	6.4	UM	
MT	2	2	CH	73	5.4	UM	
MT	2	1	RB	83	7.9	UM	
MT	2	3	RB	83	7.5	UM	
MT	2	3	RB	80	7.4	UM	
MT	2	4	RB	92	11.1	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 2 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-08	12:10	TJ<TD<JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather Light snowfall and windy

Air Temperature -7 ° C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	137
Ice thickness (cm)	42
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	35
Water Temperature	0.1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	130 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	1	105	105
RB	5	80	95

FISH COLLECTION SUMMARY

Date of Setting	2001-02-08	**Date of Collection**	2001-02-09
Time of Setting	12:10	**Time of Collection**	11:45
Number of traps set	7	**Number of traps collected**	7

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 1 RB / 2
MT	2				100	RB / 3

Comments

pH =7.1

Coho captured were all adipose clipped.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 2 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	4	Site view looking downstream, both holes visible.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	CO	105	15.2	AD	
MT	1	3	RB	80	6.3	UM	
MT	1	3	RB	82	8.6	UM	
MT	2	1	NFC				
MT	2	2	NFC				
MT	2	3	RB	88	9.1	UM	
MT	2	4	RB	81	7.2	UM	
MT	2	4	RB	95	13.5	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 2 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-08	11:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather Sunny and clear

Air Temperature -2 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	134
Ice thickness (cm)	45
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	26
Water Temperature	0.5 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	5	76	111
LNC	1	72	72
CO	0		

FISH COLLECTION SUMMARY

Date of Setting	2001-03-08	**Date of Collection**	2001-03-09
Time of Setting	11:30	**Time of Collection**	11:50
Number of traps set	7	**Number of traps collected**	7

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 2 LNC / 1
MT	2				100	RB / 3

Comments

pH = 7.6

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC- 2 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	RB	111	15	UM	
MT	1	1	RB	91	7.6	UM	
MT	1	2	LNC	72	7.6	UM	
MT	1	3	NFC				
MT	2	1	RB	86	8	UM	
MT	2	2	RB	86	8.2	UM	
MT	2	3	NFC				
MT	2	4	RB	77	5.8	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 5 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-14	2:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
BUCK CREEK		

Weather Clear and cold.

Air Temperature -15 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	101
Ice thickness (cm)	26
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	2
Water Temperature	0.3 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	140 *uS*
Dissolved Oxygen (bottom)	13 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	15	68	105
LNC	1	81	81
CO	0		

FISH COLLECTION SUMMARY

Date of Setting	2000-12-14	**Date of Collection**	2000-12-15
Time of Setting	14:00	**Time of Collection**	1:59
Number of traps set	7	**Number of traps collected**	7

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 6
MT	2				100	RB / 9 ; LNC / 1

Comments

December 15th air temp. -19.
pH=7.6
Fish sampled in truck.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC- 5 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	2	RB	77	9.3	UM	
MT	1	2	RB	82	8.4	UM	
MT	1	2	RB	79	6.9	UM	
MT	1	3	RB	78	6.6	UM	
MT	1	3	RB	112	17.9	UM	
MT	1	3	RB	68	5.4	UM	
MT	2	1	RB	91	10.2	UM	
MT	2	1	RB	100	13.4	UM	
MT	2	1	RB	75	6.8	UM	
MT	2	1	RB	75	6.4	UM	
MT	2	1	RB	80	8.2	UM	
MT	2	1	RB	95	13.3	UM	
MT	2	1	RB	105	19.5	UM	
MT	2	1	LNC	81	7.6	UM	
MT	2	2	RB	68	5.1	UM	
MT	2	3	RB	89	11.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 5 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-11	13:45	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather Sun and partly cloudy

Air Temperature -2 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	137	
Ice thickness (cm)	45	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	21	
Water Temperature	0.3	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity	100	*uS*
Dissolved Oxygen (bottom)	13	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	11	66	89
CH	3	65	66
RB	43	51	124

FISH COLLECTION SUMMARY

Date of Setting	2001-01-11	**Date of Collection**	2001-01-12
Time of Setting	13:45	**Time of Collection**	14:00
Number of traps set	7	**Number of traps collected**	7

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 4 CH / 3 RB / 21
MT	2				100	CO / 6 RB / 22

Comments

January 12th air temp. = -5

pH = 7.8

No adipose clipped coho caught.

Coho on line 52 has an old top caudel clip.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC- 5 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	81	8.2	UM	
MT	1	1	RB	102	14	UM	
MT	1	1	CO	75	6	UM	
MT	1	1	RB	122	22.7	UM	
MT	1	1	CO	66	4.3	UM	
MT	1	1	RB	65	4.9	UM	
MT	1	1	CO	83	7.4	UM	
MT	1	1	CH	65	4.3	UM	
MT	1	1	RB	69	4.9	UM	
MT	1	1	RB	76	6.8	UM	
MT	1	1	RB	70	5.7	UM	
MT	1	1	RB	101	13	UM	
MT	1	1	RB	81	7.6	UM	
MT	1	1	RB	84	9.7	UM	
MT	1	1	RB	69	4.3	UM	
MT	1	1	RB	84	9	UM	
MT	1	1	RB	78	6.9	UM	
MT	1	1	RB	80	7.7	UM	
MT	1	2	RB	121	23.2	UM	
MT	1	2	CO	78	4.9	UM	
MT	1	2	RB	80	7.6	UM	
MT	1	2	RB	69	4.7	UM	
MT	1	2	CH	65	3.3	UM	
MT	1	2	CH	66	4	UM	
MT	1	2	RB	109	17	UM	
MT	1	2	RB	75	7.4	UM	
MT	1	3	RB	124	26.2	UM	
MT	1	3	RB	98	13.8	UM	
MT	1	3	RB	81	9.5	UM	
MT	2	1	RB	51	1.1	UM	
MT	2	1	RB	80	6.8	UM	
MT	2	1	RB	81	8.3	UM	
MT	2	3	RB	108	17.5	UM	
MT	2	3	RB	79	7.4	UM	
MT	2	3	RB	72	6.1	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 5 (first three letters of stream name-site number)

VISIT # 2

MT	2	3	RB	109	10.2	UM	
MT	2	3	RB	70	4.2	UM	
MT	2	3	RB	76	5.7	UM	
MT	2	3	RB	71	5.3	UM	
MT	2	3	RB	67	5.8	UM	
MT	2	3	RB	68	4.5	UM	
MT	2	3	RB	71	5.1	UM	
MT	2	3	CO	80	6.6	UM	
MT	2	3	RB	88	9.5	UM	
MT	2	3	RB	89	10	UM	
MT	2	4	RB	106	15.1	UM	
MT	2	4	CO	89	9	UM	
MT	2	4	CO	84	8.1	UM	
MT	2	4	RB	83	8.6	UM	
MT	2	4	CO	82	8	UM	
MT	2	4	CO	89	9.6	UM	
MT	2	4	CO	82	8	UM	
MT	2	4	RB	101	14.8	UM	
MT	2	4	RB	103	14.2	UM	
MT	2	4	RB	91	10.3	UM	
MT	2	4	RB	74	6.4	UM	
MT	2	4	RB	63	4.1	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC- 5 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-08	12:45	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Bucjk Creek		

Weather Light snowfall

Air Temperature -7 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	61
Ice thickness (cm)	31
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	18
Water Temperature	0.1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	80 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	6	64	95
CH	2	69	69
RB	22	65	110

FISH COLLECTION SUMMARY

Date of Setting	2001-02-08	**Date of Collection**	2001-02-09
Time of Setting	12:45	**Time of Collection**	12:30
Number of traps set	7	**Number of traps collected**	7

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 7 CO / 1 CH / 1
MT	2				100	RB / 15 CO / 4 CH / 1

Comments

pH = 7.2

1 adipose clipped coho caught.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 5 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	5	Site view loooking upstream ,both holes visible

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	110	18.6	UM	
MT	1	1	RB	85	7.9	UM	
MT	1	1	CO	94	10.3	AD	
MT	1	1	RB	81	7.8	UM	
MT	1	2	RB	78	7	UM	
MT	1	2	RB	84	8.2	UM	
MT	1	2	CO	95	10.8	UM	
MT	1	2	RB	70	4.2	UM	
MT	1	3	RB	72	6	UM	
MT	1	3	CH	69	4.6	UM	
MT	2	1	CO	64	4.2	UM	
MT	2	1	RB	74	6.3	UM	
MT	2	1	RB	84	8.1	UM	
MT	2	1	RB	80	7.8	UM	
MT	2	1	RB	76	6.4	UM	
MT	2	1	CO	79	6.5	UM	
MT	2	1	RB	81	7.4	UM	
MT	2	1	CO	64	3	UM	
MT	2	1	CO	64	3.2	UM	
MT	2	2	RB	69	5.6	UM	
MT	2	2	RB	89	10.2	UM	
MT	2	2	RB	68	5.7	UM	
MT	2	3	RB	65	4.7	UM	
MT	2	3	RB	72	6.1	UM	
MT	2	3	RB	78	7	UM	
MT	2	3	RB	78	7.1	UM	
MT	2	3	RB	65	4.1	UM	
MT	2	3	RB	65	4.2	UM	
MT	2	3	CH	69	4.2	UM	
MT	2	4	RB	101	14.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 5 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-08	12:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather Sunny and clear

Air Temperature -2 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	56
Ice thickness (cm)	30
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	25
Water Temperature	1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	2	69	70
RB	11	71	91

FISH COLLECTION SUMMARY

Date of Setting 2001-03-08

Time of Setting 12:00

Number of traps set 7

Date of Collection 2001-03-09

Time of Collection 12:00

Number of traps collected 7

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 2 RB / 7
MT	2				100	RB / 4

Comments

pH = 7.6

Water depth at cluster # 2 = 109cm

No adipose clipped coho caught.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 5 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	80	5.8	UM	
MT	1	2	NFC				
MT	1	3	RB	76	5.5	UM	
MT	1	3	RB	91	8.1	UM	
MT	1	3	RB	78	5.2	UM	
MT	1	3	RB	82	7.4	UM	
MT	1	3	CO	69	3.7	UM	
MT	1	3	RB	90	8.6	UM	
MT	1	3	CO	70	3.9	UM	
MT	1	4	RB	80	6.3	UM	
MT	2	1	RB	82	6.8	UM	
MT	2	2	RB	71	5.3	UM	
MT	2	2	RB	76	6.1	UM	
MT	2	3	RB	80	6	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 6 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-14	2:15	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather Clear and cold

Air Temperature -15 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	123
Ice thickness (cm)	32
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	2
Water Temperature	0.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	140 *uS*
Dissolved Oxygen (bottom)	13 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	9	58	84
LNC	1	54	54

FISH COLLECTION SUMMARY

Date of Setting	2000-12-14	**Date of Collection**	2000-12-15
Time of Setting	14:15	**Time of Collection**	14:20
Number of traps set	5	**Number of traps collected**	5

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	2				100	RB / 9 LNC / 1

Comments

Fish sampled in truck as temp was -19.
pH = 7.6

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 6 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	2	2	RB	65	4.2	UM	
MT	2	2	RB	79	6.6	UM	
MT	2	2	RB	69	5.4	UM	
MT	2	2	RB	78	6.6	UM	
MT	2	3	LNC	54	2.8	UM	
MT	2	3	RB	68	4.2	UM	
MT	2	3	RB	58	2.9	UM	
MT	2	3	RB	77	7.6	UM	
MT	2	3	RB	84	8.9	UM	
MT	2	3	RB	71	5.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 6 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-11	14:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather Sun and partly cloudy

Air Temperature -2 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	82
Ice thickness (cm)	30
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	28
Water Temperature	0.2 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	130 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	1	78	78
RB	13	51	99

FISH COLLECTION SUMMARY

Date of Setting	2001-01-11	**Date of Collection**	2001-01-12
Time of Setting	14:00	**Time of Collection**	14:30
Number of traps set	5	**Number of traps collected**	5

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	2				100	CO / 1 RB / 13

Comments

Air temp. on January 12 = -6

pH = 7.8

No fish caught in cluster # 1.

No adipose clipped coho caught.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 6 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	2	1	RB	58	3.1	UM	
MT	2	1	RB	75	6.6	UM	
MT	2	1	RB	51	2.3	UM	
MT	2	1	RB	95	12.5	UM	
MT	2	1	RB	58	2.7	UM	
MT	2	1	RB	69	6.2	UM	
MT	2	2	RB	99	11.6	UM	
MT	2	2	RB	75	6.3	UM	
MT	2	2	RB	59	3.1	UM	
MT	2	2	CO	78	6.7	UM	
MT	2	2	RB	69	5.5	UM	
MT	2	2	RB	77	6.2	UM	
MT	2	2	RB	62	3.7	UM	
MT	2	2	RB	79	7.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 6 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-08	13:10	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather Light snowfall.

Air Temperature -7 °C

Ice Cover (%) 100

Stream Flow H (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	78
Ice thickness (cm)	34
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	17
Water Temperature	0.3 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	130 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CH	3	64	78
RB	6	45	65
CO	0		

FISH COLLECTION SUMMARY

Date of Setting	2001-02-08	**Date of Collection**	2001-02-09
Time of Setting	13:10	**Time of Collection**	12:45
Number of traps set	5	**Number of traps collected**	5

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CH / 3 RB / 6
MT	2				100	NFC /

Comments

pH =7.7

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 6 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	6	Site view ,both holes visible.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CH	64	3.2	UM	
MT	1	1	RB	49	1.6	UM	
MT	1	1	CH	78	6.2	UM	
MT	1	1	RB	65	3.4	UM	
MT	1	1	RB	58	3.3	UM	
MT	1	1	CH	66	4.3	UM	
MT	1	1	RB	48	1.4	UM	
MT	1	1	RB	50	1.9	UM	
MT	1	2	RB	45	1.1	UM	
MT	2	1	NFC				
MT	2	2	NFC				
MT	2	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC- 6 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-08	12:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

Weather Sunny and clear

Air Temperature -2 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	74
Ice thickness (cm)	39
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	4
Water Temperature	0.4 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CH	4	60	81
RB	8	51	82
CO	0		

FISH COLLECTION SUMMARY

Date of Setting	2001-03-08	**Date of Collection**	2001-03-09
Time of Setting	12:50	**Time of Collection**	12:30
Number of traps set	5	**Number of traps collected**	5

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CH / 4 RB / 4
MT	2				100	RB / 4

Comments

pH = 7.4

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1): BUC - 6 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CH	60	2.8	UM	
MT	1	2	CH	78	5.5	UM	
MT	1	2	RB	82	7.6	UM	
MT	1	2	RB	82	6.9	UM	
MT	1	2	RB	79	6.3	UM	
MT	1	2	RB	80	6.1	UM	
MT	1	2	CH	64	3.3	UM	
MT	1	2	CH	81	5.5	UM	
MT	2	1	RB	81	6.4	UM	
MT	2	2	NFC				
MT	2	3	RB	51	1	UM	
MT	2	3	RB	62	2.9	UM	
MT	2	3	RB	61	2.9	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 7 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-06	1:59	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Cr. Release Pond		

Weather Sunny

Air Temperature 9 ° C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	88
Ice thickness (cm)	12
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	1.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	130 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	12	71	115
O	0		
O	0		

FISH COLLECTION SUMMARY

Date of Setting	2000-12-06	**Date of Collection**	2000-12-07
Time of Setting	2:00	**Time of Collection**	10:55
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 12

Comments

Ph=7.9

A mixture of 0+ adipose clipped and 1+ adipose clipped as well as unmarked coho.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 7 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	110	13.7	A	
MT	1	1	CO	111	14.7	A	
MT	1	1	CO	115	15.4	A	
MT	1	1	CO	81	5.6	A	
MT	1	2	CO	71	3.2	UM	
MT	1	2	CO	117	17.2	UM	
MT	1	2	CO	104	11.3	A/RM	
MT	1	2	CO	94	8.2	UM	
MT	1	2	CO	83	5.6	UM	
MT	1	2	CO	73	4	UM	
MT	1	2	CO	80	5.1	UM	
MT	1	2	CO	82	5.6	UM	
MT	1	3	NA				
MT	1	3	NA				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 7 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-09	14:35	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek Release Pond		

Weather Snowing

Air Temperature 0 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	47
Ice thickness (cm)	3
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	35
Water Temperature	1.3 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	140 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	2	96	101
CH	4	72	83
RB	11	74	125

FISH COLLECTION SUMMARY

Date of Setting	2001-01-09	**Date of Collection**	2001-01-10
Time of Setting	14:30	**Time of Collection**	11:40
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 2 CH / 4 RB / 11 / / /

Comments

T.J fell through the ice.

January 10th, snowing.

pH = 8

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC- 7 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CH	75	4.7	UM	
MT	1	1	CH	83	7.5	UM	
MT	1	1	RB	84	6.8	UM	
MT	1	1	RB	89	10.1	UM	
MT	1	2	RB	104	14.8	UM	
MT	1	2	RB	101	12.3	UM	
UM	1	2	RB	95	11.3	UM	
MT	1	3	RB	125	24.1	UM	
MT	1	3	RB	88	9.1	UM	
MT	1	3	CH	72	5.5	UM	
MT	1	3	RB	88	8.8	UM	
MT	1	3	RB	95	9.7	UM	
UM	1	3	CH	73	5.5	UM	
MT	1	3	CO	96	11.1	AD	
MT	1	3	RB	74	5.5	UM	
MT	1	3	CO	101	13.6	AD/RM	
MT	1	3	RB	118	20	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 7 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-06	14:15	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek release pond		

Weather Sunny

Air Temperature -8 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	79
Ice thickness (cm)	26
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	38
Water Temperature	0.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	310 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	3	71	100
CH	2	72	80
RB	2	79	105

FISH COLLECTION SUMMARY

Date of Setting	2001-02-06	**Date of Collection**	2001-02-07
Time of Setting	14:15	**Time of Collection**	11:05
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 3 CH / 2 RB / 2 / / /

Comments

pH = 7.7
Feb. 7/01 temp = -16

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 7 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	CO	100	12.9	AD	
MT	1	2	CO	78	5.6	UM	
MT	1	2	CH	72	5.1	UM	
MT	1	2	RB	79	7.1	UM	
MT	1	2	CO	71	4.3	UM	
MT	1	2	RB	105	15.5	UM	
MT	1	3	CH	80	7.2	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 7 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-06	13:45	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek Release Pond		

Weather High overcast part sun

Air Temperature 2 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	77
Ice thickness (cm)	29
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	37
Water Temperature	1.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	7	72	112
SUC	1	78	78
CH	1	76	76
RB	4	82	109

FISH COLLECTION SUMMARY

Date of Setting	2001-03-06	**Date of Collection**	2001-03-07
Time of Setting	13:45	**Time of Collection**	10:50
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 7 SKUC / 1 CH / 1 RB / 4 /

Comments

pH = 8.0

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1): BUC- 7 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	100	10.5	AD	T/C
MT	1	1	RB	109	13.2	UM	
MT	1	1	RB	97	10.2	UM	
MT	1	1	CO	77	5	UM	
MT	1	1	CO	112	15.2	R/V	
MT	1	2	CO	91	8.2	UM	
MT	1	2	SUC	78	5.5	UM	
MT	1	3	RB	100	9.8	UM	
MT	1	3	CO	81	5.4	UM	
MT	1	3	CO	72	4.4	UM	
MT	1	3	CH	76	5.6	UM	
MT	1	3	CO	80	4.7	UM	
MT	1	3	RB	82	5.7	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC- 8 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-06	1:50	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck CR. Release Pond		

Weather Sunny

Air Temperature 9 ° C

Ice Cover (%) 95

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	77
Ice thickness (cm)	4
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	1.1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	130 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	1	94	94
CH	4	77	86
RB	9	82	112

FISH COLLECTION SUMMARY

Date of Setting	2000-12-06	**Date of Collection**	2000-12-07
Time of Setting	13:50	**Time of Collection**	10:40
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				95	CO / 1 CH / 4 RB / 9 / / /

Comments

pH=8.

Trap #1 was set in a very open area.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC- 8 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	112	15.5	UM	
MT	1	1	RB	94	7.7	UM	
MT	1	1	RB	99	10.1	UM	
MT	1	1	CH	79	5	UM	
MT	1	1	CO	94	9.2	UM	
MT	1	1	RB	82	6.4	UM	
MT	1	1	RB	95	9.7	UM	
MT	1	1	RB	92	7.8	UM	
MT	1	2	CH	77	4.7	UM	
MT	1	2	RB	80	6.2	UM	
MT	1	2	CH	82	5.4	UM	
MT	1	2	RB	110	13.2	UM	
MT	1	3	RB	96	9.7	UM	
MT	1	3	CH	86	7.6	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC- 8 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-09	14:40	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek Release Pond		

Weather Snowing

Air Temperature 0 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	81
Ice thickness (cm)	28
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	25
Water Temperature	0.7 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	130 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	6	71	99
CH	3	69	75
RB	2	72	89

FISH COLLECTION SUMMARY

Date of Setting	2001-01-09	**Date of Collection**	2001-01-10
Time of Setting	14:40	**Time of Collection**	11:55
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 6 CH / 3 RB / 2 / /

Comments

pH = 7.7

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1): BUC- 8 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	99	12.4	AD	
MT	1	1	CH	69	4.2	UM	
MT	1	1	CO	75	5.1	UM	
MT	1	2	CO	71	5	UM	
MT	1	2	CO	75	5.8	UM	
MT	1	2	RB	72	5.1	UM	
MT	1	2	CO	71	4.7	UM	
MT	1	2	RB	89	9.4	UM	
MT	1	3	CH	75	5.3	UM	
MT	1	3	CO	85	7.4	UM	
MT	1	3	CH	85	7.4	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 8 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-06	14:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek Release Pond		

Weather Sunny

Air Temperature -8 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	63
Ice thickness (cm)	8
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	36
Water Temperature	0.5 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	320 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	1	76	76
CH	2	70	78
RB	8	62	86

FISH COLLECTION SUMMARY

Date of Setting	2001-02-06	**Date of Collection**	2001-02-07
Time of Setting	14:30	**Time of Collection**	10:50
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 1 CH / 2 RB / 87 SUC / 1 /

Comments

pH = 8.1

Feb. 7/01 Temp = -16.

Sucker not sampled.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 8 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CH	78	5.7	UM	
MT	1	1	RB	81	6.8	UM	
MT	1	1	RB	62	3.7	UM	
MT	1	1	RB	86	9	UM	
MT	1	2	CH	70	4.4	UM	
MT	1	3	CO	76	6.4	UM	
MT	1	3	RB	81	7	UM	
MT	1	3	RB	82	9	UM	
MT	1	3	RB	74	5.5	UM	
MT	1	3	RB	85	8.6	UM	
MT	1	3	RB	72	5.5	UM	
MT	1	3	SUC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC - 8 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-06	13:39	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Bukck Creek Release Pond		

Weather High overcast part sun

Air Temperature 2 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	65
Ice thickness (cm)	5
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	14
Water Temperature	0.7 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	2	80	102
CH	3	74	81
RB	1	89	89

FISH COLLECTION SUMMARY

Date of Setting	2001-03-06	**Date of Collection**	2001-03-07
Time of Setting	13:39	**Time of Collection**	10:41
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 2 CH / 3 RB / 1

Comments

pH = 7.5

Ice at limno is slushy

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BUC- 8 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CH	74	4.4	UM	
MT	1	1	CH	81	5.3	UM	
MT	1	2	NFC				
MT	1	3	CO	102	10.8	AD	
MT	1	3	CO	80	6.1	UM	
MT	1	3	CH	74	4.8	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM- 1 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-05	14:50	BD,TJ,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

Weather High overcast. Rain on pick-up day.

Air Temperature 4 °C

Ice Cover (%) 80

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	90
Ice thickness (cm)	5
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	0.3 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	90 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	5	76	126

FISH COLLECTION SUMMARY

Date of Setting	2000-12-05	**Date of Collection**	2000-12-06
Time of Setting	14:50	**Time of Collection**	10:35
Number of traps set	6	**Number of traps collected**	6

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				80	RB / 5

Comments

Plunge area is open but the rest of the pool has iced over. Water is plunging about 8 inches from stream to culvert bottom.

5 traps in boulder cluster area, 1 trap in slower flowing rip rap area.
pH=7.9. The water temperature meter might be off.
Trap # 1 is directly under culvert. Trap # 5 and 6 are right in the boulder cluster.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 1 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	79	6.2	UM	
MT	1	1	RB	84	7.1	UM	
MT	1	1	RB	76	5	UM	
MT	1	4	RB	126	20.9	UM	
MT	1	5	RB	102	8.5	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM- 1 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-08	11:50	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

Weather Sunny and clear

Air Temperature -5 ° C

Ice Cover (%) 75

Stream Flow H (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	68
Ice thickness (cm)	26
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	29
Water Temperature	1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	100 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	1	52	52
RB	14	44	118

FISH COLLECTION SUMMARY

Date of Setting	2001-01-08	**Date of Collection**	2001-01-09
Time of Setting	11:50	**Time of Collection**	11:20
Number of traps set	6	**Number of traps collected**	6

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				75	CO / 1 RB / 6
MT	2				75	RB / 8

Comments

Fish cannot access the culvert.
Water is open below the culvert about a 3m area.

January 9th, it was snowing.

pH = 8

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 1 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	72	4.6	UM	
MT	1	1	RB	96	11.8	UM	
MT	1	1	RB	71	4.7	UM	
MT	1	1	RB	81	7.9	UM	
MT	1	2	RB	44	1.1	UM	
MT	1	2	RB	78	6.4	UM	
MT	1	3	CO	52	2.2	UM	
MT	2	1	RB	89	10.6	UM	
MT	2	1	RB	78	5.4	UM	
MT	2	2	RB	72	5.3	UM	
MT	2	2	RB	61	3.4	UM	
MT	2	2	RB	66	4.8	UM	
MT	2	3	RB	118	18.4	UM	
MT	2	3	RB	116	20	UM	
MT	2	3	RB	77	5.6	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM- 1 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-05	11:15	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

Weather High overcast.

Air Temperature -10 ° C

Ice Cover (%) 50

Stream Flow H (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	72
Ice thickness (cm)	5
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	H
Snow Depth (cm)	0
Water Temperature	0.4 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	40 *uS*
Dissolved Oxygen (bottom)	11 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	6	61	130
LNC	1	0	0

FISH COLLECTION SUMMARY

Date of Setting	2001-02-05	**Date of Collection**	2001-02-06
Time of Setting	11:15	**Time of Collection**	10:50
Number of traps set	6	**Number of traps collected**	6

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				50	RB / 5
MT	2				50	RB / 1 LNC / 1

Comments

pH = 8.4

Longnose chub not sampled.

Feb.6/01 light snowfall.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 1 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	16	Site view looking upstream, limno visible.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	70	4.5	UM	
MT	1	1	RB	61	3.5	UM	
MT	1	1	RB	78	6.9	UM	
MT	1	2	RB	98	12	UM	
MT	1	2	RB	130	28.2	UM	
MT	1	3	NFC				
MT	2	1	NFC				
MT	2	2	NFC				
MT	2	3	LNC				
MT	2	3	RB	81	8	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 1 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-05	11:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

Weather Sunny and clear

Air Temperature -7 ° C

Ice Cover (%) 70

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	60	
Ice thickness (cm)	15	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N	
Snow Depth (cm)	4	
Water Temperature	1	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity		*uS*
Dissolved Oxygen (bottom)	12	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	8	49	131

FISH COLLECTION SUMMARY

Date of Setting	2001-03-05	**Date of Collection**	2001-03-06
Time of Setting	11:00	**Time of Collection**	11:10
Number of traps set	6	**Number of traps collected**	6

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				70	RB / 8
MT	2				70	NFC /

Comments

pH = 7.8

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 1 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	78	5.6	UM	
MT	1	2	RB	72	4.3	UM	
MT	1	2	RB	49	1.4	UM	
MT	1	2	RB	100	10.3	UM	
MT	1	3	RB	88	8.1	UM	
MT	1	3	RB	131	22.5	UM	
MT	1	3	RB	74	4.3	UM	
MT	1	3	RB	64	3.1	UM	
MT	2	1	NFC				
MT	2	2	NFC				
MT	2	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 2 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-15	4:45	BD,TJ

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

Weather - 16 and clear

Air Temperature -16 ° C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	75
Ice thickness (cm)	10
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	1
Water Temperature	0.1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	130 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	17	56	95
CO	16	42	78

FISH COLLECTION SUMMARY

Date of Setting 2000-12-14

Time of Setting 9:45

Number of traps set 3

Date of Collection 2000-12-15

Time of Collection

Number of traps collected 3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 16 RB / 17 / / / / / /

Comments

December 15th temp. is -24 . Fish sampled in truck.

pH = 8.3

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 2 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	75	5.7	UM	
MT	1	1	RB	78	7	UM	
MT	1	1	CO	68	3.8	UM	
MT	1	1	CO	43	1.5	UM	
MT	1	1	RB	72	5.6	UM	
MT	1	1	RB	98	11.7	UM	
MT	1	1	CO	42	1.3	UM	
MT	1	1	CO	50	1.5	UM	
MT	1	1	CO	78	7	UM	
MT	1	1	CO	61	6.8	UM	
MT	1	1	CO	46	1.6	UM	
MT	1	1	RB	88	8.7	UM	
MT	1	1	RB	56	2.7	UM	
MT	1	1	RB	95	14.2	UM	
MT	1	1	RB	83	7.6	UM	
MT	1	1	RB	75	6.5	UM	
MT	1	2	RB	76	6.3	UM	
MT	1	2	RB	89	10	UM	
MT	1	2	RB	68	5.1	UM	
MT	1	2	CO	57	2.7	UM	
MT	1	2	CO	48	2	UM	
MT	1	2	CO	56	1.7	UM	
MT	1	2	CO	48	1.4	UM	
MT	1	2	CO	50	1.8	UM	
MT	1	2	CO	62	3.8	UM	
MT	1	2	RB	70	5.8	UM	
MT	1	2	RB	81	8.9	UM	
MT	1	2	CO	44	1.2	UM	
MT	1	2	RB	57	3.1	UM	
MT	1	2	CO	49	1.5	UM	
MT	1	2	CO	50	2.7	UM	
MT	1	2	CO	58	3	UM	
MT	1	2	RB	67	3.5	UM	
MT	1	2	RB	80	7.2	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 2 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-11	9:50	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

Weather overcast

Air Temperature -7 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	83
Ice thickness (cm)	12
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	1.1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	100 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	10	38	78
CH	3	59	67
RB	11	41	83

FISH COLLECTION SUMMARY

Date of Setting	2001-01-11	**Date of Collection**	2001-01-12
Time of Setting	9:50	**Time of Collection**	9:40
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 10 CH / 3 RB / 11 / / /

Comments

Fell through the ice.
No snow at limno.
January 12th, air temp. = -16
Creek is open for a bout10 meters upstream and downstream of this site.

pH = 7.8

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 2 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	59	3.9	UM	
MT	1	1	CH	67	4.6	UM	
MT	1	1	CH	67	4.7	UM	
MT	1	1	RB	62	4.2	UM	
MT	1	1	RB	41	0.9	UM	
MT	1	2	RB	71	4.4	UM	
MT	1	2	RB	83	6.8	UM	
MT	1	2	RB	74	6	UM	
MT	1	2	RB	81	7.1	UM	
MT	1	2	CO	78	6.6	UM	
MT	1	2	RB	76	5.4	UM	
MT	1	2	RB	55	2.7	UM	
MT	1	2	CO	58	2.7	UM	
MT	1	2	CO	62	3.2	UM	
MT	1	2	CO	45	1.4	UM	
MT	1	2	RB	59	2.8	UM	
MT	1	2	CO	64	3.4	UM	
MT	1	2	CO	55	3.3	UM	
MT	1	2	RB	69	4.9	UM	
MT	1	3	CH	59	2.8	UM	
MT	1	3	CO	38	0.9	UM	
MT	1	3	CO	55	2	UM	
MT	1	3	CO	45	1.3	UM	
MT	1	3	CO	65	3.4	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 2 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-08	10:00	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

Weather Light snowfall

Air Temperature -7 °C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	58
Ice thickness (cm)	21
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	0.9 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	120 uS
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	8	44	103
CO	2	62	68

FISH COLLECTION SUMMARY

Date of Setting	2001-02-08	**Date of Collection**	2001-02-09
Time of Setting	10:20	**Time of Collection**	9:45
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 8 CO / 2

Comments

pH = 7.4

Rainbow on line # 3 has top caudel erosion.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 2 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	24	Site view looking downstream, limno visible.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	61	3.1	UM	
MT	1	1	RB	44	1	UM	
MT	1	1	RB	103	15.3	UM	
MT	1	2	CO	62	3.5	UM	
MT	1	2	CO	68	3.8	UM	
MT	1	2	RB	74	5.2	UM	
MT	1	2	RB	71	5.5	UM	
MT	1	3	RB	79	7.4	UM	
MT	1	3	RB	44	1.4	UM	
MT	1	3	RB	81	7.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 2 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-08	9:30	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

Weather Sunny and clear

Air Temperature -2 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	50
Ice thickness (cm)	25
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	0.5 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	4	40	64
RB	10	45	106

FISH COLLECTION SUMMARY

Date of Setting	2001-03-08	**Date of Collection**	2001-03-09
Time of Setting	9:30	**Time of Collection**	9:40
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 4 RB / 10

Comments

pH = 7.2

Ice seems thicker between sites 1 & 2 than last month

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 2 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	NFC				
MT	1	2	RB	45	1.3	UM	
MT	1	2	CO	64	2.9	UM	
MT	1	2	RB	84	7.5	UM	
MT	1	2	RB	79	5.3	UM	
MT	1	2	CO	47	1.2	UM	
MT	1	2	CO	47	1.1	UM	
MT	1	2	CO	40	1	UM	
MT	1	3	RB	74	4.5	UM	
MT	1	3	RB	106	12.5	UM	
MT	1	3	RB	80	5.7	UM	
MT	1	3	RB	65	3	UM	
MT	1	3	RB	68	4.1	UM	
MT	1	3	RB	55	2	UM	
MT	1	3	RB	71	4.7	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 3 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-14	10:15	BD,TJ

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

Weather Clear and cold

Air Temperature -16 ° C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	87
Ice thickness (cm)	21
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	0.1 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	140 *uS*
Dissolved Oxygen (bottom)	10 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	1	62	62
RB	2	68	84

FISH COLLECTION SUMMARY

Date of Setting	2000-12-14	**Date of Collection**	2000-12-15
Time of Setting	10:15	**Time of Collection**	10:15
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 1 RB / 2 / / / / /

Comments

December 15th temp is -24 so fish were sampled in the truck.

pH=8.2

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 3 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	62	4	UM	
MT	1	1	RB	84	8.4	UM	
MT	1	1	RB	68	5.4	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 3 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-11	10:10	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

Weather Overcast.

Air Temperature -6 ° C

Ice Cover (%) 85

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	78
Ice thickness (cm)	21
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	27
Water Temperature	0.2 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	100 uS
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	6	45	53
RB	7	39	78

FISH COLLECTION SUMMARY

Date of Setting	2001-01-11	**Date of Collection**	2001-01-12
Time of Setting	10:10	**Time of Collection**	10:00
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				85	CO / 6 RB / 7 / / / / /

Comments

Ice surface is slushy. Soft enough to break through.

January 12th, air temp = -15.

pH = 7.6

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM- 3 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	76	5.8	UM	
MT	1	1	RB	46	1.6	UM	
MT	1	1	CO	45	1.2	UM	
MT	1	1	CO	45	1.3	UM	
MT	1	1	CO	44	1.1	UM	
MT	1	2	RB	41	1.1	UM	
MT	1	2	RB	78	6.8	UM	
MT	1	2	RB	50	1.6	UM	
MT	1	2	RB	44	1.2	UM	
MT	1	2	CO	46	1.3	UM	
MT	1	3	CO	45	1.3	UM	
MT	1	3	CO	53	1.9	UM	
MT	1	3	RB	39	0.9	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 3 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-08	10:10	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

Weather Light snowfall

Air Temperature -7 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	79
Ice thickness (cm)	35
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	7
Water Temperature	0 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	110 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	5	41	70
RB	12	39	76

FISH COLLECTION SUMMARY

Date of Setting	2001-02-08	**Date of Collection**	2001-02-09
Time of Setting	10:10	**Time of Collection**	9:55
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Instream Cover: Dominant	Instream Cover: Sub Dominant	Instream Cover: Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 12 CO / 5 / / / / /

Comments

pH = 7.3

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 3 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	25	Looking downstream with limno visible

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	CO	62	2.7	UM	
MT	1	1	CO	45	1.2	UM	
MT	1	2	RB	72	5.2	UM	
MT	1	2	RB	76	6.3	UM	
MT	1	2	RB	42	0.6	UM	
MT	1	2	RB	74	5.6	UM	
MT	1	2	RB	44	1.1	UM	
MT	1	2	RB	75	6.3	UM	
MT	1	2	CO	65	3.3	UM	
MT	1	2	CO	41	0.5	UM	
MT	1	2	RB	42	0.09	UM	
MT	1	3	RB	44	0.9	UM	
MT	1	3	RB	41	0.9	UM	
MT	1	3	RB	43	1.2	UM	
MT	1	3	RB	39	0.7	UM	
MT	1	3	RB	45	1.4	UM	
MT	1	3	CO	70	4.3	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM - 3 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-08	9:45	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

Weather Sunny and Clear

Air Temperature -2 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	75
Ice thickness (cm)	23
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	2
Water Temperature	0.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	uS
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	3	46	70
CH	1	68	68
RB	5	38	73

FISH COLLECTION SUMMARY

Date of Setting	2001-03-08	**Date of Collection**	2001-03-09
Time of Setting	9:45	**Time of Collection**	9:55
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 3 CH / 1 RB / 5

Comments

pH = 7.6

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) BYM- 3 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	73	4.4	UM	
MT	1	1	RB	42	0.9	UM	
MT	1	1	CO	62	2.3	UM	
MT	1	2	RB	38	0.8	UM	
MT	1	2	RB	76	5.2	UM	
MT	1	2	CH	68	3.2	UM	
MT	1	2	CO	70	3.5	UM	
MT	1	3	CO	46	1.2	UM	
MT	1	3	RB	46	1.2	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) MCQ - 1 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-05	15:10	BD,TJ,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Mcquarrie Creek		

Weather High overcast

Air Temperature 4 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration H (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	84
Ice thickness (cm)	13
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	0
Water Temperature	0.2 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	90 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	2	65	71
RB	13	49	97

FISH COLLECTION SUMMARY

Date of Setting	2000-12-05	**Date of Collection**	2000-12-06
Time of Setting	15:10	**Time of Collection**	10:53
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 2 RB / 13

Comments

Water flowing over the ice. Traps set just off of downstrream side of culvert.
pH = 8
Approx. 20 caddisfly larvae in trap # 2. Coho are long and very skinny.

Water depth from stream bottom to ice bottom is 84cm. 13 cm of water flowing over top of ice.

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) MCQ - 1 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	49	1.2	UM	
MT	1	1	RB	54	1.4	UM	
MT	1	2	RB	82	5.8	UM	
MT	1	2	RB	60	1.9	UM	
MT	1	2	RB	79	4.5	UM	
MT	1	2	RB	82	5.4	UM	
MT	1	2	RB	81	5.8	UM	
MT	1	2	RB	55	1.7	UM	
MT	1	2	RB	86	5.5	UM	
MT	1	2	RB	77	4.7	UM	
MT	1	2	RB	86	6.2	UM	
MT	1	2	CO	65	2.2	UM	
MT	1	2	CO	71	3.3	UM	
MT	1	2	RB	97	8.4	UM	
MT	1	3	RB	90	7.5	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) MCQ- 1 (first three letters of stream name-site number)

VISIT # 2

Date of survey	Time of survey	Surveyors
2001-01-08	12:10	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
McQuarrie Creek		

Weather Sunny and clear

Air Temperature -5 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration M (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	74
Ice thickness (cm)	44
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	30
Water Temperature	0.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	100 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	15	39	88

FISH COLLECTION SUMMARY

Date of Setting	2001-01-08	**Date of Collection**	2001-01-09
Time of Setting	12:10	**Time of Collection**	11:40
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 15 / / / / / / / / /

Comments

~ 3cm of air space between water surface and bottom of ice.
January 9th snowing.
Lots of caddisfly larva in traps.

pH = 7.4

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1): MCQ- 1 (first three letters of stream name-site number)

VISIT # 2

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	78	5.9	UM	
MT	1	1	RB	75	5.8	UM	
MT	1	1	RB	44	1.2	UM	
MT	1	1	RB	44	1.2	UM	
MT	1	1	RB	51	1.9	UM	
MT	1	1	RB	44	1.2	UM	
MT	1	2	RB	52	2	UM	
MT	1	2	RB	39	1.5	UM	
MT	1	2	RB	72	4.8	UM	
MT	1	2	RB	41	1.8	UM	
MT	1	3	RB	83	7	UM	
MT	1	3	RB	49	2.1	UM	
MT	1	3	RB	78	5.9	UM	
MT	1	3	RB	88	8.8	UM	
MT	1	3	RB	46	2.2	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) MCQ - 1 (first three letters of stream name-site number)

VISIT # 3

Date of survey	Time of survey	Surveyors
2001-02-05	11:35	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
McQuarrie Creek		

Weather High overcast

Air Temperature -10 ° C

Ice Cover (%) 100

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	71
Ice thickness (cm)	8
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	H
Snow Depth (cm)	0
Water Temperature	0.3 ° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	40 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	3	44	71

FISH COLLECTION SUMMARY

Date of Setting	2001-02-05	**Date of Collection**	2001-02-06
Time of Setting	11:35	**Time of Collection**	11:32
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	RB / 3

Comments

pH = 8.0

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) MCQ - 1 (first three letters of stream name-site number)

VISIT # 3

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	17	Site vieew looking upstream.

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	44	1	UM	
MT	1	2	RB	71	4.1	UM	
MT	1	2	RB	45	1.5	UM	
MT	1	3	NFC				

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) MCQ- 1 (first three letters of stream name-site number)

VISIT # 4

Date of survey	Time of survey	Surveyors
2001-03-05	11:15	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Mcquarrie Creek		

Weather Sunny and clear

Air Temperature -7 ° C

Ice Cover (%) 95

Stream Flow M (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	68	
Ice thickness (cm)	2	
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	H	
Snow Depth (cm)	0	
Water Temperature	0.4	° C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C	
Conductivity		*uS*
Dissolved Oxygen (bottom)	12	ppm
Dissolved Oxygen (surface)		ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
RB	3	41	73

FISH COLLECTION SUMMARY

Date of Setting	2001-03-05	**Date of Collection**	2001-03-06
Time of Setting	11:15	**Time of Collection**	11:20
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				95	RB / 3

Comments

pH = 8.0

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1): MCQ - 1 (first three letters of stream name-site number)

VISIT # 4

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	1	RB	45	1.1	UM	
MT	1	2	NFC				
MT	1	3	RB	73	3.8	UM	
MT	1	3	RB	41	1	UM	

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC - 1 (first three letters of stream name-site number)

VISIT # 1

Date of survey	Time of survey	Surveyors
2000-12-18	10:05	BD,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

Weather Overcast with snow flurries.

Air Temperature -1 °C

Ice Cover (%) 100

Stream Flow L (High, Moderate, Limited, None)

Potential for fish migration L (High, Moderate, Limited, None)

LIMNOLOGY STATION

Depth from upper surface of ice (cm)	98
Ice thickness (cm)	46
Clarity of Ice (H,M,L, or N) (High, Moderate, Limited, None)	N
Snow Depth (cm)	12
Water Temperature	0.1 °C
Turbidity (H,M, L, or C) (High, Moderate, Low, or Clear)	C
Conductivity	80 *uS*
Dissolved Oxygen (bottom)	12 ppm
Dissolved Oxygen (surface)	ppm

FISH SUMMARY

Species	Total # of Fish	Mininimum Length (mm)	Maximum Length (mm)
CO	1	52	52
RB	3	68	105

FISH COLLECTION SUMMARY

Date of Setting	2000-12-18	**Date of Collection**	2000-12-19
Time of Setting	10:05	**Time of Collection**	10:25
Number of traps set	3	**Number of traps collected**	3

NOTE: Cluster contains three traps within an ~5 meter diameter area

Capture Method	Cluster Number	Instream Cover: Mean Depth	Dominant	Sub Dominant	Percent ice cover	Species/ Number Captured per Cluster
MT	1				100	CO / 1 RB / 3

Comments

Three traps set at limno.
pH = 7.7

SITE VISIT DESCRIPTION

Site Name (e.g. TOB-1) RIC- 1 (first three letters of stream name-site number)

VISIT # 1

PHOTO DOCUMENTATION

INDIVIDUAL FISH DATA

Capture Method	Cluster Number	Trap Number	Species	Fork Length (mm)	Fish Weight (g)	Type of Fin Clip (e.g. adipose, upper caudal, none)	Type of Recaptured Fin Clip
MT	1	2	CO	52	2	UM	
MT	1	3	RB	86	8.7	UM	
MT	1	3	RB	105	16.6	UM	
MT	1	3	RB	68	4.7		

List of Appendices

Appendix 1. Fall Habitat Assessments

Appendix 1a. Fall Assessment Data Summary Table and Graphs

Appendix 1b. Fall Habitat Assessments Forms

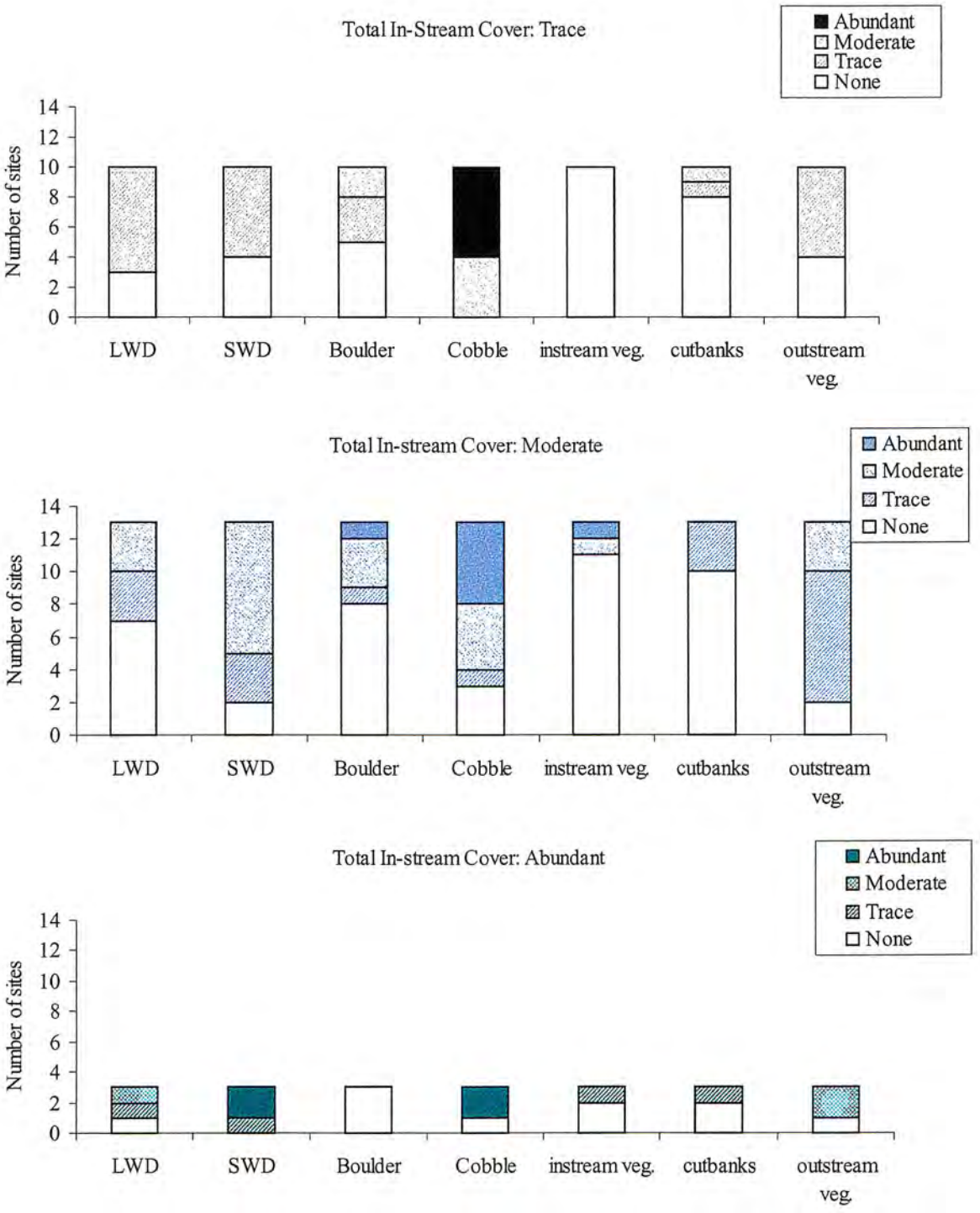

Plate 2. Histograms summarizing instream cover components at sites sampled during the overwintering study.

Appendix 1b. Fall Habitat Assessments Forms

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) BAR- 1 (first three letters of stream name-site number)

Date of survey: 2000-11-23 | Time of survey: 12:00 | Surveyors: TJ,BD,TD

Gazetted Stream Name: Barren Creek | Local Stream Name: | Watershed Code:

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Upstream side of highway 16 Culvert.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging): Gravel Bar — distance to nearest pool upstream (meters):

Downstream Site Boundary marker: Culvert — distance to nearest pool downstream (meters):

Gradient (%): 0 | **Site Length (meters)**: 4 | **Interval between channel widths (meters)**: 2

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	6	4	2							
Max. Wetted Depth (cm)	53	54	77							
Max. Bankful Depth (cm)										

Pool Habitat: max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep

Percent: 90 | Estimated Area (m2):

Dominant Substrate: COBBLE
Sub-Dominant Substrate: FINES
D90: 14
% Embeddedness: 10

Glide Habitat: average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep

Percent: 5 | Estimated Area (m2):

Dominant Substrate: COBBLE
Sub-Dominant Substrate: FINES
D90: 14
% Embeddedness: 10

Edge Habitat: Edges of Pools and Glides that are <10 cm deep

Percent: 5 | Estimated Area (m2):

Riffle Habitat: Surface disturbance provides cover

Percent: | Estimated Area (m2):

Dominant Substrate:
Sub-Dominant Substrate:
D90:
% Embeddedness:

Assessment of Fish Habitat — Instream Cover (N,T,M,A): T | Out of Stream Cover (N,T,M, A): N

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	N	Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD	N						
Boulder Cover	T	Single > 30 cm	5	Boulder-clusters	1		
Cobble Cover	M	Percent of site area	40				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	N						

Fish Species Present:

Fish Species Suspected: Coho Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
BAR - 1		2000-11-23	12:00	TJ,BD,TD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	21	Site view, trap hole visible.
NR	3	Looking downstream towards culvert with limno visible

COMMENTS

Disturbance Indicators	Pool is infilling more and more each year on both th upstream and downstream sides of the culvert. Thre are also eroding hillslopes upstream.
Comment 1	Gravel bar just upstream of pool appears to be more built up this year. Water level is about halfway up the culvert.
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) BUC - 1 (first three letters of stream name-site number)

Date of survey: 2000-11-26 | Time of survey: 10:29 | Surveyors: BD,TJ,TD

Gazetted Stream Name: Buck Creek | Local Stream Name: | Watershed Code:

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Same Limno station as last year,ie, limno still in.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging): Pink Flagging | distance to nearest pool upstream (meters): 200

Downstream Site Boundary marker: Pink Flagging | distance to nearest pool downstream (meters): 75

Gradient (%): 0 | **Site Length (meters)**: 14 | **Interval between channel widths (meters)**: 2

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	10	9	9	10	10	10				
Max. Wetted Depth (cm)	86	84	106	89	85	61				
Max. Bankful Depth (cm)										

Pool Habitat: max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep | Percent: 30 | Estimated Area (m2): | Dominant Substrate: COBBLE | Sub-Dominant Substrate: FINES | D90: 31 | % Embeddedness: 0

Glide Habitat: average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep | Percent: 60 | Estimated Area (m2): | Dominant Substrate: COBBLE | Sub-Dominant Substrate: FINES | D90: 31 | % Embeddedness: 0

Edge Habitat: Edges of Pools and Glides that are <10 cm deep | Percent: 10 | Estimated Area (m2):

Riffle Habitat: Surface disturbance provides cover | Percent: | Estimated Area (m2): | Dominant Substrate: | Sub-Dominant Substrate: | D90: | % Embeddedness:

Assessment of Fish Habitat | Instream Cover (N,T,M,A): T | Out of Stream Cover (N,T,M, A): T

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	T	Number <20 cm		Number 20-50 cm	3	Number >50 cm	
Functional SWD	T					
Boulder Cover	T	Single > 30 cm	25	Boulder-clusters	4	
Cobble Cover	A	Percent of site area				
Undercut Banks	M	Length (m)	10	Average width (m)	1	
Aquatic Vegetation	N					
Overhanging Veg.	T					

Fish Species Present:

Fish Species Suspected: Coho, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
BUC - 1		2000-11-26	10:29	BD,TJ,TD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	3	Site view looking downstream ,both holes and limno visible.
R3	1	Looking downstream, limno station visible

COMMENTS

Disturbance Indicators

Road, some farmland adjacent.

Comment 1

Deeper water appears to be more in centre of creek where as last year deeper water was at cut bank.

Comment 2

Cobble is slippery this year due to Periphyton growth.

Comment 3

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) BUC - 2 (first three letters of stream name-site number)

Date of survey: 2000-11-26 | Time of survey: 11:01 | Surveyors: BD,TJ,MN

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

About 100 meters upstream of Buck Bridge # 1 between curved tree and tree in the middle of the creek.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Pink Flagging	distance to nearest pool upstream (meters)	100
Downstream Site Boundary marker	Pink Flagging	distance to nearest pool downstream (meters)	150

Gradient (%) 0 | **Site Length (meters)** 16 | **Interval between channel widths (meters)** 4

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	10	12	13	12						
Max. Wetted Depth (cm)	102	127	120	134						
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	40		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	24
				% Embeddedness	0

		Percent	Estimated Area (m2)		
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep	50		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	24
				% Embeddedness	0

		Percent	Estimated Area (m2)
Edge Habitat	Edges of Pools and Glides that are <10 cm deep	10	

		Percent	Estimated Area (m2)		
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat | Instream Cover (N,T,M,A): T | Out of Stream Cover (N,T,M, A): T

N=None, T=Trace, M=Moderate, A=Abundant

	(N,T,M,A)					
Functional LWD	T	Number <20 cm		Number 20-50 cm		Number >50 cm: 2
Functional SWD	T					
Boulder Cover	N	Single > 30 cm		Boulder-clusters		
Cobble Cover	A	Percent of site area	70			
Undercut Banks	N	Length (m)		Average width (m)		
Aquatic Vegetation	N					
Overhanging Veg.	N					

Fish Species Present:

Fish Species Suspected: Coho Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	BUC - 2		2000-11-26	11:01	BD,TJ,MN

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	4	Site view looking downstream, both holes visible.
R3	2	Looking downstream, limno visible

COMMENTS

Disturbance Indicators	Beaver activity
Comment 1	Last year water was deepest under the fallen trees, most of the deeper water is now just upstream of the fallen tree.
Comment 2	There is a small creek entering at root wad of fallen tree.
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) BUC - 5 (first three letters of stream name-site number)

Date of survey: 2000-11-26 | Time of survey: 13:07 | Surveyors: TJ,BD,MN

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

About 100 meters from Buck Creek Site # 6. Limno rebar is submerged so there is a pink flag on middle tree marks the limno station.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Pink Flagging	distance to nearest pool upstream (meters)	100
Downstream Site Boundary marker	Pink Flagging	distance to nearest pool downstream (meters)	100

Gradient (%) 0 **Site Length (meters)** 15 **Interval between channel widths (meters)** 3

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	10	11	11	13	13					
Max. Wetted Depth (cm)	119	119	115	118	115					
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	40		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	20
				% Embeddedness	10

		Percent	Estimated Area (m2)		
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep	40		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	20
				% Embeddedness	10

		Percent	Estimated Area (m2)
Edge Habitat	Edges of Pools and Glides that are <10 cm deep	20	

		Percent	Estimated Area (m2)		
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat Instream Cover (N,T,M,A): T | Out of Stream Cover (N,T,M, A): T

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	N	Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD	N						
Boulder Cover	M	Single > 30 cm	20	Boulder-clusters	2		
Cobble Cover	M	Percent of site area	60				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	N						

Fish Species Present:

Fish Species Suspected: Coho, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
BUC - 5		2000-11-26	13:07	TJ,BD,MN

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	5	Site view loooking upstream ,both holes visible
R3	6	looking downstream

COMMENTS

Disturbance Indicators	Beaver Activity
Comment 1	Site is deeper than last year, boulders are about 0.5m to 1.0m in diameter. A little more silt on edge areas than last year due to broken beaver dams.
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
BUC - 6		2000-11-26	12:55	TJ,BD,MN

Gazetted Stream Name	Local Stream Name	Watershed Code
Buck Creek		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone | Northing | Easting

Site Location: Describe road and foot access

500 meters downstream of CNR crossing at fallen tree on right bank side of creek

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Pink Flagging	distance to nearest pool upstream (meters)	40
Downstream Site Boundary marker	Pink Flagging	distance to nearest pool downstream (meters)	150

Gradient (%) 0 **Site Length (meters)** 14 **Interval between channel widths (meters)** 2

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	8	8	10	8	9					
Max. Wetted Depth (cm)	103	108	102	85	60					
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	30		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	19
				% Embeddedness	5
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep	60		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	19
				% Embeddedness	5
Edge Habitat	Edges of Pools and Glides that are <10 cm deep	10			
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat Instream Cover (N,T,M,A): M | Out of Stream Cover (N,T,M, A): M

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	M	Number <20 cm		Number 20-50 cm		Number >50 cm	1
Functional SWD	M						
Boulder Cover	N	Single > 30 cm		Boulder-clusters			
Cobble Cover	A	Percent of site area	90				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	T						

Fish Species Present:

Fish Species Suspected: Coho, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
BUC - 6		2000-11-26	12:55	TJ,BD,MN

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	6	Site view ,both holes visible.
R3	5	Looking downstream, Limno flag visible hanging off fallen tree

COMMENTS

Disturbance Indicators	Eroding bank upstream. Some Beaver activity, broken dam just upstream.
Comment 1	Same tree as last year, water appears to be a little faster this year.
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) BUC - 7 (first three letters of stream name-site number)

Date of survey: 2000-11-26 | Time of survey: 11:28 | Surveyors: BD,TJ,MN

Gazetted Stream Name: Buck Creek | Local Stream Name: | Watershed Code:

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Dense woody debris cluster about the middle of Buck Creek release pond.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging): Pink Flagging — distance to nearest pool upstream (meters):

Downstream Site Boundary marker: Pink Flagging — distance to nearest pool downstream (meters):

Gradient (%): 0 | **Site Length (meters)**: 6 | **Interval between channel widths (meters)**: 2

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	5	5	4							
Max. Wetted Depth (cm)	84	84	75							
Max. Bankful Depth (cm)										

Pool Habitat: max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep

Percent: 90 | Estimated Area (m2):

Dominant Substrate: COBBLE
Sub-Dominant Substrate: FINES
D90: 28
% Embeddedness: 0

Glide Habitat: average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep

Percent: | Estimated Area (m2):

Dominant Substrate:
Sub-Dominant Substrate:
D90:
% Embeddedness:

Edge Habitat: Edges of Pools and Glides that are <10 cm deep

Percent: 10 | Estimated Area (m2):

Riffle Habitat: Surface disturbance provides cover

Percent: | Estimated Area (m2):

Dominant Substrate:
Sub-Dominant Substrate:
D90:
% Embeddedness:

Assessment of Fish Habitat

Instream Cover (N,T,M,A): A

Out of Stream Cover (N,T,M, A): N

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	M	Number <20 cm		Number 20-50 cm	10	Number >50 cm	
Functional SWD	T						
Boulder Cover	N	Single > 30 cm		Boulder-clusters			
Cobble Cover	A	Percent of site area	90				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	N						

Fish Species Present:

Fish Species Suspected: Coho, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	BUC- 7		2000-11-26	11:28	BD,TJ,MN

PHOTO DOCUMENTATION

COMMENTS

Disturbance Indicators	Release pond was constructed in September 1999, cobble and woody debris was added in September 2000.
Comment 1	Comparison between Buc 7 and Buc 8, Buc 7 has dense woody debris and Buc 8 has trace woody debris and mostly cobble.
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1): BUC - 8 (first three letters of stream name-site number)

Date of survey: 2000-11-26 | Time of survey: 11:43 | Surveyors: BD,TJ,MN

Gazetted Stream Name: Buck Creek | Local Stream Name: | Watershed Code:

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Upstream end of Buck Creek Release Pond

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging): U?S weir | distance to nearest pool upstream (meters):

Downstream Site Boundary marker: Pink Flagging | distance to nearest pool downstream (meters):

Gradient (%): 0 **Site Length (meters):** 7 **Interval between channel widths (meters):** 2

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	2	5	6							
Max. Wetted Depth (cm)	47	77	87							
Max. Bankful Depth (cm)										

Pool Habitat

max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep

Percent: 90 | Estimated Area (m2):

Dominant Substrate: COBBLE
Sub-Dominant Substrate: FINES
D90: 28
% Embeddedness: 5

Glide Habitat

average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep

Percent: | Estimated Area (m2):

Dominant Substrate:
Sub-Dominant Substrate:
D90:
% Embeddedness:

Edge Habitat

Edges of Pools and Glides that are <10 cm deep

Percent: 10 | Estimated Area (m2):

Riffle Habitat

Surface disturbance provides cover

Percent: | Estimated Area (m2):

Dominant Substrate:
Sub-Dominant Substrate:
D90:
% Embeddedness:

Assessment of Fish Habitat

Instream Cover (N,T,M,A): T | Out of Stream Cover (N,T,M, A): N

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	T	Number <20 cm		Number 20-50 cm	1	Number >50 cm	
Functional SWD	N						
Boulder Cover	N	Single > 30 cm		Boulder-clusters			
Cobble Cover	A	Percent of site area	85				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	N						

Fish Species Present:

Fish Species Suspected: Coho, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)			Date of survey	Time of survey	Surveyors
BUC - 8	first three letters of stream name-site number		2000-11-26	11:43	BD,TJ,MN

PHOTO DOCUMENTATION

COMMENTS

Disturbance Indicators	Release pond site.
Comment 1	comparing Buck 7 to Buck 8.
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) BYM - 1 (first three letters of stream name-site number)

Date of survey	Time of survey	Surveyors
2000-11-22	12:51	TJ, BD

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Downstream side of Highway 16 culvert.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Pink Flagging	distance to nearest pool upstream (meters)	500
Downstream Site Boundary marker	Pink Flagging	distance to nearest pool downstream (meters)	300

Gradient (%) 0 **Site Length (meters)** 13 **Interval between channel widths (meters)** 3

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	13	10	10	12						
Max. Wetted Depth (cm)	89	124	43	22						
Max. Bankful Depth (cm)										

Pool Habitat

max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep

Percent: 80 | Estimated Area (m2):

Dominant Substrate	COBBLE
Sub-Dominant Substrate	FINES
D90	38
% Embeddedness	1

Glide Habitat

average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep

Percent: 10 | Estimated Area (m2):

Dominant Substrate	COBBLE
Sub-Dominant Substrate	FINES
D90	38
% Embeddedness	1

Edge Habitat

Edges of Pools and Glides that are <10 cm deep

Percent: 5 | Estimated Area (m2):

Riffle Habitat

Surface disturbance provides cover

Percent: 5 | Estimated Area (m2):

Dominant Substrate	COBBLE
Sub-Dominant Substrate	FINES
D90	38
% Embeddedness	1

Assessment of Fish Habitat Instream Cover (N,T,M,A): T | Out of Stream Cover (N,T,M, A): T

N=None, T=Trace, M=Moderate, A=Abundant

	(N,T,M,A)					
Functional LWD	N	Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD	T						
Boulder Cover	T	Single > 30 cm	15	Boulder-clusters	0		
Cobble Cover	A	Percent of site area	90				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	T						

Fish Species Present:

Fish Species Suspected: Coho Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
BYM- 1		2000-11-22	12:51	TJ, BD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	16	Site view looking upstream, limno visible.
NR	8	Looking upstream towards culvert, limno station visible

COMMENTS

Disturbance Indicators	New lock blocks installed on right bank. Boulder cluster that used to be in th centre of the pool has been removed and used as rip rap to shore up the lock blocks.
Comment 1	Culvert pool has been modified. This is a plunge pool limno station, same as last year. Lock Blocks have been installed on banks.
Comment 2	There is rip rap on right bank and some on left bank as cover
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
BYM - 2		2000-11-22	13:17	BD<TJ<TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Byman Creek		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Perrow Station Rd approx. 100 metres downstream of CNR crossing.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Pink Flagging	distance to nearest pool upstream (meters)	20
Downstream Site Boundary marker	Pink Flagging	distance to nearest pool downstream (meters)	

Gradient (%) 0 | **Site Length (meters)** 11 | **Interval between channel widths (meters)** 2

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	4	5	4	5	6					
Max. Wetted Depth (cm)	38	54	89	67	43					
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	50		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	24
				% Embeddedness	5

		Percent	Estimated Area (m2)		
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep	30		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	24
				% Embeddedness	5

		Percent	Estimated Area (m2)
Edge Habitat	Edges of Pools and Glides that are <10 cm deep	10	

		Percent	Estimated Area (m2)		
Riffle Habitat	Surface disturbance provides cover	10		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	24
				% Embeddedness	5

Assessment of Fish Habitat | Instream Cover (N,T,M,A): M | Out of Stream Cover (N,T,M, A): T

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	N	Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD	M						
Boulder Cover	M	Single > 30 cm	20	Boulder-clusters	1		
Cobble Cover	A	Percent of site area	70				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	N						

Fish Species Present:

Fish Species Suspected: Coho, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
BYM - 2		2000-11-22	13:17	BD<TJ<TD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	24	Site view looking downstream, limno visible.
NR	7	Looking downstream with limno visible.

COMMENTS

Disturbance Indicators

CNR crossing approx 100 meters upstream.

Comment 1

Site looks very similar to last year.

Comment 2

Comment 3

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) BYM - 3 (first three letters of stream name-site number)

Date of survey: 2000-11-23 | Time of survey: 10:30 | Surveyors: BD,TJ,TD

Gazetted Stream Name: Byman Creek | Local Stream Name: | Watershed Code:

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Downstream of Byman # 2 and also dowstream of confluence with Perrow Creek.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging): Pink Flagging | distance to nearest pool upstream (meters): 100

Downstream Site Boundary marker: Pink Flagging | distance to nearest pool downstream (meters): 100

Gradient (%): 0 | **Site Length (meters):** 12 | **Interval between channel widths (meters):** 2

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	7	5	7	7	8	7				
Max. Wetted Depth (cm)	41	80	90	71	47	28				
Max. Bankful Depth (cm)										

Pool Habitat

max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep

Percent: 75 | Estimated Area (m2):

Dominant Substrate: COBBLE
Sub-Dominant Substrate: FINES
D90: 19
% Embeddedness: 0

Glide Habitat

average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep

Percent: 15 | Estimated Area (m2):

Dominant Substrate: COBBLE
Sub-Dominant Substrate: FINES
D90: 19
% Embeddedness: 0

Edge Habitat

Edges of Pools and Glides that are <10 cm deep

Percent: 5 | Estimated Area (m2):

Riffle Habitat

Surface disturbance provides cover

Percent: 5 | Estimated Area (m2):

Dominant Substrate: COBBLE
Sub-Dominant Substrate: FINES
D90: 19
% Embeddedness: 0

Assessment of Fish Habitat

Instream Cover (N,T,M,A): T | Out of Stream Cover (N,T,M, A): T

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	T	Number <20 cm		Number 20-50 cm		Number >50 cm	1
Functional SWD	T						
Boulder Cover	N	Single > 30 cm		Boulder-clusters			
Cobble Cover	A	Percent of site area	85				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	T						

Fish Species Present:

Fish Species Suspected: Coho, Chinook and Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
BYM - 3			2000-11-23	10:30	BD,TJ,TD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	1	Site view looking downstream.
OW3	25	Looking downstream with limno visible

COMMENTS

Disturbance Indicators	CNR crossing about 250 meters upstream
Comment 1	Pool is slightly larger than last year. Deepened out at tail end of pool.
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) MCQ - 1 (first three letters of stream name-site number)

Date of survey	Time of survey	Surveyors
2000-11-23	11:21	BD,TJ,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
McQuarrie Creek		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Downstream of highway 16. This is a culvert pool.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Pink Flagging	distance to nearest pool upstream (meters)	500
Downstream Site Boundary marker	Pink Flagging	distance to nearest pool downstream (meters)	200

Gradient (%) 0 **Site Length (meters)** 9 **Interval between channel widths (meters)** 2

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	3	5	6	7	7					
Max. Wetted Depth (cm)	80	77	69	53	42					
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	30		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	24
				% Embeddedness	50

		Percent	Estimated Area (m2)		
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep	70		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	24
				% Embeddedness	50

		Percent	Estimated Area (m2)
Edge Habitat	Edges of Pools and Glides that are <10 cm deep		

		Percent	Estimated Area (m2)		
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat Instream Cover (N,T,M,A): N | Out of Stream Cover (N,T,M, A): N

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	N	Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD	N						
Boulder Cover	T	Single > 30 cm	10	Boulder-clusters			
Cobble Cover	M	Percent of site area	50				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	T						
Overhanging Veg.	N						

Fish Species Present:

Fish Species Suspected: Coho, Chinook, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	MCQ - 1		2000-11-23	11:21	BD,TJ,TD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	17	Site vieew looking upstream.
NR	4	Looking upstream at highway culvert with limno visible.

COMMENTS

Disturbance Indicators	1)Lock blocks installed around downstream side of culvert. 2) Lots of algae and pariphyton on cobble. The gravel was clean last year. There is a cattle feed lot just upstream.
Comment 1	Cobble is silted and embedded this year, Banks upstream near feed lot are severely eroding (Don McKilligan property).
Comment 2	Entire culvert is one long glide
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		Date of survey	Time of survey	Surveyors
RIC - 1 (first three letters of stream name-site number)		2000-01-06	14:30	BD, JE

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek	Richfield Creek	

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Just upstream with confluence Upper Bulkley River. (THIS WAS SITE # 2 LAST YEAR).

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Orange Flagging	distance to nearest pool upstream (meters)	6
Downstream Site Boundary marker	Orange Flagging	distance to nearest pool downstream (meters)	20

Gradient (%) 0 **Site Length (meters)** 12 **Interval between channel widths (meters)** 3

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	4	4	5	7	7	9				
Max. Wetted Depth (cm)	62	108	112	140	110	54				
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	50		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	15
				% Embeddedness	0

		Percent	Estimated Area (m2)		
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep	45		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	15
				% Embeddedness	0

		Percent	Estimated Area (m2)
Edge Habitat	Edges of Pools and Glides that are <10 cm deep	5	

		Percent	Estimated Area (m2)		
Riffle Habitat	Surface disturbance provides cover	0		Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat Instream Cover (N,T,M,A): A Out of Stream Cover (N,T,M, A): A

	(N,T,M,A)	N=None, T=Trace, M=Moderate, A=Abundant				
Functional LWD	T	Number <20 cm	2	Number 20-50 cm	0	Number >50 cm 0
Functional SWD	A					
Boulder Cover	N	Single > 30 cm		Boulder-clusters		
Cobble Cover	A	Percent of site area	95			
Undercut Banks	T	Length (m)	3	Average width (m)	1	
Aquatic Vegetation	N					
Overhanging Veg.	M					

Fish Species Present:

Fish Species Suspected: COHO, CHINOOK, RAINBOW/STEELHEAD

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	RIC - 1		2000-01-06	14:30	BD, JE

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	13	Looking down into trap hole
OW4	14	Site view looking dodwnstream.
R1	18	

COMMENTS

Disturbance Indicators	Hay field.
Comment 1	Site is deeper than last year on the outside corner, lots of small woody debris. Some algae growth on cobble.
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
RIC - 2		2000-10-06	15:00	BD, JE

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek	Richfield Creek	

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

About 50 meters upstream of CNR crossing

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Orange Flagging	distance to nearest pool upstream (meters)	
Downstream Site Boundary marker	Orange Flagging	distance to nearest pool downstream (meters)	

Gradient (%): | **Site Length (meters)**: 12 | **Interval between channel widths (meters)**: 4

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	5	6	7							
Max. Wetted Depth (cm)	72	92	89							
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	40		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	16
				% Embeddedness	5

		Percent	Estimated Area (m2)		
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep	40		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	16
				% Embeddedness	25

		Percent	Estimated Area (m2)
Edge Habitat	Edges of Pools and Glides that are <10 cm deep	5	

		Percent	Estimated Area (m2)		
Riffle Habitat	Surface disturbance provides cover	15		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	16
				% Embeddedness	5

Assessment of Fish Habitat | Instream Cover (N,T,M,A): M | Out of Stream Cover (N,T,M, A): M

N=None, T=Trace, M=Moderate, A=Abundant

	(N,T,M,A)					
Functional LWD	N	Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD	M						
Boulder Cover	N	Single > 30 cm		Boulder-clusters			
Cobble Cover	A	Percent of site area	80				
Undercut Banks	T	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	M						

Fish Species Present:

Fish Species Suspected: Coho, Chinook, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	RIC - 2		2000-10-06	15:00	BD, JE

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	12	Looking into trap hole.
OW3	13	Site view loooking downstream.
R1	19	

COMMENTS

Disturbance Indicators	-Evidence of cattle watering, land clearing for the hayfield, man made watering hole just upstream of Richfield #2.
Comment 1	
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	RIC - 3 (first three letters of stream name-site number)	Date of survey	Time of survey	Surveyors
		2000-11-22	11:36	TJ, BD

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

This is last years site # 3

Limnology Station Marked ☐

Upstream Site Boundary marker (e.g. Red flagging)		distance to nearest pool upstream (meters)	20
Downstream Site Boundary marker		distance to nearest pool downstream (meters)	15

Gradient (%) 0 **Site Length (meters)** 13 **Interval between channel widths (meters)** 4

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	15	9	7							
Max. Wetted Depth (cm)	33	60	70							
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	10		Dominant Substrate	FINES
				Sub-Dominant Substrate	COBBLE
				D90	14
				% Embeddedness	15

		Percent	Estimated Area (m2)		
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep	10		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	14
				% Embeddedness	15

		Percent	Estimated Area (m2)
Edge Habitat	Edges of Pools and Glides that are <10 cm deep	10	

		Percent	Estimated Area (m2)		
Riffle Habitat	Surface disturbance provides cover	70		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	14
				% Embeddedness	15

Assessment of Fish Habitat Instream Cover (N,T,M,A): T Out of Stream Cover (N,T,M, A): T

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	T	Number <20 cm		Number 20-50 cm		Number >50 cm	2
Functional SWD	N						
Boulder Cover	N	Single > 30 cm		Boulder-clusters			
Cobble Cover	M	Percent of site area	50				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	T						

Fish Species Present:

Fish Species Suspected: Coho, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	RIC - 3		2000-11-22	11:36	TJ, BD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	17	Site view looking downstream
OW4	18	Limno hole showing sunken banks ie dropping water level.
NR	12	Looking downstream, pink flag on limno station visible.

COMMENTS

Disturbance Indicators

Comment 1 Not much pool habitat reamining, mostly riffle now. Too fast to set traps. Shallower on average than last year

Comment 2

Comment 3

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) RIC - 3 (first three letters of stream name-site number)

Date of survey: 2000-11-22 | Time of survey: 11:23 | Surveyors: BD, TJ

Gazetted Stream Name: Richfield Creek | Local Stream Name: | Watershed Code:

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

50 meters upsteam of site # 4

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging): Pink Flagging | distance to nearest pool upstream (meters): 15

Downstream Site Boundary marker: Pink Flagging | distance to nearest pool downstream (meters):

Gradient (%): 0 | **Site Length (meters)**: 11 | **Interval between channel widths (meters)**: 2

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	9	10	9	7						
Max. Wetted Depth (cm)	95	54	35	49						
Max. Bankful Depth (cm)										

Pool Habitat: max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep | Percent: 30 | Estimated Area (m2): | Dominant Substrate: COBBLE | Sub-Dominant Substrate: FINES | D90: 19 | % Embeddedness: 5

Glide Habitat: average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep | Percent: 40 | Estimated Area (m2): | Dominant Substrate: COBBLE | Sub-Dominant Substrate: FINES | D90: 19 | % Embeddedness: 5

Edge Habitat: Edges of Pools and Glides that are <10 cm deep | Percent: 15 | Estimated Area (m2):

Riffle Habitat: Surface disturbance provides cover | Percent: 15 | Estimated Area (m2): | Dominant Substrate: COBBLE | Sub-Dominant Substrate: FINES | D90: 20 | % Embeddedness: 5

Assessment of Fish Habitat | Instream Cover (N,T,M,A): T | Out of Stream Cover (N,T,M, A): T

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	T	Number <20 cm		Number 20-50 cm	2	Number >50 cm	
Functional SWD	T						
Boulder Cover	N	Single > 30 cm		Boulder-clusters			
Cobble Cover	A	Percent of site area	90				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	T						

Fish Species Present:

Fish Species Suspected: Coho Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		Date of survey	Time of survey	Surveyors
RIC - 3 (first three letters of stream name-site number)		2000-11-22	11:23	BD, TJ

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	17	Site view looking downstream
OW4	18	Limno hole showing sunken banks ie dropping water level.
NR	12	Looking downstream, pink flag on limno station visible.

COMMENTS

Disturbance Indicators	Beaver activity. Site is 60 meters downstream from an eroding bank.
Comment 1	
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) RIC - 4 (first three letters of stream name-site number)

Date of survey: 2000-11-22 | Time of survey: 11:00 | Surveyors: BD, TJ

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

5 meters upstream of Richfield #3.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging): Pink Flagging — distance to nearest pool upstream (meters): 10

Downstream Site Boundary marker: Pink Flaging — distance to nearest pool downstream (meters): 5

Gradient (%): 0 | **Site Length (meters)**: 14 | **Interval between channel widths (meters)**: 3

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	4	9	11	8						
Max. Wetted Depth (cm)	78	109	51	95						
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	60		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	13
				% Embeddedness	20
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep	20		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	13
				% Embeddedness	20
Edge Habitat	Edges of Pools and Glides that are <10 cm deep	20			
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat — Instream Cover (N,T,M,A): M — Out of Stream Cover (N,T,M, A): T

N=None, T=Trace, M=Moderate, A=Abundant

	(N,T,M,A)					
Functional LWD	N	Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD	T					
Boulder Cover	M	Single > 30 cm	5	Boulder-clusters	1	
Cobble Cover	M	Percent of site area				
Undercut Banks	T	Length (m)	4	Average width (m)	2	
Aquatic Vegetation	N					
Overhanging Veg.	T					

Fish Species Present:

Fish Species Suspected: Coho, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	RIC - 4		2000-11-22	11:00	BD, TJ

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	16	Site view , limno and trap hole visible.
NR	11	Looking downstream with limno visible

COMMENTS

Disturbance Indicators	Cleared hay field on right bank, some erosion on outside corner of creek.
Comment 1	This pool has changed since last year. The deepest water used to be right at the boulder cluster, now that pool has infilled and only about half of the boulders (depth wise) are showing.
Comment 2	Lots of spawning size gravel
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
RIC - 5		2000-11-22	10:45	BD, TJ

Gazetted Stream Name	Local Stream Name	Watershed Code
Richfield Creek		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

At McCrackens fence line across creek. Downstream of site # 4, actually connects to site # 4.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Pink Flagging	distance to nearest pool upstream (meters)	4
Downstream Site Boundary marker	Pink Flagging	distance to nearest pool downstream (meters)	50

Gradient (%) 0 **Site Length (meters)** 18 **Interval between channel widths (meters)** 4

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	7	9	9	8						
Max. Wetted Depth (cm)	89	79	105	56						
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	40		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	20
				% Embeddedness	5

		Percent	Estimated Area (m2)		
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep	40		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	21
				% Embeddedness	

		Percent	Estimated Area (m2)
Edge Habitat	Edges of Pools and Glides that are <10 cm deep	20	

		Percent	Estimated Area (m2)		
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat Instream Cover (N,T,M,A): M | Out of Stream Cover (N,T,M, A): M

N=None, T=Trace, M=Moderate, A=Abundant

	(N,T,M,A)				
Functional LWD	T	Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD	M						
Boulder Cover	N	Single > 30 cm		Boulder-clusters	
Cobble Cover	A	Percent of site area			
Undercut Banks	T	Length (m)		Average width (m)	
Aquatic Vegetation	N				
Overhanging Veg.	M				

Fish Species Present:

Fish Species Suspected: Coho, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	RIC - 5		2000-11-22	10:45	BD, TJ

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW4	15	Site view looking downstrraam.
NR	1	Looking at small woody debris with limno visible.

COMMENTS

Disturbance Indicators	Beaver activity- beaver lodge just upstream from limno site
Comment 1	New pool ie. Partially formed last year- deeper and larger this year. Substrate under large woody debris = fines/sand. Lots of spawning size gravel.
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	Date of survey	Time of survey	Surveyors
SID - 1 (first three letters of stream name-site number)	2000-11-27	9:45	TJ,BD,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River Side Channel		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Downstream of rest area on Highway 16 between Houston and Topley between CNR tracks and highway 16. Side channel beaver pond area.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Pink Flagging	distance to nearest pool upstream (meters)	
Downstream Site Boundary marker		distance to nearest pool downstream (meters)	

Gradient (%) 0 **Site Length (meters)** 15 **Interval between channel widths (meters)** 5

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	16	16	16							
Max. Wetted Depth (cm)	97	97	97							
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	100		Dominant Substrate	MUD
				Sub-Dominant Substrate	MUD
				D90	
				% Embeddedness	100
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	
Edge Habitat	Edges of Pools and Glides that are <10 cm deep				
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat Instream Cover (N,T,M,A): A Out of Stream Cover (N,T,M, A): A

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	N	Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD	A						
Boulder Cover	N	Single > 30 cm		Boulder-clusters	
Cobble Cover	N	Percent of site area			
Undercut Banks	N	Length (m)		Average width (m)	
Aquatic Vegetation	M				
Overhanging Veg.	M				

Fish Species Present:

Fish Species Suspected: Coho, Rainbow/Steelhead,Shiners, Dace, Squawfish

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	SID - 1		2000-11-27	9:45	TJ,BD,TD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	20	Site view looking from highway.
R3	8	Looking downstream, limno visible

COMMENTS

Disturbance Indicators

CNR tracks, Highway 16, beaver activity.

Comment 1

Is an old side channel/beaver pond area. Lots of willows and grasses in the water. Water is f lowing over beaver dam. Good depth here but no cobble on bottom.

Comment 2

Comment 3

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) SID - 2 (first three letters of stream name-site number)

Date of survey: 2000-11-27 | Time of survey: 10:00 | Surveyors: TJ,BD,TD

Gazetted Stream Name: Upper Bulkley River Side Channel | Local Stream Name: | Watershed Code:

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Just downstream from Bill Wilson's driveway - North side of highway 16. Some ground water influence, no ice at time of survey. Just downstream of an old Upper Bulkley River channel that heads north.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging): Pink Flagging | distance to nearest pool upstream (meters): 25

Downstream Site Boundary marker: Pink Flagging | distance to nearest pool downstream (meters): 50

Gradient (%): 0 | **Site Length (meters)**: 12 | **Interval between channel widths (meters)**:

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	7	7	12							
Max. Wetted Depth (cm)	24	45	50							
Max. Bankful Depth (cm)										

Pool Habitat: max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep | Percent: 80 | Estimated Area (m2): | Dominant Substrate: FINES | Sub-Dominant Substrate: GRAVEL | D90: | % Embeddedness: 95

Glide Habitat: average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep | Percent: | Estimated Area (m2): | Dominant Substrate: | Sub-Dominant Substrate: | D90: | % Embeddedness:

Edge Habitat: Edges of Pools and Glides that are <10 cm deep | Percent: 20 | Estimated Area (m2):

Riffle Habitat: Surface disturbance provides cover | Percent: | Estimated Area (m2): | Dominant Substrate: | Sub-Dominant Substrate: | D90: | % Embeddedness:

Assessment of Fish Habitat | Instream Cover (N,T,M,A): M | Out of Stream Cover (N,T,M, A): M

N=None, T=Trace, M=Moderate, A=Abundant

	(N,T,M,A)					
Functional LWD	T	Number <20 cm		Number 20-50 cm		Number >50 cm: 1
Functional SWD	T					
Boulder Cover	N	Single > 30 cm		Boulder-clusters		
Cobble Cover	N	Percent of site area				
Undercut Banks	N	Length (m)		Average width (m)		
Aquatic Vegetation	M					
Overhanging Veg.	M					

Fish Species Present:

Fish Species Suspected: Coho, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	SID-2		2000-11-27	10:00	TJ,BD,TD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW3	18	Site view
R3	9	

COMMENTS

Disturbance Indicators	Cattle grazing area runs parallel to this side channel. Highway 16.
Comment 1	Appears to be ground water influence. No ice at time of survey. There is a fallen tree in the water that runs the length of this site.
Comment 2	Lots of grasses and willows in the water at this site.
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	Date of survey	Time of survey	Surveyors
SID - 3 (first three letters of stream name-site number)	2000-11-27	10:20	BD,TJ,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River Side Channel		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Approx. 300 meters downstream from site # 2 at culvert crossing at highway 16.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Pink Flagging	distance to nearest pool upstream (meters)	
Downstream Site Boundary marker	Pink Flagging	distance to nearest pool downstream (meters)	

Gradient (%): 0 **Site Length (meters)**: 13 **Interval between channel widths (meters)**: 4

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	12	12	12							
Max. Wetted Depth (cm)	89	65	57							
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	90		Dominant Substrate	FINES
				Sub-Dominant Substrate	GRAVEL
				D90	
				% Embeddedness	95
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	
Edge Habitat	Edges of Pools and Glides that are <10 cm deep	10			
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat Instream Cover (N,T,M,A): M Out of Stream Cover (N,T,M, A): T

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	T	Number <20 cm		Number 20-50 cm	4	Number >50 cm: 2
Functional SWD	N					
Boulder Cover	N	Single > 30 cm		Boulder-clusters		
Cobble Cover	T	Percent of site area				
Undercut Banks	N	Length (m)		Average width (m)		
Aquatic Vegetation	A					
Overhanging Veg.	T					

Fish Species Present:

Fish Species Suspected: Coho, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		Date of survey	Time of survey	Surveyors
SID - 3 (first three letters of stream name-site number)		2000-11-27	10:20	BD,TJ,TD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
R3	10	Limno visible
OW3	19	Site view looking down from highway

COMMENTS

Disturbance Indicators	Highway 16. Cattle grazing area parallel to side channel.
Comment 1	There is a culvert under highway 16 at the downstream end of this site. There appears to be some flow. There was no ice at time of survey.
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) UBR - 1 (first three letters of stream name-site number)

Date of survey	Time of survey	Surveyors
2000-11-23	12:17	BD,TJ,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

TRIM Map Number | NTS 1:50000 Map # | **UTM** Zone | Northing | Easting

Site Location: Describe road and foot access

100 meters downstream from McKilligan Road bridge at fallen tree with root wad in water.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging) | distance to nearest pool upstream (meters)

Downstream Site Boundary marker | distance to nearest pool downstream (meters)

Gradient (%) | **Site Length (meters)** | **Interval between channel widths (meters)**

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)										
Max. Wetted Depth (cm)										
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

		Percent	Estimated Area (m2)		
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

		Percent	Estimated Area (m2)
Edge Habitat	Edges of Pools and Glides that are <10 cm deep		

		Percent	Estimated Area (m2)		
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat | Instream Cover (N,T,M,A) | Out of Stream Cover (N,T,M, A)

N=None, T=Trace, M=Moderate, A=Abundant

	(N,T,M,A)				
Functional LWD		Number <20 cm		Number 20-50 cm	Number >50 cm
Functional SWD					
Boulder Cover		Single > 30 cm		Boulder-clusters	
Cobble Cover		Percent of site area			
Undercut Banks		Length (m)		Average width (m)	
Aquatic Vegetation					
Overhanging Veg.					

Fish Species Present:

Fish Species Suspected:

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
UBR - 1		2000-11-23	12:17	BD,TJ,TD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
0	0	No pictures taken, camera battery dead.

COMMENTS

Disturbance Indicators	Land cleared for hay field upstream of McKilligan road bridge
Comment 1	- back eddy, - pool is larger and deeper than last year and it's scouring out.
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) UBR - 2 (first three letters of stream name-site number)

Date of survey: 2000-11-23 | Time of survey: 10:54 | Surveyors: BD,TJ,Td

Gazetted Stream Name: Upper Bulkley River | Local Stream Name: | Watershed Code:

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Big root wad about 75 meters upstream of confluence with Byman Creek. Limno rebar under pink flag on root wad.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging): Pink Flagging | distance to nearest pool upstream (meters):

Downstream Site Boundary marker: Pink Flaging | distance to nearest pool downstream (meters):

Gradient (%) | **Site Length (meters)** | **Interval between channel widths (meters)**

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	4	4	4							
Max. Wetted Depth (cm)	102	102	85							
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	90		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	25
				% Embeddedness	20
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep	10		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	25
				% Embeddedness	20
Edge Habitat	Edges of Pools and Glides that are <10 cm deep				
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat | Instream Cover (N,T,M,A): M | Out of Stream Cover (N,T,M, A): T

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	M	Number <20 cm		Number 20-50 cm		Number >50 cm	1
Functional SWD	T						
Boulder Cover	T	Single > 30 cm	10	Boulder-clusters			
Cobble Cover	M	Percent of site area	70				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	N						

Fish Species Present:

Fish Species Suspected: Coho, Chinook Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
UBR - 2		2000-11-23	10:54	BD,TJ,Td

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
NR	5	Looking upstream, middle pink flag is limno station
OW4	2	Site view showing both the original trap hole as well as the new one.

COMMENTS

Disturbance Indicators	Small log jams. Some bank erosion just upstream.
Comment 1	Looks like good cover, even when water level goes down as root wad goes down quite deep.
Comment 2	NOTE: Byman Creek, the section just upstream of the confluence(100m) that used to be deep mud is now shallower and has cobble substrate rather than silt/mud.
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) UBR - 3 (first three letters of stream name-site number)

Date of survey: 2000-11-23 | Time of survey: 12:17 | Surveyors: BD,TJ,TD

Gazetted Stream Name: Upper Bulkley River | Local Stream Name: | Watershed Code:

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

100 meters downstream from McKilligan Road bridge at fallen tree with root wad in the water.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging): Pink Flagging — distance to nearest pool upstream (meters): 150

Downstream Site Boundary marker: Pink Flagging — distance to nearest pool downstream (meters): 150

Gradient (%): 1 **Site Length (meters):** 11 **Interval between channel widths (meters):** 3

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	2	4	4	4						
Max. Wetted Depth (cm)	111	114	114	123						
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	70		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	12
				% Embeddedness	0
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep	25		Dominant Substrate	COBBLE
				Sub-Dominant Substrate	FINES
				D90	12
				% Embeddedness	0
Edge Habitat	Edges of Pools and Glides that are <10 cm deep	5			
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat — Instream Cover (N,T,M,A): T — Out of Stream Cover (N,T,M, A): N

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	T	Number <20 cm		Number 20-50 cm		Number >50 cm	1
Functional SWD	T						
Boulder Cover	N	Single > 30 cm		Boulder-clusters			
Cobble Cover	A	Percent of site area	90				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	N						

Fish Species Present:

Fish Species Suspected: Coho, Chinook, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	UBR - 3		2000-11-23	12:17	BD,TJ,TD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
N	0	no photo, camera battery was dead
OW4	19	Site view, limno visible.

COMMENTS

Disturbance Indicators	Land cleared for hay field upstream of McKilligan Road bridge.
Comment 1	this is a back eddy. Pool is larger and deeper than last year as it is scouring out.
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
UBR - 9		2000-10-06	13:15	BD,JE

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Downstream from confluence with Richfield Creek. Sample area is 1/3 of a large pool.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Orange Flagging	distance to nearest pool upstream (meters)	
Downstream Site Boundary marker	Orange Flagging	distance to nearest pool downstream (meters)	0

Gradient (%): 0 **Site Length (meters)**: 20 **Interval between channel widths (meters)**: 3

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	13	12	13	11	11	11	11			
Max. Wetted Depth (cm)	137	147	124	120	108	78	80			
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	70		Dominant Substrate	FINES
				Sub-Dominant Substrate	COBBLE
				D90	11
				% Embeddedness	100
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep	25		Dominant Substrate	FINES
				Sub-Dominant Substrate	COBBLE
				D90	11
				% Embeddedness	70
Edge Habitat	Edges of Pools and Glides that are <10 cm deep	5			
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat Instream Cover (N,T,M,A): M Out of Stream Cover (N,T,M, A): M

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	N	Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD	M						
Boulder Cover	N	Single > 30 cm		Boulder-clusters			
Cobble Cover	N	Percent of site area					
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	T						

Fish Species Present:

Fish Species Suspected: Coho, Rainbow/Steelhead, Sculpin

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	UBR - 9		2000-10-06	13:15	BD,JE

PHOTO DOCUMENTATION

COMMENTS

Disturbance Indicators	Some bank erosion. This site is downstream of a hayfield
Comment 1	
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) UBR - 10 (first three letters of stream name-site number)

Date of survey: 2000-10-06 | Time of survey: 1:55 | Surveyors: BD,JE

Gazetted Stream Name: Upper Bulkley River | Local Stream Name: | Watershed Code:

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Just downstream of Upper Bulkley River # 11.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging): Orange Flagging — distance to nearest pool upstream (meters):

Downstream Site Boundary marker: Orange Flagging — distance to nearest pool downstream (meters):

Gradient (%): 0 | **Site Length (meters)**: 7 | **Interval between channel widths (meters)**: 3

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	15	14	15							
Max. Wetted Depth (cm)	89	99	117							
Max. Bankful Depth (cm)										

Pool Habitat: max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep

Percent: 70 | Estimated Area (m2):

Dominant Substrate: FINES
Sub-Dominant Substrate: COBBLE
D90: 4
% Embeddedness: 90

Glide Habitat: average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep

Percent: 25 | Estimated Area (m2):

Dominant Substrate: FINES
Sub-Dominant Substrate: COBBLE
D90: 4
% Embeddedness: 90

Edge Habitat: Edges of Pools and Glides that are <10 cm deep

Percent: 5 | Estimated Area (m2):

Riffle Habitat: Surface disturbance provides cover

Percent: | Estimated Area (m2):

Dominant Substrate:
Sub-Dominant Substrate:
D90:
% Embeddedness:

Assessment of Fish Habitat — Instream Cover (N,T,M,A): M | Out of Stream Cover (N,T,M, A): M

N=None, T=Trace, M=Moderate, A=Abundant

	(N,T,M,A)					
Functional LWD	N	Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD	M					
Boulder Cover	N	Single > 30 cm		Boulder-clusters		
Cobble Cover	N	Percent of site area				
Undercut Banks	N	Length (m)		Average width (m)		
Aquatic Vegetation	N					
Overhanging Veg.	T					

Fish Species Present:

Fish Species Suspected: Coho

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	UBR-10		2000-10-06	1:55	BD,JE

PHOTO DOCUMENTATION

COMMENTS

Disturbance Indicators	Some bank erosion
Comment 1	Small woody debris is in the middle of the channel. Looks like root wad material in stream. This area is like a large pool. Very meandering.
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
UBR - 11		2000-11-27	10:56	BD,TJ,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Upper Bulkley River	Upper Bulkley River	

TRIM Map Number | NTS 1:50000 Map # | UTM Zone | Northing | Easting

Site Location: Describe road and foot access

Just Downstream of North Road Forest Service Road bridge crossing but upstream of highway 16 bridge and CNR crossing.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Pink Flagging	distance to nearest pool upstream (meters)	300
Downstream Site Boundary marker	Pink Flagging	distance to nearest pool downstream (meters)	100

Gradient (%) 0 **Site Length (meters)** 19 **Interval between channel widths (meters)**

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	4	4	4	4						
Max. Wetted Depth (cm)	106	105	136	84						
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep	100		Dominant Substrate	BOULDE
				Sub-Dominant Substrate	FINES
				D90	76
				% Embeddedness	15
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	
Edge Habitat	Edges of Pools and Glides that are <10 cm deep				
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat Instream Cover (N,T,M,A) M Out of Stream Cover (N,T,M, A) T

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	N	Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD	N						
Boulder Cover	A	Single > 30 cm	50	Boulder-clusters	1		
Cobble Cover	M	Percent of site area					
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	T						

Fish Species Present:

Fish Species Suspected: Coho Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		Date of survey	Time of survey	Surveyors
UBR - 11 (first three letters of stream name-site number)		2000-11-27	10:56	BD,TJ,TD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
R1	16	Looking at small woody debris complex
OW3	14	Site View looking downstream

COMMENTS

Disturbance Indicators

Bridg Crossing, North Road Forest Service Road, Rip Rapped site.

Comment 1

is like an alcove/back eddy. - Huge chunks of rip rap ie. One meter in diameter. - Ice already building up. - really deep

Comment 2

Comment 3

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) UBR - 12 (first three letters of stream name-site number)

Date of survey: 2000-11-23 | Time of survey: 14:14 | Surveyors: TJ,BD,MN

Gazetted Stream Name: Upper Bulkley River | Local Stream Name: | Watershed Code:

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

60 meters downstream of CNR crossing west of Houston, large woody debris site with large cobble cover. End of site is = wetted bank to about the middle of the river.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging): Pink Flagging — distance to nearest pool upstream (meters): 70

Downstream Site Boundary marker: Pink Flagging — distance to nearest pool downstream (meters): 100

Gradient (%): 0 | **Site Length (meters)**: 7 | **Interval between channel widths (meters)**: 2

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	10	11	8							
Max. Wetted Depth (cm)										
Max. Bankful Depth (cm)										

Pool Habitat: max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep — Percent: 50 — Estimated Area (m2):

Dominant Substrate: COBBLE | Sub-Dominant Substrate: FINES | D90: 27 | % Embeddedness: 20

Glide Habitat: average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep — Percent: 40 — Estimated Area (m2):

Dominant Substrate: COBBLE | Sub-Dominant Substrate: FINES | D90: 27 | % Embeddedness: 20

Edge Habitat: Edges of Pools and Glides that are <10 cm deep — Percent: 10 — Estimated Area (m2):

Riffle Habitat: Surface disturbance provides cover — Percent: — Estimated Area (m2):

Dominant Substrate: | Sub-Dominant Substrate: | D90: | % Embeddedness:

Assessment of Fish Habitat — Instream Cover (N,T,M,A): T — Out of Stream Cover (N,T,M, A): T

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	T	Number <20 cm		Number 20-50 cm	1	Number >50 cm	1
Functional SWD	T						
Boulder Cover	M	Single > 30 cm	20	Boulder-clusters	0		
Cobble Cover	M	Percent of site area	50				
Undercut Banks	T	Length (m)	2	Average width (m)	0		
Aquatic Vegetation	N						
Overhanging Veg.	T						

Fish Species Present:

Fish Species Suspected: Dolly varden, Coho, Chinook, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)	first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
UBR - 12		2000-11-23	14:14	TJ,BD,MN

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
R1	17	
OW3	15	Site view

COMMENTS

Disturbance Indicators	Highway Bridge. CNR Bridge. Subdivision water intake upstream. North Road Forest Service Road.
Comment 1	Below sewage outfall, some silt build up, one cottonwood in the water.
Comment 2	
Comment 3	

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) TOB - 1 (first three letters of stream name-site number)

Date of survey: 2000-10-03 | Time of survey: 11:05 | Surveyors: BD,TJ

Gazetted Stream Name: Toboggan Creek | Local Stream Name: | Watershed Code:

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Just downstream of the Toboggan Creek Hatchery building

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging): Orange Flagging — distance to nearest pool upstream (meters): 15

Downstream Site Boundary marker: Orange Flagging — distance to nearest pool downstream (meters): 50

Gradient (%): 2 | **Site Length (meters)**: 14 | **Interval between channel widths (meters)**: 2

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	5	3	4	6	7	5				
Max. Wetted Depth (cm)	69	75	74	61	38	42				
Max. Bankful Depth (cm)										

Pool Habitat: max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep — Percent: 75 — Estimated Area (m2): | Dominant Substrate: COBBLE | Sub-Dominant Substrate: FINES | D90: 7 | % Embeddedness: 5

Glide Habitat: average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep — Percent: | Estimated Area (m2): | Dominant Substrate: | Sub-Dominant Substrate: | D90: | % Embeddedness:

Edge Habitat: Edges of Pools and Glides that are <10 cm deep — Percent: 10 | Estimated Area (m2):

Riffle Habitat: Surface disturbance provides cover — Percent: 15 | Estimated Area (m2): | Dominant Substrate: COBBLE | Sub-Dominant Substrate: PEBBLE | D90: 7 | % Embeddedness: 5

Assessment of Fish Habitat — Instream Cover (N,T,M,A): M | Out of Stream Cover (N,T,M, A): M

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD	M	Number <20 cm		Number 20-50 cm		Number >50 cm: 3
Functional SWD	M					
Boulder Cover	N	Single > 30 cm		Boulder-clusters		
Cobble Cover	M	Percent of site area	80			
Undercut Banks	N	Length (m)		Average width (m)		
Aquatic Vegetation	N					
Overhanging Veg.	T					

Fish Species Present:

Fish Species Suspected: Coho, Dolly Varden,Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)			Date of survey	Time of survey	Surveyors
TOB - 1	first three letters of stream name-site number		2000-10-03	11:05	BD,TJ

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
R1	13	looking upstream
R1	14	looking downstream
OW5	1	Site view looking downstream, limno visible.

COMMENTS

Disturbance Indicators

Comment 1 Same limno as last year

Comment 2

Comment 3

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) TOB - 2 (first three letters of stream name-site number)

Date of survey	Time of survey	Surveyors
2000-10-03	11:35	BD,TJ

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

Upstream of Hatchery at smolt fence site.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)	Orange Flagging	distance to nearest pool upstream (meters)	30
Downstream Site Boundary marker	Orange Flagging	distance to nearest pool downstream (meters)	75

Gradient (%) 0 **Site Length (meters)** 11 **Interval between channel widths (meters)** 2

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)	8	8	8	11	10	11				
Max. Wetted Depth (cm)	74	81	87	76	67	30				
Max. Bankful Depth (cm)										

Pool Habitat: max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep

Percent: 50 | Estimated Area (m2):

Dominant Substrate	COBBLE
Sub-Dominant Substrate	FINES
D90	28
% Embeddedness	5

Glide Habitat: average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep

Percent: | Estimated Area (m2):

Dominant Substrate	
Sub-Dominant Substrate	
D90	
% Embeddedness	

Edge Habitat: Edges of Pools and Glides that are <10 cm deep

Percent: 10 | Estimated Area (m2):

Riffle Habitat: Surface disturbance provides cover

Percent: 40 | Estimated Area (m2):

Dominant Substrate	COBBLE
Sub-Dominant Substrate	FINES
D90	28
% Embeddedness	5

Assessment of Fish Habitat Instream Cover (N,T,M,A): M | Out of Stream Cover (N,T,M, A): T

	(N,T,M,A)	N=None, T=Trace, M=Moderate, A=Abundant					
Functional LWD	N	Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD	M						
Boulder Cover	M	Single > 30 cm	50	Boulder-clusters	0		
Cobble Cover	A	Percent of site area	95				
Undercut Banks	N	Length (m)		Average width (m)			
Aquatic Vegetation	N						
Overhanging Veg.	T						

Fish Species Present:

Fish Species Suspected: Dolly Varden, Coho, Rainbow/Steelhead

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
	TOB- 2		2000-10-03	11:35	BD,TJ

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
R1	15	Site view looking upstreram
OW5	2	Site view looking downstream.

COMMENTS

Disturbance Indicators

Comment 1

Some cobble about 30 cm in diameter has been added to the site from smolt fence installation.

Comment 2

Comment 3

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		Date of survey	Time of survey	Surveyors
TOB - 5 (first three letters of stream name-site number)		2000-11-16	1:30	BD,TJ

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Lake		

TRIM Map Number: | NTS 1:50000 Map #: | UTM Zone: | Northing: | Easting:

Site Location: Describe road and foot access

About 100 meters in front of Jill Storeys house

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging)		distance to nearest pool upstream (meters)	
Downstream Site Boundary marker		distance to nearest pool downstream (meters)	

Gradient (%): | **Site Length (meters)**: | **Interval between channel widths (meters)**:

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)										
Max. Wetted Depth (cm)										
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

		Percent	Estimated Area (m2)		
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

		Percent	Estimated Area (m2)
Edge Habitat	Edges of Pools and Glides that are <10 cm deep		

		Percent	Estimated Area (m2)		
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat | Instream Cover (N,T,M,A): | Out of Stream Cover (N,T,M, A):

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD		Number <20 cm		Number 20-50 cm		Number >50 cm
Functional SWD						
Boulder Cover		Single > 30 cm		Boulder-clusters		
Cobble Cover		Percent of site area				
Undercut Banks		Length (m)		Average width (m)		
Aquatic Vegetation						
Overhanging Veg.						

Fish Species Present:

Fish Species Suspected:

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)			Date of survey	Time of survey	Surveyors
TOB- 5	first three letters of stream name-site number		2000-11-16	1:30	BD,TJ

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW5	4	Site view limno visible

COMMENTS

Disturbance Indicators

Comment 1

Comment 2

Comment 3

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1) TOB - 6 (first three letters of stream name-site number)

Date of survey	Time of survey	Surveyors
2000-12-20	12:00	TJ,TD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

TRIM Map Number | NTS 1:50000 Map # | UTM Zone | Northing | Easting

Site Location: Describe road and foot access

About 50 meters to the right of site # 5.

Limnology Station Marked ☑

Upstream Site Boundary marker (e.g. Red flagging) — distance to nearest pool upstream (meters)

Downstream Site Boundary marker — distance to nearest pool downstream (meters)

Gradient (%) | **Site Length (meters)** | **Interval between channel widths (meters)**

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)										
Max. Wetted Depth (cm)										
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

		Percent	Estimated Area (m2)		
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

		Percent	Estimated Area (m2)
Edge Habitat	Edges of Pools and Glides that are <10 cm deep		

		Percent	Estimated Area (m2)		
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate	
				Sub-Dominant Substrate	
				D90	
				% Embeddedness	

Assessment of Fish Habitat — Instream Cover (N,T,M,A) | Out of Stream Cover (N,T,M, A)

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD		Number <20 cm		Number 20-50 cm		Number >50 cm	
Functional SWD							
Boulder Cover		Single > 30 cm		Boulder-clusters			
Cobble Cover		Percent of site area					
Undercut Banks		Length (m)		Average width (m)			
Aquatic Vegetation							
Overhanging Veg.							

Fish Species Present:

Fish Species Suspected:

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		first three letters of stream name-site number	Date of survey	Time of survey	Surveyors
TOB-	6		2000-12-20	12:00	TJ,TD

PHOTO DOCUMENTATION

Roll Name	Frame Number	Photo Description
OW5	5	Site view limno visible.

COMMENTS

Disturbance Indicators

Comment 1

Comment 2

Comment 3

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)		Date of survey	Time of survey	Surveyors
TOB- 8 (first three letters of stream name-site number)		2000-12-20	1:17	TJ,TD,JD

Gazetted Stream Name	Local Stream Name	Watershed Code
Toboggan Creek		

TRIM Map Number | NTS 1:50000 Map # | UTM Zone | Northing | Easting

Site Location: Describe road and foot access

Couldn't get enough depth in the side channel so the site is now under CNR bridge by Eric Johnsons property.

Limnology Station Marked ☐

Upstream Site Boundary marker (e.g. Red flagging) | distance to nearest pool upstream (meters)

Downstream Site Boundary marker | distance to nearest pool downstream (meters)

Gradient (%) | **Site Length (meters)** | **Interval between channel widths (meters)**

Note: Minimum of 6 widths taken at equal intervals (@ .5 intervals, 1.5 intervals, 2.5 intervals ...to... 9.5 intervals)

Channel Width (m)										
Wetted Width (m)										
Max. Wetted Depth (cm)										
Max. Bankful Depth (cm)										

		Percent	Estimated Area (m2)		
Pool Habitat	max. depth is > 50 cm, average flow is < 0.1 m/sec, excluding edges <10 cm deep			Dominant Substrate Sub-Dominant Substrate D90 % Embeddedness	
Glide Habitat	average flow is >0.1 m/sec, no surface disturbance, excluding edges <10 cm deep			Dominant Substrate Sub-Dominant Substrate D90 % Embeddedness	
Edge Habitat	Edges of Pools and Glides that are <10 cm deep				
Riffle Habitat	Surface disturbance provides cover			Dominant Substrate Sub-Dominant Substrate D90 % Embeddedness	

Assessment of Fish Habitat | Instream Cover (N,T,M,A) | Out of Stream Cover (N,T,M, A)

(N,T,M,A) N=None, T=Trace, M=Moderate, A=Abundant

Functional LWD		Number <20 cm		Number 20-50 cm	Number >50 cm
Functional SWD					
Boulder Cover		Single > 30 cm		Boulder-clusters	
Cobble Cover		Percent of site area			
Undercut Banks		Length (m)		Average width (m)	
Aquatic Vegetation					
Overhanging Veg.					

Fish Species Present:

Fish Species Suspected:

DETAILED SITE DESCRIPTION

Site Name (e.g. TOB-1)			Date of survey	Time of survey	Surveyors
TOB-	8	first three letters of stream name-site number	2000-12-20	1:17	TJ,TD,JD

PHOTO DOCUMENTATION

COMMENTS

Disturbance Indicators	
Comment 1	
Comment 2	
Comment 3	

Appendix 2. Winter Sampling Data

Appendix 2a. Winter Sampling Data and Graphs

Appendix 2b.Winter Sampling Data Forms