Life History, Stock Assessment and Recommendations for a Sustainable Recreational Fishery of Buckley Lake Rainbow Trout

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Abstract

Buckley Lake was sampled September 8-10, 2003 by Skeena Region Fisheries staff in an effort to address: 1) rainbow trout life history characteristics; and, 2) provide advice to Skeena Region Protected Areas staff on the sensitivity of the population to angler exploitation. Buckley Lake is a small, remote lake within Mt. Edziza Provincial Park. The lake outlet drains over a major waterfall barrier into the lower reaches of the Klastline River. Buckley Lake was deemed barren of fish following an inventory by BC Fish and Wildlife staff in 1982 (Miller and Davidson, 1982). BC Parks staff received reports of large rainbow trout being captured in the lake beginning in the early 1990's. It is speculated that a local trapper illegally stocked the lake with a local stock of wild rainbow trout in the mid 1980's.

Buckley Lake is accessible by a short fixed wing flight from both Iskut (Tatogga Lake Resort) and Telegraph Creek or by foot or horseback along the Telegraph Trail. Buckley Lake currently provides a highly prized fishery for abundant large rainbow trout captured on conventional surface and littoral angling gear. Buckley Lake offers this unique angling experience due in most part to a high abundance of invertebrate forage, as well as, productive juvenile and adult rearing habitat. Analysis of stomach samples from Buckley Lake rainbow trout indicate that they are feeding almost exclusively on zooplankton (Amphipoda & Cladocera). Buckley Lake provides a relatively long growing season and high nitrogen –to- phosphorus ratio relative to other small wilderness Skeena Region lakes. However, Buckley Creek (outlet stream) provides limited spawning habitat for the system, and therefore constrains juvenile recruitment to the lake. Subsequently, fish densities are suspected to be low and a major contributor to conditions that result in exceptional growth rates for rainbow trout; especially given its latitude and elevation. Fishing mortality is expected to be very low for Buckley Lake under the current effort and harvest conditions. Maximum angler effort fro Buckley Lake is estimated to be conservatively set at 3,900 angler days following methods presented by Cox and Walters (2002). However, a limit of 2,000 angler days is recommended for compliance with stated Stikine Country Management Plan goals. Increased certainty on maximum sustainable effort and harvest levels would result from more rigorous sampling for rainbow trout mortality, harvest, density and recruitment estimates. Recommendations for monitoring the fishery are also presented.

Acknowledgements

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Larry Boudreau, Dave Zevick, Herb Green of BC Parks, Gordon Hitchcock (COS) and Gerry Creyke provided historical perspectives on the Buckley Lake fishery. Carol Lidstone (Birkenhead Fisheries Services, Lone Butte, BC) conducted the scale analysis.

Ian Sharpe (BC WLAP, Skeena EP Section) is acknowledged for his assistance with water sample processing, which was completed by PSC Analytical Services. Trout stomach samples and invertebrate trawl samples were processed by Fraser Environmental Services. Eric Parkinson, WLAP Biodiversity Branch, UBC and Dr. Sean Cox, SFU School of Resource and Environmental Management provided valuable advice and assistance with analysis and recommendations section of the report. Dana Atagi and Mark Beere are acknowledged for their editorial review and helpful comments.

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1.0 Introduction

Buckley Lake rainbow trout stock assessment was initiated to support the need to…*"investigate the current population structure of the [rainbow] trout within Buckley Lake"*…as outlined in the Buckley Lake Management Area, Management and Key Strategies section of the Stikine Country Management Plan (Anonymous, 2003). This plan also states the need to *monitor angling pressure on this population*. These items have been raised in the Stikine Management plan due to the unique character of the Buckley Lake fishery. Therefore, the goals for this study were to:

- describe the life history characteristics and population structure for the rainbow trout of Buckley Lake, its outlet and tributaries; and,
- generate science based recommendations to the Skeena Region, Protected Areas Section on how to monitor and manage angler effort in a sustainable manner in accordance with Stikine Country Management Plan.

In order to achieve the stated goals, the following objectives were established:

1. collect biological samples (age, length, weight, maturity) from adult and juvenile rainbow trout from both fluvial and lacustrine habitats;
2. conduct qualitative habitat assessments and juvenile densities from accessible fluvial portions of the watershed in an effort to locate and describe areas of recruitment production;
3. collect environmental (water quality) samples from the lake; and,
4. identify and describe the forage base for lake rearing rainbow trout.

1.1 Background

Buckley Lake was initially inventoried in September, 1982 by Miller and Davidson of the BC Fish & Wildlife Branch and concluded that the lake was barren of fish following standard reconnaissance inventory gill netting procedures. BC Parks, Skeena District became aware of the presence of large rainbow being captured in the lake following anecdotal reports of local residents and subsequent publication of photos advertising remote, fly-in angling opportunities in the Stikine Management Area in the early 1990's. Interviews conducted with local Parks operational and management staff, past and present local conservation officers, float plane and helicopter pilots, as well as, the guide outfitter, place the illegal stocking of the lake in the mid 1980's. It is speculated that a resident trapper moved wild rainbow trout from a local lake into Buckley Lake by way of a float plane. This would have placed approximately 10 years between the founding event and detection by BC Conservation Officer Service and Parks Branch authorities.

1.2 Study Area

Buckley Lake is located in Mt. Edziza Provincial Park, approximately 46km WNW of the town of Iskut (Figure 1). Descriptions of Buckley Lake and its geologic and bio-physical setting can be found in the Stikine Country Management Plan (2003) and the lake inventory report completed by Miller and Davidson (1982). Besides the absence of fish in the lake, Miller and Davidson inventory report noted the abundance of invertebrates and waterfowl, as well as, numerous fish passable beaver dams in the lake outlet. Physical and chemical summaries for Buckley Lake as a result of the Miller and Davidson (1982) inventory are presented in Tables 1 and 2.

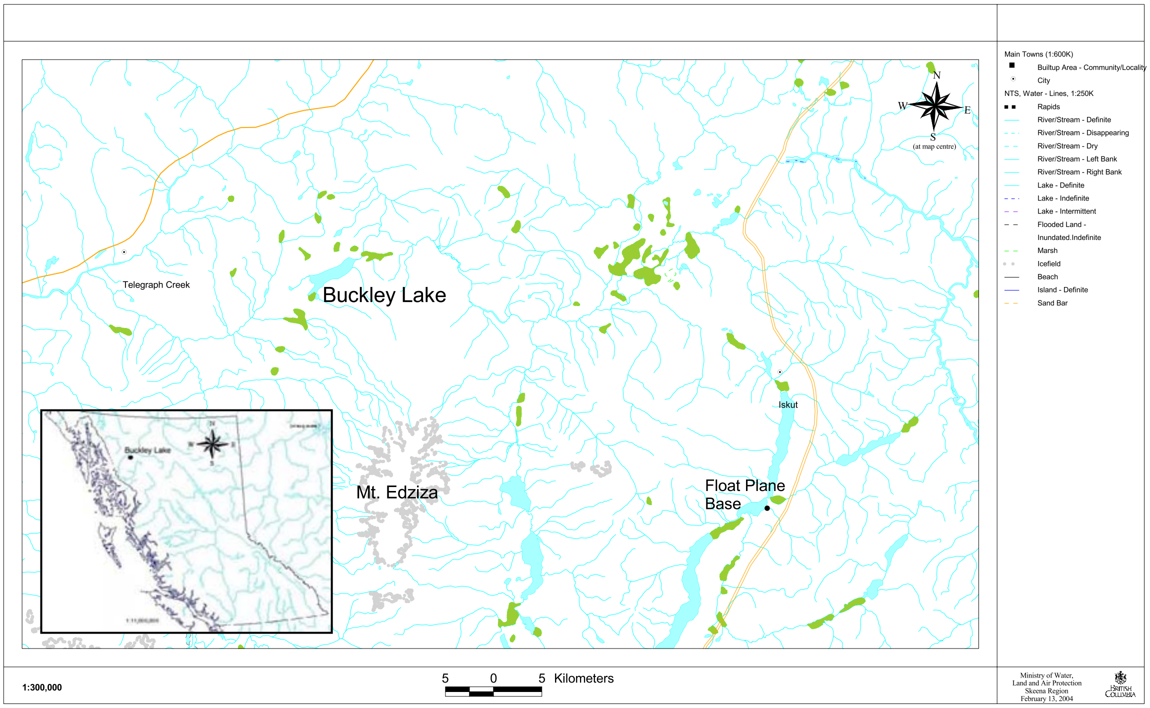

Figure 1: Buckley Lake location map.

Buckley Lake tributaries are comprised of one outlet stream (Buckley Creek), four major inlet tributaries and several seasonal or subsurface tributaries. Most of the seasonal subsurface tributaries appear to be associated with a lobe of the lava flow that meets Buckley Lake on its eastern shore (Figure 2).

Table 1: Summary of Buckley Lake physical parameters (BC Fisheries Data Warehouse; Miller & Davidson 1982).

BC Watershed Code	Elevation (m a.s.l.)	Lake Area (ha)	Littoral Area (ha)	Lake Perimeter (m)	Volume (m^3)	Mean Depth (m)	Max. Depth (m)	No. of Outlets	No. of Inlets (permanent)
660-185500	835	568.16	170.73	16353	74110100	13	27	1	5

Table 2: Summary of chemical parameters collected at Buckley Lake by Miller and Davidson, 1982.

pH	TDS	H_2S	Secchi Depth (m)
8.9	100	No Odour	1.5

2.0 Methods

2.1 *Access and Camp Amenities*

A project crew of five, camp supplies, two inflatable boats, outboard motors and fuel were transported to a campsite located on the north end of Buckley Lake (Figure 2) in three 45 km round trips by DeHavilland Beaver from the Harbour Air float plane base located at Tatogga Lake. The pilot was Doug Beaumont who had previous experience angling, and transporting anglers into Buckley Lake. The MWLAP Park facility was moderately developed with a dock, pit toilet, metal food storage box and an open area suitable to land a helicopter. The public camp site is located directly adjacent to a guide outfitter camp operated by the Creyke family. The Creyke private camp is comprised of two tent frames, a horse corral and a fire pit area. All sampling excursions during the September 7th to 11th, 2003 assessment were based out of the aforementioned camp.

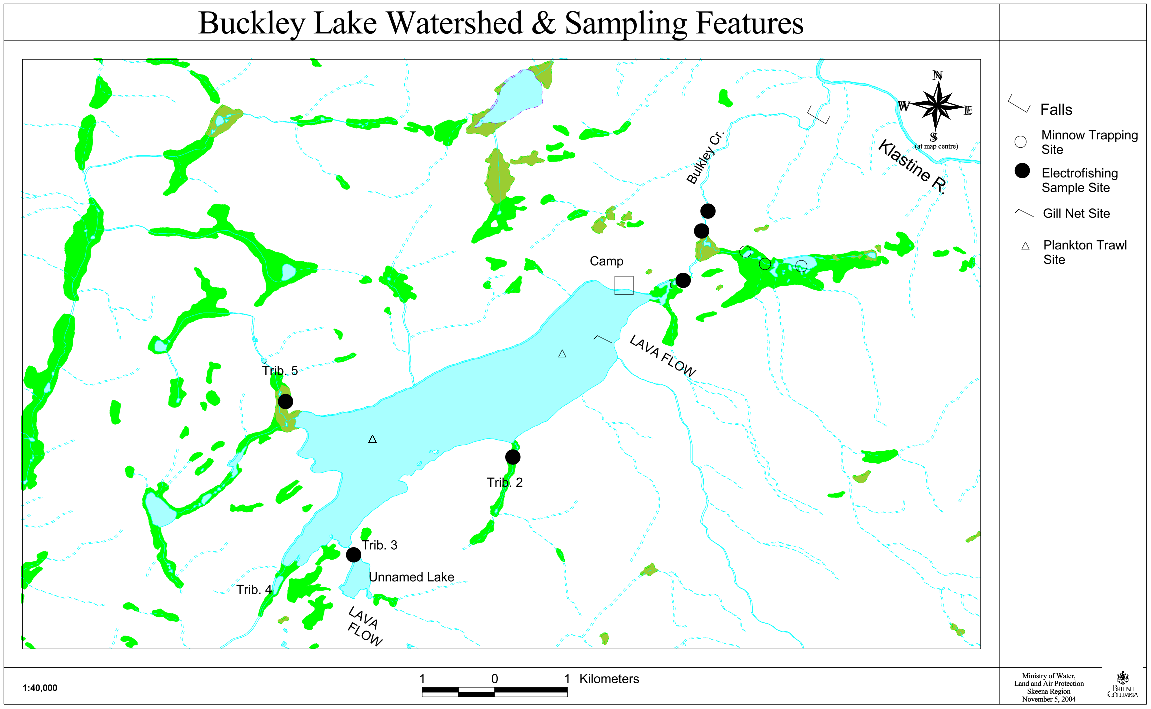

Figure 2: Detailed view of Buckley Lake, with gill net site (bent line), electrofishing (dots), minnow trapping (open circles), and plankton trawl (triangles) sample sites. Camp, waterfall and lava flow locations are also identified.

2.2 *Habitat Assessment*

2.2.1 Stream Habitat Sampling

Resource Inventory Standards Committee (RISC), Field Data Information System (FDIS) site cards were used to describe fluvial habitat at each stream site. Stream sites were composed of a minimum of 100 m lineal habitat. Overall fluvial habitat quality and quantity was estimated via remote sensing, aerial observations and by walking the more productive reaches of the streams. The fish and fish habitat assessment concentrated on Buckley Creek and the four major unnamed inlet streams with the objective of characterizing the most productive fluvial fish habitats in the watershed.

2.2.2 Lake Habitat Sampling

Lake bathymetry, shoreline, littoral, invertebrate, water chemical properties and oxygen/temperature profile was previously described by Miller and Davidson (1982).

2.2.3 Water Chemistry Sampling

Buckley Lake surface water samples were collected on September 11, 2003 from two sites for analysis of general water chemistry, as well as, standard total and dissolved metals. The field sampling and treatment protocol followed those outlined in the RISC publication *Freshwater Biological Sampling Manual* available at:
http://srmwww.gov.bc.ca/risc/pubs/aquatic/freshwaterbio/freshwaterbio-05.htm#4
The water sample analysis was completed by PSC Analytical Services in Vancouver and was summarised in a spreadsheet format for further analysis (Appendix III).

The lake oxygen/temperature profile was measured at mid-afternoon on September 8th at the lakes deep hole using an Oxyguard® DO/Temperature meter fitted with a 30m cable. Conditions were cloudy and calm.

2.2.4 Invertebrate Sampling

Vertical plankton hauls were collected from a depth of 15 m at three sites located in the west, central and eastern ends of Buckley Lake (Figure 2). Invertebrate hauls were gathered to provide basic information on pelagic invertebrate community composition, as well as, information on lake productivity and potential forage sources for rainbow trout. All samples were collected Sept. 10. A basic 32 cm Ø Wildco™ tow net, with a mesh size of 100 μm was used. Samples were stored in a 10% formalin solution. The invertebrate field sampling and treatment protocol followed those methods outlined in the Resource Information Standards Committee (RISC) publication *Freshwater Biological Sampling Manual* available at:
http://srmwww.gov.bc.ca/risc/pubs/aquatic/freshwaterbio/freshwaterbio-05.htm#4

Invertebrate sample analysis was completed by Fraser Environmental Services of Surrey BC. Invertebrates in the sample were separated and enumerated in the laboratory by family, genus and where possible species. The results from Fraser Environmental Services are provided in Appendix V.

2.3 Fish Sampling

2.3.1 Juvenile Sampling

Juvenile rainbow trout were captured using a Smith Root B12 back-pack electro-shocker, pole seine (3x2 m; 3 mm mesh) and angling in streams. A length stratified, sub-sample of approximately 50 juvenile rainbow trout captured in streams were anaesthetized in a water and clove oil/ethanol (ratio of 1:1000) bath and sampled for fork-length (mm), weight (g) and age (scale sample). A Tanaka® digital scale (500g maximum) and spring scales were used to measure rainbow trout round weights. Scale samples were stored in coin envelopes. Attempts were made to sample all available habitat types within each sample site location.

2.3.2 Adult Sampling

Adult rainbow trout were captured by gill net and angling. Resource Inventory Standards Committee (RISC) standard 90m multi-panelled floating and sinking gill nets were deployed from randomly chosen locations. Rainbow trout were angled at stream mouths and in pelagic habitats using a variety of angling techniques; trolling artificial flies, spoons and spinners behind an outboard or oar powered boat being the primary method deployed. All adult fish captured were measured for fork-length (mm), weight (g) and age samples. Gill net sampled fish were separated into 30-40 cm, 40 -50 cm and 50+ cm length classes and a sub-sample of approximately 5-10 fish per length class were sampled for stomach contents. Stomach content samples were pooled by length-class and stored in a 10% formalin solution. White floy type anchor tags were applied to rainbow trout angled.

3.0 Results

3.1 Habitat Assessment

3.1.1 Stream Habitat

Seasonal tributaries identified by remote sensing were site inspected and either ground surveyed and included below, or discounted as providing insignificant production areas for rainbow trout. Although not observed in this survey, shore spawning attempts are reportedly occurring in early June on the northeast shore of the lake (Doug Beaumont pers. comm., Sept. 2004). The shore spawning attempts may be associated with upwelling of subsurface flows under the lava, or associated with seasonal small intermittent tributary flows.

3.1.1.1 Buckley Creek

Buckley Creek (*i.e.* lake outlet) is located at the northeast end of Buckley Lake and flows approximately 4.5 km over six reaches where it joins the Klastine River of the Stikine Watershed (Figure 1). Reach one, two and three were assessed on foot and from the air. Reach four, five and six were assessed only from the air due to the inability to land near the creek and due to the limited habitat values identified in these reaches during an initial aerial reconnaissance flight.

Reach 1

Reach 1 was comprised of a low gradient meandering channel starting at the lake outlet and flowing through a sedge dominated wetland at a low gradient (<1%) for approximately 500 m to a gradient break at Reach 2. The channel substrate was primarily comprised of fines, gravel with a minor component of cobble, providing marginal spawning habitat. In-stream cover was dominated by aquatic vegetation and periphyton growth. Overhead cover was provided primarily by extensive sedge growth that dominates the reach. A low density of woody debris in the stream channel was observed in Reach 1. Any of the wood that was recruited to the stream has come from patches of relic coniferous stands that were killed by historic beaver induced flooding events (Appendix I, Plate1). Assessment of historical air photos (Miller and Davidson 1982) and field observations indicated that much of the upper section of Reach 5 was influenced by beaver dams prior to the early eighties. Beaver dams appear to have not been prevalent in the last 20 years although remnants of the relic dams still persist in the upper section of Reach 1 (Appendix I, Plate 2). Active beaver developments were not observed in any part of the reach during this 2003 assessment.

High densities of freshwater shrimp (*Hyalella azteca* and/or *Gammarus lacustrus)* were observed in the upper section of Reach 1, although many of the juvenile rainbows were observed surface feeding on terrestrial invertebrates. In addition high densities of freshwater shrimp moult casts were observed in the upper section of the reach. It appeared that the floating exoskeletons had drifted downstream from the lake surface and accumulated in off channel alcoves. The majority of the exoskeletons where still intact indicating a relatively recent "mass moulting" event of the watersheds shrimp population(s).

Reach 2

Reach 2 began approximately 1.5 km downstream of the lake outlet where the stream channel gradient shifted to about 4% (Appendix I, Plate 3). This reach continued downstream in a relatively straight, pool riffle, channel morphology for approximate 1 km. The stream channel substrate was comprised of predominantly cobble and some minor gravel components that were limited for spawning potential. Similar to reach one, aquatic vegetation and periphyton growth was still extensive and over-head cover increased with the increased presence of large woody debris (LWD) due to the stream entering into a spruce stand. Willow and scrub birch was also prevalent along the shoreline. This reach had little spawning habitat and the prime rearing habitat was limited to the pools.

Reach 3

Reach 3 of Buckley Creek is characterized by a low gradient meandering channel with excellent spawning and rearing fish habitat. A small low gradient tributary that drains a relatively large wetland complex enters Buckley Creek on the right bank near the middle of the reach. The wetland tributary complex had extensive sedge growth along its banks and the habitats appeared to be suitable for rearing juveniles (Appendix I, Plate 4). Downstream of the tributary confluence, Buckley Creek continued to flow at 1% average gradient for approximately 500 m to the reach break. The channel substrate was dominated by cobble and boulder with patches of gravel suitable for spawning. This lower section of Reach 3 had the highest quality and quantity of spawning habitat assessed in the watershed, yet it was only present in small patches and distributed over a lineal distance of only 200 m of stream. In-stream cover for rearing was excellent and was provided primarily by sedge, undercut banks and boulders (Appendix I, Plates 5 and 6).

Reach 4

Reach 4 is the longest reach section of Buckley Creek that flows at an approximately 3 to 5% gradient for approximately 1 km. The habitat in this reach appeared to have limited spawning potential although some limited rearing habitat did appear to be available for fish use. These rearing habitats were mostly observed in the form of small pools developed by the boulder dominated stream channel and wood recruited from the coniferous dominated riparian sections of the reach (Appendix I, Plate 7).

Reach 5

Reach 5 began where Buckley Creek became confined by steep bank head walls (Appendix I, Plate 8) and flowed at approximately 4% gradient for 1.6 km to a spectacular columnar basalt cliff, where the creek spilled approximately 15 m prior to the confluence with the Klastine River. Spawning habitat was assessed to be very limited in this reach and rearing habitat was restricted to small pools formed by wood and boulders.

Reach 6

Reach 6 was a short (0.65 km) very steep section of stream that started at the base of the 15 m vertical falls and flowed downstream over large rocks and boulders to the Klastine River (Appendix I, Plate 9). There are no fish habitat values in Reach 6 of Buckley Creek.

3.1.1.2 Tributary 2

Tributary 2 was located on the central south shore of Buckley Lake (Figure 2). The stream is approximately 1 km in length and is comprised of three reaches. Based on remote sensing and aerial observations made during the reconnaissance flight, only Reach 1 was assessed in detail.

Reach 1

Reach 1 was comprised of a short section of low gradient stream that began at Buckley Lake confluence and flowed 75 m over a 1.0% to 2.5% gradient stream channel where it ended at a 0.8 m high beaver dam. At the moderate flows observed during our assessment the beaver dam was assessed to be a barrier to upstream and/or downstream migration of all age classes of rainbow trout. Excellent overhead stream cover was provided by dense willow growth near the stream channel. Instream cover was dominated by cobble and undercut banks. Very little, if any, spawning habitat was observed (Appendix I, Plate 10).

Freshwater shrimp were observed in the lower 30 m of Reach 1, which was the lowest gradient section of the reach.

Reach 2

Reach two was comprised of a complex of ponds created by beaver dams. The ponds were difficult to sample with electro-fishing gear, but no fish were observed feeding on the surface. The ponds were relatively deep and diverse and were not typical of preferred rearing habitats utilized by rainbow trout.

Reach 3

Reach 3 was a small low gradient braided channel that drained (possibly seasonally) to the beaver pond complex in Reach 2. Aerial observations and remote sensing indicated limited fish habitat in Reach 3 and therefore was not assessed on the ground.

3.1.1.3 Tributary 3

Tributary 3 is a 110 m section of moderate to low gradient stream that flows out of a small unnamed headwater lake to the southwest arm of Buckley Lake (Figure 2). The stream had two reaches both of which contained excellent rearing habitat. The unnamed lake was not assessed in detail, but despite observing many terrestrial insects on the lakes surface, not a single fish was observed feeding (Appendix I, Plate 11).

Reach 1

Reach 1 begins at the Buckley Lake tributary inlet and flows over excellent 2% to 3.5 % gradient juvenile rearing habitat for approximately 25 m. At this point the channel changes to a 0.75 m high bedrock cascade to form the first reach break. A small amount of habitat was assessed to be suitable for spawning at the gravel delta formed by the stream at its inlet to the lake (Appendix I, Plate 12).

Reach 2

Reach 2 extended 80 m upstream from the bedrock cascade to the tributary outlet at the north end of an unnamed lake. The rearing habitat was assessed to be excellent with complex, deep pools that have extensive in stream and overhead cover (Appendix I, Plate 13). A limited amount of habitat suitable for spawning was dispersed sporadically throughout Reach 2 but it appeared not to be utilized due the complete lack of young of the year (YOY) fry captured during fish sampling.

3.1.1.4 Tributary 4

Tributary 4 was a short low gradient drainage located on the south western arm of Buckley Lake (Figure 2). The stream was initially identified for assessment using remote sensing techniques. Field investigations on September 9 identified a wetland complex drainage area dominated by extensive sedge growth and an undefined stream channel. The tributary was evaluated as having limited fish habitat values and consequently no further assessments were completed.

3.1.1.5 Tributary 5

Tributary 5 is a low gradient stream that drained a small basin that flowed into the south western arm of Buckley Lake (Figure 2). The stream channel in the lowest section meandered through a wetland complex with extensive sedge growth along its undefined banks. The water was stagnant, very tannic and was assessed not typical of key rearing habitats typically utilized by rainbow trout (Appendix I, Plate 14). Electrofishing conducted in the complex 400 m upstream from the lake captured no fish.

3.1.2 Lake Habitat

3.1.2.1 Water Chemistry Sampling

Analysis of water samples revealed a relatively high total nitrogen to phosphorus ratio for the two surface samples collected. Sample Site 1 at the central west end of Buckley Lake had a nitrogen to phosphorus (N:P) ratio of 14:1, whereas Site 2 at the central north east end of Buckley Lake had a N:P ratio of 17:1 (Table 3). The N:P ratio derived from a surface water sample collected by Miller and Davidson in 1982 was lower at 10:1. It's important to note that the lab documents from the1982 sample indicated that the sample *"arrived frozen and was too long in transit".* This may indicate sampling error and possibly contribute to observed differences from the 2003 sample.

Secchi depth was measured at 3.55 m in 2003, and 1.5 m in 1982 (Miller and Davidson 1982). Applying Carlson's (1977) trophic state index (TSI) calculation for Secchi depth measurements ($TSI_{\text{secchi depth}}$ = 60 – 14.4ln(secchi depth), places Buckley in the meso-trophic class for the 2004 measurement (TSI = 41.7), and in the eutrophic class (TSI=54.17) for Miller and Davidson (1982) result. Applying the 2004 total phosphorus result in Carlson's TSI, Buckley Lake is classed as eutrophic (TSI = 51.5).

pH measured at Buckley Lake's four tributary sample sites and two limnology sample sites was relatively high (8.7 pH and 8.6 pH), whereas tributary samples ranged from very high levels of 9.3 at site 1 and 12 in Buckley Creek down to 8.1 pH at site 3 located in Tributary 2 (Table 3).

Table 3: Nitrogen, phosphorus and pH from Buckley Lake, Buckley Creek and inlet tributaries.

	Lake Sample		**Tributary Samples**			
Parameter	**Site 1**	**Site 2**	**Site 1**	**Site 12**	**Site 3**	**Site 4**
Total Nitrogen (mg/l)	0.36	0.46				
Phosphorus Total (mg/l)	0.025	0.027				
N:P ratio	14:1	17:1				
pH	8.7	8.6	9.3	9.3	8.1	8.7

Calcium levels in the water chemistry samples were considered moderate at 13 mg/L when compared to 30 mg/L calcium levels measured at Morchuea Lake (Miller and Davidson 1982$_b$) and 12 mg/L in Lakelse Lake (Cleugh1978). Additional water quality parameters were analysed for baseline data collection purposes and are summarized in Appendix II.

The early September profile of water temperature (°C) and dissolved oxygen (DO mg/l) revealed that Buckley Lake was stratified and is typical of eutrophic lakes (Wetzel 1975). The thermocline, measured at the temperature inflection point, was located at 12 m from the surface. The epilimnion provides near optimal rainbow trout rearing temperatures and dissolved oxygen levels in September (Figure 3). The hypolimnion however, has anoxic conditions below 12 m and could not sustain rainbow trout below this depth.

Applying the Osgoode Index (mean depth/(surface area)$^{0.5}$; Cooke et al. 1993) for classifying lakes functional aspects of lake morhpometry and the frequency and extent of summer mixis, Buckley is classed as a dimicitc lake (Osgoode score: 5.493); meaning it fully mixes twice a year, usually in spring and fall.

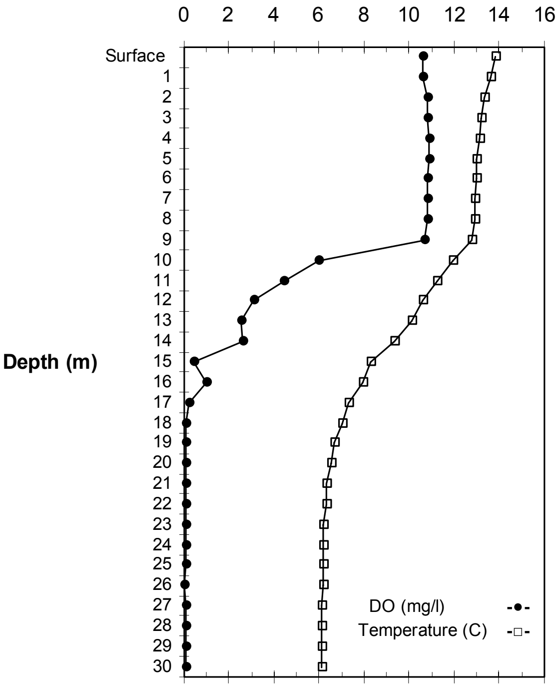

Figure 3: Temperature (^{o}C; open squares) and dissolved oxygen (DO mg/l; dark circles) profile for Buckley Lake, September 9th, 2003.

3.1.2.2 Invertebrate Sampling

Seven species, two orders and one unidentifiable group of invertebrates were identified in the three hauls conducted. Invertebrate abundance and density was dominated by *Cyclops scutifer,* (including nauplii) and *Diaptomus ashlandi* were the second most abundant taxa observed (Table 4). Of note in the sample results is the absence of the *Hyalella azteca* in the pelagic hauls compared to their abundance in the gut samples of rainbow trout, indicating benthic or littoral feeding behaviour of Buckley's larger rainbow trout.

Table 4: Total and mean abundance, % abundance and density (invertebrates/m^3) of pelagic invertebrates sampled from 15m deep net hauls in the west, central and eastern basins of Buckley Lake, September 2003.

Invertebrate Taxa	Total			Mean†		
	Abundance	% Abundance	Density/m^3	Abundance	% Abundance	Density/m^3
Nauplii (cyclops larvae)	36,379	18.4	33,414	12,126	18.4	11,138
Cyclops scutifer (adult)	1,841	0.9	1,691	614	0.9	564
Cyclops scutifer (copepodid)	121,526	61.5	111,620	40,509	61.0	37,207
Cyclops scutifer combined	**159,746**	**80.9**	**146,724**	**53,249**	**80.4**	**48,908**
Diaptomus ashlandi (adult)	3,334	1.7	3,062	1,111	1.7	1,021
Diaptomus ashlandi (copepodid)	12,640	6.4	11,610	4,213	6.8	3,870
Diaptomus ashlandi combined	**15,974**	**8.1**	**14,672**	**5,325**	**8.5**	**4,891**
Heterocope septentrionales (adult)	306	0.2	281	102	0.2	94
Daphnia middendorffiana	1,178	0.6	1,082	393	0.6	361
Gammarus lacustrus	40	0.0	37	13	0.0	12
Coelenterata*	4,393	2.2	4,035	1,464	2.2	1,345
Conochilus sp	5,060	2.6	4,648	1,687	2.7	1,549
Euchlanis sp.	15	0.0	14	5	0.0	5
Kellicottia longispina	10,699	5.4	9,827	3,566	5.3	3,276
Keratella cochlearis	80	0.0	73	27	0.0	24
Unidentified	19	0.0	13	6	0.0	6
TOTAL	197,510	100.0	181,406	65,837	--	60,470

† mean of three hauls

3.2 Fish Sampling

3.2.1 Rainbow Trout Stomach Content Analysis

Eight separate invertebrate species (seven identified to order) were identified in each of the three fish sample length classes (Table 5). Vertebrates were absent from the stomach samples.

The diversity of invertebrate species identified in the stomach samples decreased significantly as the length and age class increased (Table 5, Figure 4). The stomach contents of 30 cm to 40 cm length class fish consisted primarily of water fleas (Cladocera *sp.*) and freshwater shrimp (Amphipods), but also revealed limited feeding on copepods (*Copepoda*) and Tricoptera. The stomach contents of length class 41 cm to 50 cm fish consisted of predominantly on water fleas, freshwater shrimp and copedods with minor occurrences of flies (Diptera), snails (Mollusca), and spiders (Araneae). Length class 51-60 cm fish appeared to have shifted all their feeding, at the time of our sampling, to freshwater shrimp. The freshwater shrimp species identified were predominantly *Hyalella azteca* (99.8%) with minor occurrences of *Gammarous lacustrus* (0.2%).

Table 5: Frequency and percent composition of invertebrates analyzed from Buckley Lake rainbow trout stomach samples stratified by 30-40, 40-50, and 50-60 cm fork length (FL) classes collected, September 2003.

	30-40 cm		**40-50 cm**		**50-60 cm**	
Invertebrate Order	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
Amphipoda	577	15	1400	36	2713	100
Copepoda	64	2	717	19	0	0
Moluska	0	0	2	0.05	0	0
Araneae	0	0	1	0.03	0	0
Cladocera	2938	79	1742	45	0	0
Tricoptera	148	4	0	0	0	0
Diptera	0	0	7	0.02	0	0
TOTAL	3727	100	3869	100	2713	100

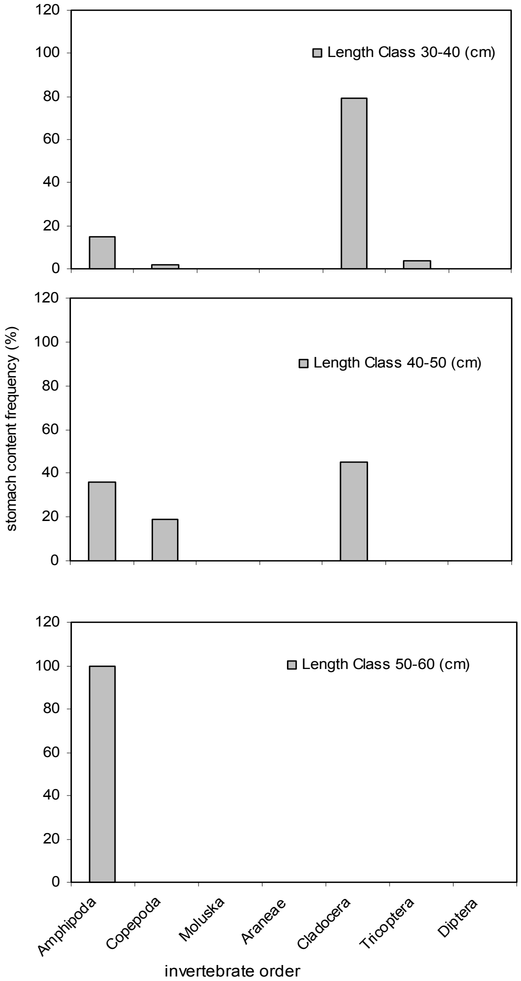

Figure 4: Percent frequency composition of invertebrates sampled from stomach contents for 30-40 cm, 40-50 cm, and 50cm+ fork-length classes of Buckley Lake rainbow trout sampled September 2003.

3.2.2 Rainbow Trout Growth

3.2.2.1 Condition

Buckley Lake rainbow trout exhibited exceptional growth. Fulton's condition factor (K; Ricker 1975) calculated for rainbow trout greater than 200mm fork length was 1.32. When compared to rainbow trout in Barrett Lake, a stocked lake near Houston BC, (K=1.11) and the mean wild rainbow in Skeena Region lakes (K=1.08; unpublished data on file), the significantly higher condition of Buckley's rainbow is apparent (Figure 5). Round weight (g) of Buckley rainbow trout can be predicted using the equation presented in Figure 6.

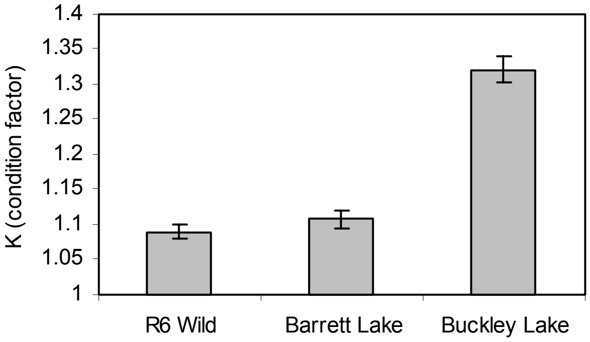

Figure 5: Mean and standard error bars of Fulton's condition factor for Buckley Lake rainbow trout sampled September 2003, Barrett Lake rainbow trout sampled September, 2001 and Skeena Region rainbow trout (*n*=542) collected from lakes throughout R6 between 1997-1999.

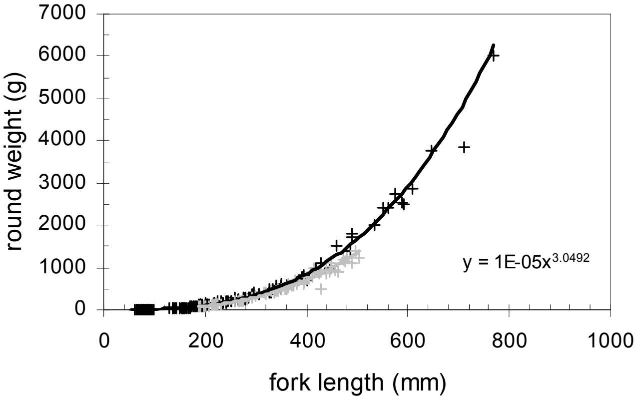

Figure 6: Length (mm) *vs.* weight (g) for Buckley Lake rainbow trout captured September 2003. Exponential formula for predicting Buckley Lake rainbow trout weight from length is presented. Barrett Lake rainbow trout growth is presented in grey for comparison.

Slope (β) of linear regression analysis between log length and log weight of rainbow trout captured in Buckley Lake and tributaries demonstrates higher condition factor for fish less than 450 mm and the total sample, whereas fish greater than 200 mm and greater than 450 mm were lower (Table 6).

Table 6: Summary of β (slope) derived from linear regression analysis of logLength (mm) *vs.* logWeight (g) of rainbow trout captured in Buckley Lake & tributaries, September 2003.

Length Class (mm)	β L_{log} . W_{log}
all RB	3.05
RB > 200	2.96
RB < 450	3.05
RB > 450	2.62

3.2.2.2 Growth

Von Bertalanffy growth parameters generated using a Walford plot (Ricker 1975) with all age classes included for *K* and L_∞ were found to under estimate growth, whereas a more accurate estimate of *K* was obtained using the Walford plot excluding 0+ age class and maximum length ($L\infty'$) used as $L\infty$ (Figures 7 & 8).

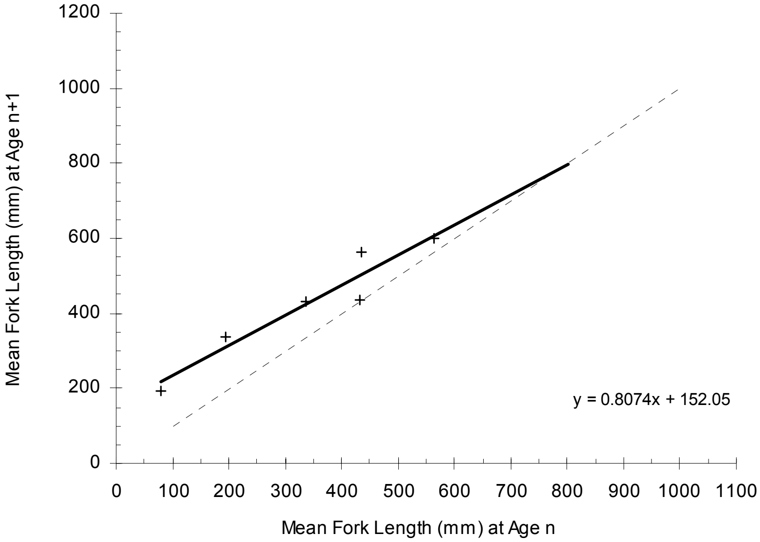

Figure 7: Walford plot of rainbow trout captured at Buckley Lake and tributaries, September 2003. Linear regression equation and β estimate presented. Linear regression line projected forward to assist with determining L∞ (760 mm). Dashed line represents allometric (1:1) growth.

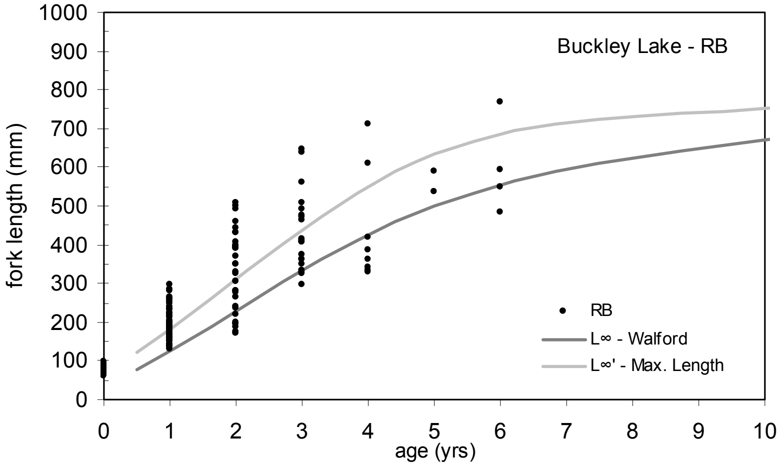

Figure 8: Age-at-length plot and Von Bertalanffy growth curves for all rainbow trout (dark circles) captured in Buckley Lake, September 2003. Von Bertalanffy growth curves generated by Walford plot *K* and L∞ (Walford dark grey) and maximum length L∞′ (light grey).

Table 7: Summary Von Bertalanffy growth parameters generated by Walford plot and maximum length (from Figure 8).

	β	*K*	L∞
L∞′, 0+ excluded	0.713	0.338	780
Walford	0.8074	0.214	760

Walford plot slope (β), growth rate (*K*) and asymptotic length (L∞).

3.2.3 Rainbow Trout Population Structure

3.2.3.1 Age and Length Frequency: Stream Samples

Rainbow trout captured in Buckley Lake inlets and outlets demonstrated a declining trend in abundance as age increases (Figure 9). Buckley Creek's (*i.e.* lake outlet) catch was dominated by 0+ rainbow trout young-of-the-year (YOY), followed by 1+, and 2+ juveniles respectively. Young of the year fry were absent from the catch of inlet tributaries with the exception of tributary three, where 1+ juveniles dominated the catch followed by 2+ and 3+ fish. These results indicate that the outlet stream is the primary spawning area for Buckley Lake rainbow trout. Inlet streams appear to provide minor spawning habitat and rearing habitat for 0+ juvenile trout.

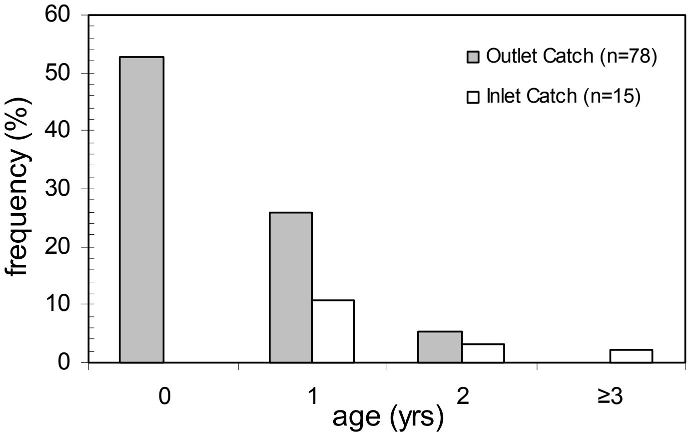

Figure 9: Age-frequency histogram (percent) for rainbow trout captured in Buckley Creek (outlet) and all inlet tributaries (pooled sample). Percentage values presented calculated using total catch from all tributary samples.

The outlet catch was dominated by rainbow trout less than 110mm, whereas rainbow over 140mm were present in lower abundances (Figure 10). Juvenile rainbow ages were clearly separated when superimposed on the outlet catch length frequency histogram (Figure 10). This indicates that either there is high over-wintering mortality of 0+ YOY rainbow trout or, the majority of the rainbow trout recruit to the lake following one year rearing in the outlet tributary. The gill net catch results presented in the next section indicate it is the latter rather than the former.

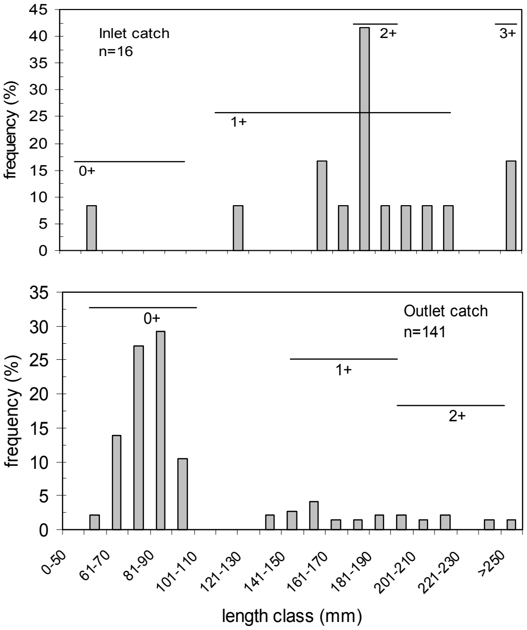

Figure 10: Length frequency histograms (mm) of rainbow trout captured in Buckley Creek (lake outlet) and inlet tributaries (combined). Age-at-length information is depicted by solid horizontal bars

The inlet catch was dominated by larger juvenile rainbow (>160mm), with YOY fry comprising a minor portion. Discrimination of age classes in the inlet streams was only possible for 0+ and 3+ fish, where fish aged at 1+ overlapped with 2+ (Figure 10). The high length variation of 1+ fish in the inlets could be due to pooled inlet fish data, where fish densities and growing conditions were likely variable between streams.

3.2.3.2 Length and Age Frequency: Lake Samples

Gill net catch results were dominated by 1+ and 2+ rainbow trout, whereas angling captured 3+ fish in the greatest proportion (Figure 11).

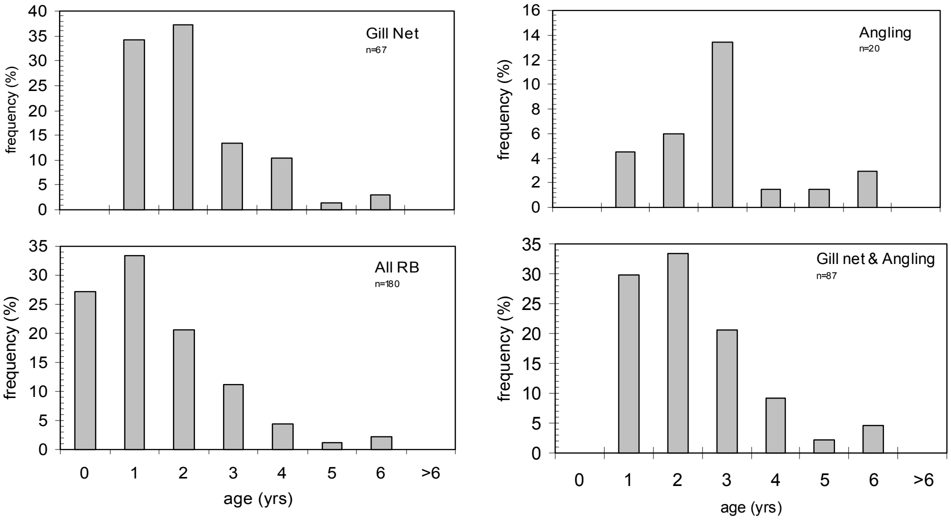

Figure 11: Age frequency histogram (percent) for rainbow trout (RB) captured in by gill net (n=67), angling (n=20), all rainbow trout captured (gillnet, angling, electro-fishing, lake and tributary sampling; n=180) and gill net and angling combined (n=87).

The length frequency plots for gill net and angling catch results indicate an apparent size selectivity of each method; where the gill net captured primarily short, young fish and angling long, old fish (Figures 11 & 12). The total catch (All RB), as well as, the gill net and angling catch combined length frequency results also provide an indication of the length and age at which survival decreases, which usually corresponds with age-at-maturity.

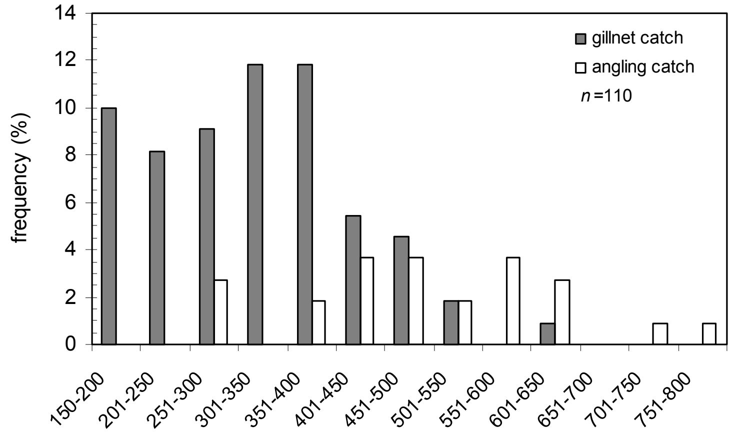

Figure 12: Length frequency histogram (mm) of rainbow trout captured by angling (white bars) and gill net (grey bars) in Buckley Lake, September 2003.

3.2.3.3 Biomass

Total biomass for the Buckley Lake rainbow trout catch, from all capture methods, was 95.6kg. Percent biomass (g) presented over length classes demonstrated that the greatest concentration of biomass was in fish greater than 350 mm with peak biomass occurring at the 601-650 mm length class (Figure 13). The initial peak at 350-400 mm class may be due to gill net selectivity for that particular size class of fish.

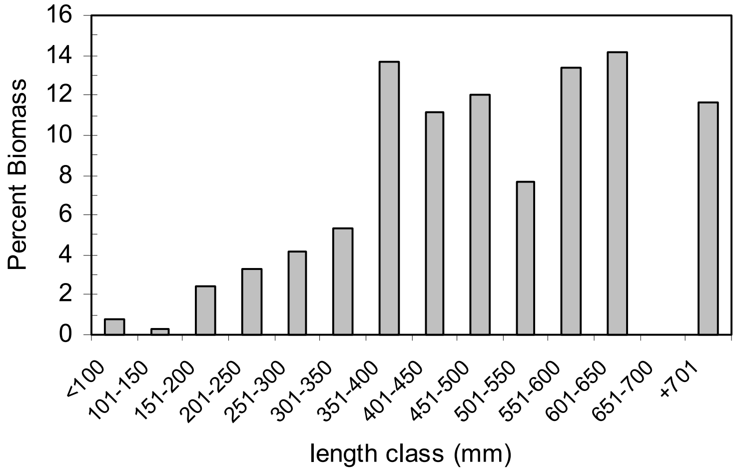

Figure 13: Percent biomass of rainbow trout by fork length classes (mm) captured from Buckley Lake, September 2003.

3.2.4 Rainbow Trout Mortality

Rainbow trout instantaneous mortality (*Z*) estimates were generated by applying Ricker's (1975) catch curve. Fishing mortality is expected to be a minimum component of the total mortality for Buckley Lake due to its remote location and low angler effort. Therefore, the observed estimate of *Z* may also represent natural mortality (*M*). Total catch (*Z*=0.56), gill net catch (*Z*=0.63) and gill net and angling catch combined (*Z*=0.52) generated similar mortality estimates (Figure 14). Gill net and angling combined represent mortality of fish susceptible to the fishery.

Mortality increases substantially with the onset of reproduction (≥ 2 yrs; Figure 14). Fish appear to spawn or ripen for spawning 1-3 times prior to death.

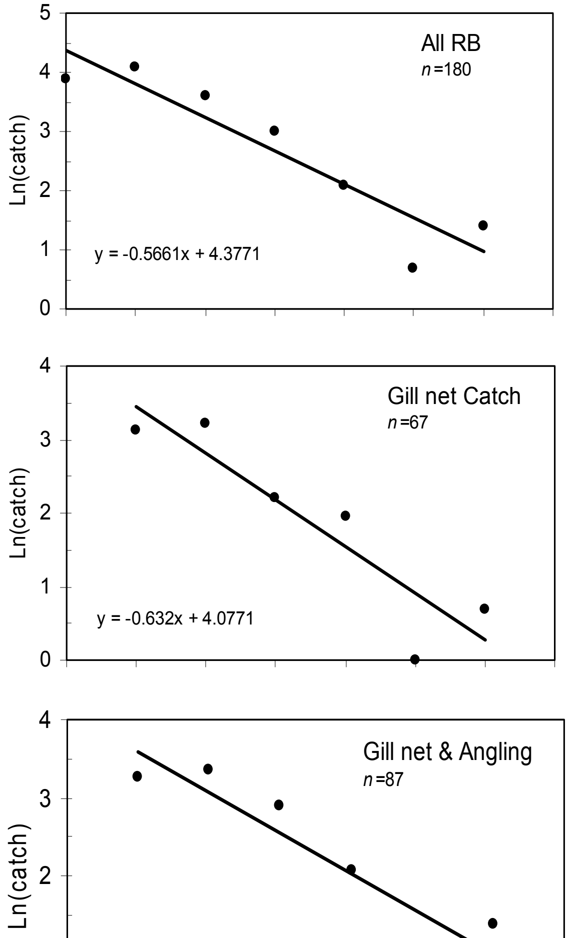

Figure 14: Natural log of rainbow trout catch *vs.* age for the total catch of rainbow trout (upper), gill net catch (middle) and angling and gill net catch combined (lower). Linear regression equation is presented for each, where slope (β) is an estimate of instantaneous mortality (Ricker 1975).

3.2.5 Rainbow Trout Maturity

Maturity assessments on fish captured proved to be difficult with many specimens examined. Examples of fish from all length classes demonstrated variable levels of gonadal development; however, fish between the 300-400 mm length-class represented the major category of inconsistencies in the interpretation or existence of gonadal development (Table 8). Also of note was the apparent lack of gonadal development for large fish (Plate 1). As a result, patterns on the age- or length-at-maturity are unclear, with the exception of: 1) immature fish were shorter and younger than other maturity classes; and, 2) spawn bound fish were longer and older than all other maturity classes (Figure 15; Table 8).

Table 8: Summary of maturity assessments resulting from internal examinations for rainbow trout captured at Buckley Lake, September, 2003. Results are presented by fork length (mm) and age (years) classes for condition factor (Fulton's K), mean, standard error (SE), median, minimum (min.) and maximum (max.).

			Length (mm)					Age				
Maturity Condition	n	Fulton's K	mean	SE	median	min.	max.	mean	SE	median	min.	max.
unknown	35	1.33	379.4	23.1	375	130	770	2.4	0.23	2	1	6
immature	192	1.28	132.9	6.1	88	56	470	0.7	0.07	1	0	4
maturing	18	1.33	406.1	25.7	375	275	645	2.8	0.22	3	2	5
mature	11	1.27	334.4	39.9	285	200	640	1.9	0.31	2	1	4
spawnbound	6	1.31	563.3	34.7	542.5	485	710	4.5	0.62	4.5	2	6
spent	0	--	--	--	--	--	--	--	--	--	--	--

Plate 1: Photograph of undeveloped gonads in a 770mm rainbow trout captured in Buckley Lake, September, 2004.

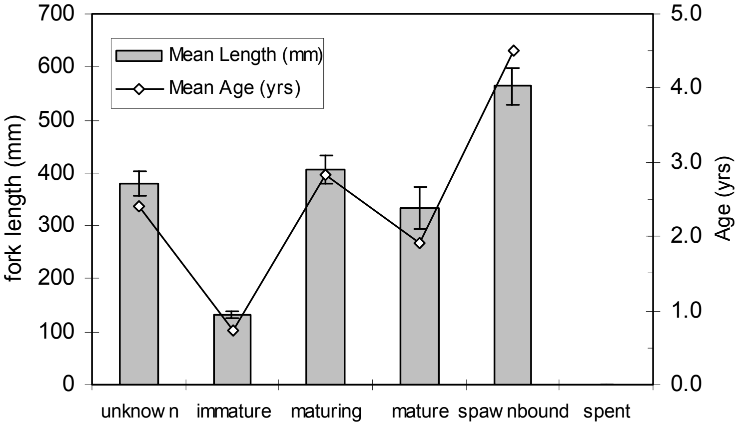

Figure 15: Mean fork length (columns with standard error bars) and mean age for maturity classes of rainbow trout captured at Buckley Lake, September, 2003.

Evidence of age at first spawning as interpreted from scale reading provides a view consistent with that found from internal fish examinations. Rainbow trout as young as 1+ (*n*=1) were identified as showing signs of stress consistent with maturity; however, the majority of scales with discernable past spawning checks were identified at ages two (*n*=7) and three (*n*=5). Two scale samples were interpreted as having the first spawning check at age four. Only one scale was identified as repeat spawning.

4.0 Discussion

At present, Buckley Lake provides a rare and exceptional fishing experience for anglers, with large (>50cm), healthy and abundant rainbow trout in a remote wilderness setting. Anecdotal evidence indicates that this fishery has existed for at least six years, but likely much longer. Without historical fisheries samples it is not possible to describe recent trends in the population structure. However, it is likely that the population has reached equilibrium and is producing the maximum number of adults given current habitat limitations. Fishing mortality (*F*) is also assumed to be very low. Based on the results of the field studies conducted to date, Buckley Lake appears to be a highly productive lake relative to other high-latitude lakes and appears to be limited by the availability of phosphorus (P). Fish production (*i.e.* fish abundance) is constrained by limited amounts of spawning habitat. The habitat assessment identifies that spawning habitat for the entire population was restricted to small sections of the lake outlet. The limited amount of spawning habitat appears to be a major factor influencing abundance of fish, their growth and mortality characteristics.

Forage for the rainbow population is varied in their early life history, but the larger maturing fish are very dependant on the freshwater shrimp population especially as fall approaches. The lakes' abundant shrimp population coupled with the limited juvenile recruitment to the lake creates a unique and rare population of rainbow trout for this area, characterized by rapid growth and large maximum size.

Freshwater shrimp appear to be widely available to fish based on fish stomach content analysis. Observations of high densities of moulted shrimp exoskeletons dispersed along the lakes leeward shoreline (Plate 2) and in the lake outlet slough's indicates an abundant population. Relatively high nitrogen levels stimulate growth of aquatic vegetation observed throughout the lake and may also encourage high levels of primary algal production events (algal blooms) that are reported to seasonally frequent Buckley Lake (D. Beaumont pers. comm., Sept. 2004). Both of these plant forms are favoured forage for shrimp (Newman, 2004) and act as a source of calcium, necessary for crustacean exoskeleton development. Elevated calcium concentrations and pH levels were present in the lake water quality results and are possibly related to geothermal influences and contributing to the high invertebrate abundances.

Plate 2: Photograph of freshwater shrimp (*Hyalella azetca* and/or *Gammerus lacustrus*) moulting casts (light brown) observed along the shore of Buckley Lake at the confluence of Tributary 2. Note aquarium dip net in foreground.

4.1 *Sustainable Angler Effort*

Based on the helicopter over flight and ground assessments, spawning and 0+ juvenile rearing habitat is limited to the first 1500 m of stream downstream of Buckley Lake. With an average wetted width of 7.4m over the same distance, 11,100m^2 of stream habitat is available. Field crews walked the lower 1000m of the channel and estimate between 5-10% of the channel was composed of substrates suitable for spawning. This estimate, although crude, results in 555m^2 – 1110m^2 of available spawning habitat. Using estimates of required area for rainbow trout (2.8m^2/pair), larger Gerrard rainbow trout (14m^2/pair) and steelhead trout (21.9m^2/pair), between 25 and 396 pairs of spawning fish may be accommodated in Buckley Creek (Table 9; Hartman 1969, Giroux and Witt 2000). Due to the larger size of the Buckley Lake rainbow trout, the spawning area requirements may be closer to estimates for Gerrard rainbow or steelhead, rather than rainbow trout. Therefore, a small proportion of mature rainbow trout appear to be able to utilize quality spawning habitat, while many mature trout are excluded. Under these conditions, the high occurrence of spawn bound fish observed in September is not surprising. The existence of limited spawning area is also corroborated by observations of high concentrations of "…large, *coloured* rainbow…" (Doug Beaumont, pers. comm., Sept. 2004) in the portion of the lake closest to the outlet, and what has been described as shore spawning behaviour. The latter rainbow trout are likely attempting to relieve the stress of spawning by any means available. Lake shore excavated redds would only be effective under very unique conditions of shore upwelling or at an inlet-lake confluence with adequate gravel composition (Scott & Crossman 1974). These conditions were not assessed in the field. However, should adequate conditions exist they would only likely contribute a marginal amount of recruitment.

Although limited for spawning, fry rearing habitat was considered excellent in the outlet stream and likely results in exceptionally high juvenile survivals and recruitment to the lake and fishery of 0+ and 1+ rainbow.

Table 9: Summary of available spawning habitat (m^2) and spawning pair estimates for Buckley Creek.

Species Race	Req'd Spawning Area/Pair (m^2)	Buckley Cr. Total Available Habitat (m^2)	Spawning Area (m^2) Estimate		Estimated No. of RB Pairs	
		(1,500m x 7.4m)	5%	10%	5%	10%
Rainbow ***	2.8	11,100	555	1110	198	396
Gerrard Rainbow +++	14	11,100	555	1110	40	79
Steelhead ***	21.9	11,100	555	1110	25	51

*** Giroux & Witt 2000, +++ Hartman 1969.

Cox and Walters (2002) modeled optimum fishing effort relative to maximum sustainable yield (MSY), as well as, relationships between effort and exploitation. Because Buckley Lake is assumed to have a low recruitment, Cox and Walters (2002) results for a low production system (*i.e.* low number of spawners/recruits $K = 3$) appear to be: 1) more biologically meaningful; and, 2) are more conservative. Optimum fishing effort levels were reported as 9.4 ±2.4 (± standard deviation) angler days/ha; expressed as total angler days for Buckley Lake (568 ha), 5,339 potential angler days (AD) may be expended to reach maximum yield and avoid stock declines, whereas the lower limit estimate places effort at 3,976 AD/yr. The lower estimate of potential angler days shall be used to account for uncertainty associated with applying generalized models (Sean Cox, pers. comm., Nov. 2004).

At present, the Buckley Lake fishery is presumed to be experiencing very low fishing mortalities (F) due to its remote location and subsequent low effort. Cox and Walters (2002) set maximum optimum F (F_{opt}) at 0.33 for low productivity lakes. To monitor F in the future, and assuming F will increase with an increase in effort, instantaneous mortality differences from future estimates compared to 2004 estimate may be useful (i.e. $Z_{2004} - Z_i = F$) given data are collected in a similar manner.

Considering the bathymetry and dissolved oxygen profile characteristics of Buckley Lake, the area of the lake where rainbow appear to be feeding and are therefore vulnerable to conventional angling gear may be reduced to the area above the 6 m contour (107 ha; Miller and Davidson, 1982) or the area above the thermocline (12m contour - 150 ha; estimated). Anecdotal information collected from Doug Beaumont and the Stikine Country Protected Areas Advisory Committee members indicates that much of the June and July angling effort is focused on the littoral habitat located in the western basin and the bay near the outlet in particular. A fishery focused on congregating fish, especially aggressive ripe, spawnbound or kelts increases their vulnerability to anglers.

Therefore, catchability rates for Buckley Lake rainbow may exceed those observed by Cox & Walters (2002) during the peak of the fishery effort, and may make the population more vulnerable to over exploitation if general optimum levels are applied over the entire lake surface. Reducing vulnerability to over-harvest can be addressed through a number of options, including angling regulations that reduce angler efficiency (e.g. area closures, gear or boat restrictions) or by adjusting optimal effort (E_{opt}) to reflect the area of the lake utilized by fish and anglers.

Assuming the littoral area of the lake (i.e. the area above the 6 m contour; 107 ha) is the area in which fish are vulnerable, an optimum effort level of 392 angler days (AD)/year results. The E_{opt} increases to 650 AD/yr expanding the vulnerable area to the 12 m contour. Completion of a creel survey, with a spatial analysis component should be conducted, especially during the spawning period, to substantiate the claims of a localized fishery prior to acceptance of this highly conservative approach.

4.2 *Rainbow Trout Catch and Release Mortality*

Numerous anecdotal reports have been received by Skeena Region Protected Areas staff that rainbow trout angled in Buckley Lake during July and August were difficult to revive following capture and release, and in many cases were suffering immediate post angling release mortality. These reports were confirmed by observations made by the local Conservation Officer in Dease Lake (Dale Ryan, pers. comm. Aug. 2004) in July of 2004. Beyond internal examinations of rainbow trout conducted by the COS and Regional Fisheries staff indicating a lack of parasite infestations, there is very little physical data available from the time of noted mortalities to assist in determining what the contributing factors are. Therefore, discussion on the possible causes for the observed mortalities must be limited to speculation and literature review.

High water temperatures and associated reduced oxygen levels common during prolonged hot and calm summer weather, combined with an physiological stresses associated with angled fatigued fish and the possibility of algal blooms in the uppermost surface waters of Buckley Lake appear to be the most likely contributors to the observed rainbow trout mortalities. Buckley Lake is eutrophic; with conditions characterized by the clear separation of upper layers of warmer, oxygenated water (epilimnetic) from cooler, anoxic water conditions in the hypolimnion at the thermocline during the warm, open water season (Wetzel 1975). Rainbow trout mortality following angling was not noted in Buckley Lake during the early September sampling in 2004. At that time, water temperatures were 14 ^{o}C at the surface and dissolved oxygen was a uniform 10.5 mg/l from the surface to the thermocline at 12 m deep (Figure 3); conditions well below the upper maximum temperature (21 ^{o}C) and above dissolved oxygen (2 mg/l will cause death) thresholds for rainbow trout (from, Deas and Orlob, 1999). It is possible that the uppermost layers of Buckley Lake could approach, or exceed the upper temperature threshold during extended clear, hot, calm, high pressure summer conditions. In controlled laboratory experiments, Atlantic salmon (*Salmo salar*) suffered post angling and exercise mortalities as high as 40-60% respectively when exposed to temperatures as high as 23 ^{o}C during and after exercise (Wilkie et al. 1996, Wilkie et al. 1997). Mortality of post-exercised Atlantic salmon was also shown to be positively correlated with water softness (Kieffer et. al 2001); that is, as water hardness increased, post recovery rates were shorter and survival rates increased. Buckley Lake's water hardness is lies between Kieffer et al.'s (2001) 40% - 0 % mortality class. Wydoski et al. (1976) also noted lower recovery times and greater stress for larger rainbow trout following exposure to five minutes of hooking stress. Combined with these factors, fish handling techniques can also have a serious negative effect on post-angled recovery and survival.

Ferguson and Tufts (1992) demonstrated that rainbow trout exposed to air (i.e. removal of the fish from the water) following exercise for a 30 second period, such as for a photo or examination, increased post angling mortality rates by 26%, and as high as 60% for periods of one minute above the control (12% mortality rate of fish exercise and not removed form the water). Therefore, without mixing action of the lakes upper layers by wind and wave action, temperature levels may become elevated due to aforementioned weather conditions. Angled fish will generate what could be described as a physiological debt due to struggling to avoid capture with larger fish, taking longer to land, create a greater debt and are slower to recover. Buckley Lakes water hardness although not low, is not optimal for fish recovery making rapid movement of angled fish from the deep cooler water to the warm surface appears to create difficult if not impossible conditions for revival of some fish.

Concomitant with high water temperatures, seasonal blue-green algal blooms, a toxin to fish, may exist in concentrations capable of causing fish mortality. This situation could be exacerbated during periods of little surface water mixing common in hot, calm weather conditions. Extreme algal blooms may also be contributing to reduced oxygen levels at the surface of the lake during periods of darkness and early morning hours due to reduced photosynthesis. This process may be more extreme during the fall season, when BOD levels are expected to be higher while photosynthesis is reduced by shorter daylight periods.

The increased physiological stress imposed on the angled rainbow trout following capture, combined with high surface water temperature, reduced oxygen levels and the possibility of blue green algae contamination appear to be the most plausible causes for the observed angler induced mortality of rainbow trout. At present angling effort levels and estimates of instantaneous mortality (Z=0.52), there does not appear to be a necessity to intervene with special angling regulations to avoid excessive catch and release mortalities. Angler education combined with a monitoring program will assist in reducing unnecessary mortalities and understanding the processes and environmental conditions that are causing the observed fish mortalities. Recommendations to address the latter issues are presented in Section 5 of this report.

5.0 Recommendations

5.1 Fishery Management

Presently, the Skeena Region Protected Areas Section is limiting angler effort by restricting angling guide activities and limiting float plane access through park-use permit conditions (Larry Boudreau, pers. comm., June 2004). Increasing plane landings and providing allocations of guided angler days to guides along with accommodation facilities may be considered in the future. Therefore, biologically sustainable exploitation limits for the fishery are required.

Assuming Buckley Lake's current rainbow trout recruitment rate, growth and lake productivity conditions are maintained, the rainbow trout fishery appears to be able to theoretically support a greater amount of exploitation relative to suspected current levels while maintaining attributes of a high quality fishery (i.e. high CUE of >50cm RB). However, establishing a precise estimate of the amount of sustainable exploitation is not possible given the available data. Collection of the data necessary to determine the latter is not cost effective considering current levels of use. Therefore, application of theoretical models predicting rainbow trout angling effort and sustainable exploitation will allow the establishment of a base exploitation rate, which can be subsequently monitored to determine population response to the fishery. The base exploitation rate must conform with the general management direction for aquatic ecosystems within the Stikine Country Protected Areas Management Plan (BC WLAP 2003) of: 1) ensuring the natural functioning of fish populations; and 2) to provide a range of recreation angling opportunities that has low impacts on fish populations. Therefore, harvest and fishing mortality should be managed well below estimates of maximum sustainable yields. To achieve this, the following guidelines and actions are recommended.

5.1.1 Fishery Exploitation

- In order to comply with general management direction for the Stikine Country Protected Areas Management Plan (see above Section 5.1) and account for uncertainties associated with utilization of the general theoretical optimal effort model (Cox & Walters 2002), a 50% reduction of the theoretical optimal effort from 4000 to 2000 angler days/yr should be adopted as the upper exploitation limit; a more conservative limit of 650 AD/yr may be adopted should creel survey data indicate angler spatial bias (i.e. only angle 100 ha of lake area) and increased fish vulnerability due to spawning activity or spawnbound fish exists.

5.1.2 Fishery Monitoring & Evaluation

- A ground based roving and exit (camp) creel survey designed by the Skeena Region Fish and Wildlife Science and Allocation staff and completed over the open water angling season (late May – early Sept) should be completed to determine:

    - angler effort (expressed as angler days/ha)
    - angler catch rate
    - fork length of rainbow in catch
    - fork length and age of harvested rainbow
    - gear type(s)
    - angler demographics from provincial angling licence (age, origin, gender)
    - angler perceptions of the fishery, wilderness experience
    - angling methods
    - spatial and temporal distribution of anglers
    - condition of fish angled (e.g. maturity, mortalities, etc.)
    - compliance of 1) anglers with regulations; and, 2) commercial permit holders
    - temporal surface water quality trends (temperature, DO, Secchi depth, chlorophyll a - algae concentrations)

- Failure in the ability to implement a creel survey as described above, Park Use Permits (PUP) issued for Buckley Lake access should include the following:

    - a log is to be kept by pilots, guides and/or visitors to the lake with the following recorded and submitted to Protected Areas Staff at the end of the permit period or visit: 1) dates angled; 2) hrs/day angled; 3) no. of RB captured; 4) max. length (fork length) of the days catch; and 5) number, and lengths of fish harvested.
    - Log books including instructions and data forms should be produced in cooperation with Protected Areas and Fish & Wildlife Science and Allocation Staff and distributed to PUP holders and visitors by Skeena Region, Protected Areas Section.
    - Skeena Region, Protected Areas Section should ensure compliance with data quality, capture and collection.
    - Skeena Region Fish and Wildlife, Science and Allocation Section (F&W) should provide assistance in the development of the log book data management & analysis.
    - Trends in angler effort (rod days), catch per unit effort (CUE), maximum catch length and harvest rates should be monitored and summarized annually. Analysis and evaluation will be completed every 5 years. Recommendations for adjustments to angling regulations, effort and harvest should follow each 5-year review. Significant changes observed in the fishery may require additional field sampling.

- To examine the relationship between water quality and post angling mortality, it is recommended that water temperatures are continuously monitored at various depths throughout a season, data temperature loggers (Stowaway® TidBits) should be deployed at 0.5 m, 5 m and 10 m depths each year the camp is opened and removed at the seasons end in October. Loggers could be attached to anchored and labelled Scotchman type floats and suspended at the required depths. Logger anchor lines would be deployed in the center of the lake (*i.e.* deep hole), and at the 18 m and 6 m contour (6 m deep line would not have a 10 m logger) of the western portion of the basin to determine spatial variation in water temperature. Angler reports of post angled fish mortality from either the creel or log book process will be correlated to recorded water temperatures.

- Buckley Creek and Buckley Lake should also be sampled by MWLAP Fisheries staff during late May –to- early June to determine:

    - spatial distribution of spawning rainbow trout in Buckley Creek, and other inlet streams with potential spawning habitat (e.g. inlet # 3);
    - estimate of abundance (e.g. counts) of spawning rainbow trout in Buckley Creek, as well as, inlets;
    - existence and extent of reported shore spawning behaviour; and,
    - length and age distribution by gender of spawning rainbow trout.

- The estimate of *F(opt)* used in this report could be refined to accurately describe the Buckley Lake rainbow trout population through the determination of actual recruitment and survival estimates by way of collecting detailed juvenile densities in the streams known to produce rainbow fry.

5.1.3 Education

- An information pamphlet and camp site notice board shall be produced to accompany the monitoring log book. The following are suggestions for content:

    - Goals, objectives and justification for the Bulkley Lake fishery management and monitoring plan;
    - Notification and instructions pertaining to sampling activities (i.e. water temperature data loggers, co-operation with creel technicians);
    - ethical catch and release practices including specific references to angler induced mortality due to hooking injury and water quality issues (e.g. water temperature & oxygen thresholds, sensitivities to algal blooms); indications of fish stress;
    - Buckley Lake regulations summary; and,
    - Bear Aware information specific to fish cleaning.

- A floating aquatic thermometer could be attached to the dock at the Parks campsite and each Scotchman buoys during the open water season to allow anglers to monitor water temperatures and avoid angling during high temperature periods.

5.1.4 Regulation Changes

- In an effort to protect spawning rainbow trout and maintain simplified angling regulations, Buckley Creek upstream of the falls should be closed to angling.
- Spatial and/or temporal closures within the lake should only be considered following completion and review of a creel survey.
- Current daily quota of 2/day and none over 50 cm with single barbless hooks only, bait ban and closed to angling between Nov. 1 – April 30, should be maintained.

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Appendix I: Stream Habitat Photographs

Plate 3: Buckley Creek outlet tributary, Reach 1. Note dead conifer stands.

Plate 4: Buckley Creek Reach 1. Note relic beaver dams near center of photograph.

Plate 5: Buckley Creek reach break between Reaches 1 and 2.

Plate 6: Buckley Creek reach break between Reaches 2 and 3. Note tributary entering from wetland complex on the right.

Plate 7: Buckley Creek, Reach 3. This sample site was assessed to be the most productive spawning and fluvial rearing habitat sampled during the lake survey.

Plate 8: Buckley Creek, Reach 3. Example of high value rainbow trout spawning and rearing habitat.

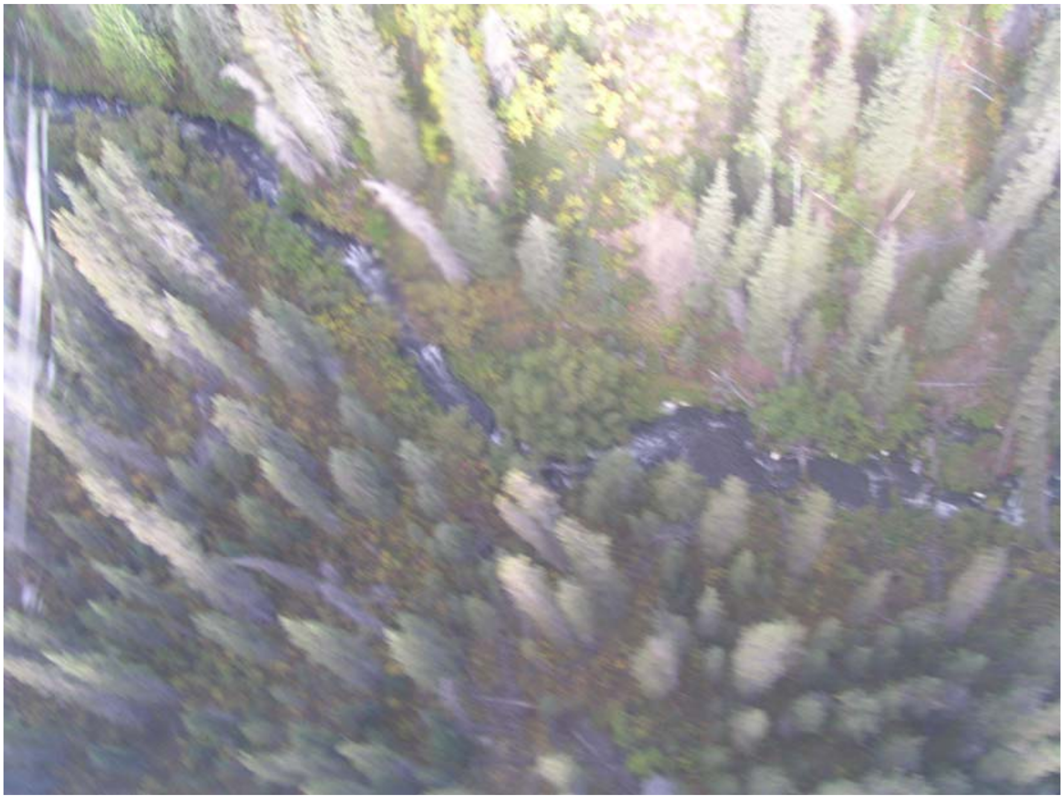

Plate 9: Buckley Creek, Reach 4. Moderate to high gradient section of stream where limited spawning and rearing habitat observed.

Plate 10: Buckley Creek, Reach 5. Note confined channel that were lower amount of spawning and rearing habitat was observed.

Plate 11: Buckley Creek reach break between Reaches 5 and 6. Note columnar basalt geological formation.

Plate 12: Inlet Tributary 2, Reach 1. Limited spawning and moderate rearing habitat created by dense willow growth and undercut banks.

Plate 13: Unnamed lake at outlet to Tributary 3.

Plate 14: Tributary 3 confluence with Buckley Lake. Note gravel riffle potentially suitable for spawning at low and moderate lake water levels.

Plate 15: Tributary 3, Reach 2. This reach had very high quality rearing habitat for juvenile rainbow trout.

Plate 16: Tributary 5, Reach 1. Low gradient wetland section not typical of high quality rearing habitats typically utilized by rainbow trout.

Appendix II: Fish Sampling Data

	OfficialName	Site Numbe	UTMZone	UTMEastin	UTMNorthir	Site_Crew	Fish_Speci	Length (mn	Weight (g)	Fish_Sex	Fish_Matur
1	Buckley Lake	1	9	639764	6422041	JL/PG	RB	56		U	IM
2	Buckley Lake	1	9	639764	6422041	JL/PG	RB	60		U	IM
3	Buckley Lake	1	9	639764	6422041	JL/PG	RB	64	3.2	U	IM
4	Buckley Lake	1	9	639764	6422041	JL/PG	RB	64	3.2	U	IM
5	Buckley Lake	1	9	639764	6422041	JL/PG	RB	64		U	IM
6	Buckley Lake	1	9	639764	6422041	JL/PG	RB	64		U	IM
7	Buckley Lake	1	9	639764	6422041	JL/PG	RB	64		U	IM
8	Buckley Lake	1	9	639764	6422041	JL/PG	RB	65		U	IM
9	Buckley Lake	1	9	639764	6422041	JL/PG	RB	67	4	U	IM
10	Buckley Lake	1	9	639764	6422041	JL/PG	RB	67		U	IM
11	Buckley Lake	1	9	639764	6422041	JL/PG	RB	68	3.5	U	IM
12	Buckley Lake	1	9	639764	6422041	JL/PG	RB	68	3.3	U	IM
13	Buckley Lake	1	9	639764	6422041	JL/PG	RB	68		U	IM
14	Buckley Lake	1	9	639764	6422041	JL/PG	RB	68		U	IM
15	Buckley Lake	1	9	639764	6422041	JL/PG	RB	69	4.1	U	IM
16	Buckley Lake	1	9	639764	6422041	JL/PG	RB	69	3.4	U	IM
17	Buckley Lake	1	9	639764	6422041	JL/PG	RB	69		U	IM
18	Buckley Lake	1	9	639764	6422041	JL/PG	RB	69		U	IM
19	Buckley Lake	1	9	639764	6422041	JL/PG	RB	69		U	IM
20	Buckley Lake	1	9	639764	6422041	JL/PG	RB	69		U	IM
21	Buckley Lake	1	9	639764	6422041	JL/PG	RB	72	5	U	IM
22	Buckley Lake	1	9	639764	6422041	JL/PG	RB	73		U	IM
23	Buckley Lake	1	9	639764	6422041	JL/PG	RB	74	5.7	U	IM
24	Buckley Lake	1	9	639764	6422041	JL/PG	RB	74	5.7	U	IM
25	Buckley Lake	1	9	639764	6422041	JL/PG	RB	74	4	U	IM
26	Buckley Lake	1	9	639764	6422041	JL/PG	RB	74		U	IM
27	Buckley Lake	1	9	639764	6422041	JL/PG	RB	74		U	IM
28	Buckley Lake	1	9	639764	6422041	JL/PG	RB	74		U	IM
29	Buckley Lake	1	9	639764	6422041	JL/PG	RB	74		U	IM
30	Buckley Lake	1	9	639764	6422041	JL/PG	RB	75	5.9	U	IM
31	Buckley Lake	1	9	639764	6422041	JL/PG	RB	75		U	IM
32	Buckley Lake	1	9	639764	6422041	JL/PG	RB	76	4.8	U	IM
33	Buckley Lake	1	9	639764	6422041	JL/PG	RB	76		U	IM
34	Buckley Lake	1	9	639764	6422041	JL/PG	RB	76		U	IM
35	Buckley Lake	1	9	639764	6422041	JL/PG	RB	77	5.2	U	IM
36	Buckley Lake	1	9	639764	6422041	JL/PG	RB	77	4.7	U	IM
37	Buckley Lake	1	9	639764	6422041	JL/PG	RB	77		U	IM
38	Buckley Lake	1	9	639764	6422041	JL/PG	RB	77		U	IM
39	Buckley Lake	1	9	639764	6422041	JL/PG	RB	77		U	IM
40	Buckley Lake	1	9	639764	6422041	JL/PG	RB	77		U	IM
41	Buckley Lake	1	9	639764	6422041	JL/PG	RB	77		U	IM
42	Buckley Lake	1	9	639764	6422041	JL/PG	RB	78		U	IM
43	Buckley Lake	1	9	639764	6422041	JL/PG	RB	78		U	IM
44	Buckley Lake	1	9	639764	6422041	JL/PG	RB	78		U	IM
45	Buckley Lake	1	9	639764	6422041	JL/PG	RB	79	6.5	U	IM
46	Buckley Lake	1	9	639764	6422041	JL/PG	RB	79	5.6	U	IM
47	Buckley Lake	1	9	639764	6422041	JL/PG	RB	79		U	IM
48	Buckley Lake	1	9	639764	6422041	JL/PG	RB	80	7	U	IM
49	Buckley Lake	1	9	639764	6422041	JL/PG	RB	80	5.5	U	IM
50	Buckley Lake	1	9	639764	6422041	JL/PG	RB	80	6.1	U	IM
51	Buckley Lake	1	9	639764	6422041	JL/PG	RB	80		U	IM
52	Buckley Lake	1	9	639764	6422041	JL/PG	RB	80		U	IM
53	Buckley Lake	1	9	639764	6422041	JL/PG	RB	80		U	IM
54	Buckley Lake	1	9	639764	6422041	JL/PG	RB	80		U	IM
55	Buckley Lake	1	9	639764	6422041	JL/PG	RB	80		U	IM
56	Buckley Lake	1	9	639764	6422041	JL/PG	RB	80		U	IM
57	Buckley Lake	1	9	639764	6422041	JL/PG	RB	81	6.3	U	IM
58	Buckley Lake	1	9	639764	6422041	JL/PG	RB	81		U	IM
59	Buckley Lake	1	9	639764	6422041	JL/PG	RB	81		U	IM
60	Buckley Lake	1	9	639764	6422041	JL/PG	RB	81		U	IM
61	Buckley Lake	1	9	639764	6422041	JL/PG	RB	82	5.6	U	IM
62	Buckley Lake	1	9	639764	6422041	JL/PG	RB	82	6.4	U	IM
63	Buckley Lake	1	9	639764	6422041	JL/PG	RB	82		U	IM
64	Buckley Lake	1	9	639764	6422041	JL/PG	RB	82		U	IM
65	Buckley Lake	1	9	639764	6422041	JL/PG	RB	83	7.5	U	IM
66	Buckley Lake	1	9	639764	6422041	JL/PG	RB	83	9.1	U	IM
67	Buckley Lake	1	9	639764	6422041	JL/PG	RB	83		U	IM

68	Buckley Lake	1	9	639764	6422041	JL/PG	RB	83		U	IM
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70	Buckley Lake	1	9	639764	6422041	JL/PG	RB	84		U	IM
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72	Buckley Lake	1	9	639764	6422041	JL/PG	RB	84		U	IM
73	Buckley Lake	1	9	639764	6422041	JL/PG	RB	84		U	IM
74	Buckley Lake	1	9	639764	6422041	JL/PG	RB	85	6.7	U	IM
75	Buckley Lake	1	9	639764	6422041	JL/PG	RB	85	7.3	U	IM
76	Buckley Lake	1	9	639764	6422041	JL/PG	RB	85		U	IM
77	Buckley Lake	1	9	639764	6422041	JL/PG	RB	86	6.4	U	IM
78	Buckley Lake	1	9	639764	6422041	JL/PG	RB	86	7.5	U	IM
79	Buckley Lake	1	9	639764	6422041	JL/PG	RB	86		U	IM
80	Buckley Lake	1	9	639764	6422041	JL/PG	RB	86		U	IM
81	Buckley Lake	1	9	639764	6422041	JL/PG	RB	86		U	IM
82	Buckley Lake	1	9	639764	6422041	JL/PG	RB	87	6.9	U	IM
83	Buckley Lake	1	9	639764	6422041	JL/PG	RB	87	7.8	U	IM
84	Buckley Lake	1	9	639764	6422041	JL/PG	RB	87	6.5	U	IM
85	Buckley Lake	1	9	639764	6422041	JL/PG	RB	87		U	IM
86	Buckley Lake	1	9	639764	6422041	JL/PG	RB	88	8.3	U	IM
87	Buckley Lake	1	9	639764	6422041	JL/PG	RB	88	7.5	U	IM
88	Buckley Lake	1	9	639764	6422041	JL/PG	RB	88	7.3	U	IM
89	Buckley Lake	1	9	639764	6422041	JL/PG	RB	88	7.7	U	IM
90	Buckley Lake	1	9	639764	6422041	JL/PG	RB	88		U	IM
91	Buckley Lake	1	9	639764	6422041	JL/PG	RB	88		U	IM
92	Buckley Lake	1	9	639764	6422041	JL/PG	RB	88		U	IM
93	Buckley Lake	1	9	639764	6422041	JL/PG	RB	89	7.3	U	IM
94	Buckley Lake	1	9	639764	6422041	JL/PG	RB	89		U	IM
95	Buckley Lake	1	9	639764	6422041	JL/PG	RB	90		U	IM
96	Buckley Lake	1	9	639764	6422041	JL/PG	RB	90		U	IM
97	Buckley Lake	1	9	639764	6422041	JL/PG	RB	90		U	IM
98	Buckley Lake	1	9	639764	6422041	JL/PG	RB	91	8.3	U	IM
99	Buckley Lake	1	9	639764	6422041	JL/PG	RB	91		U	IM
100	Buckley Lake	1	9	639764	6422041	JL/PG	RB	91		U	IM
101	Buckley Lake	1	9	639764	6422041	JL/PG	RB	92	8.8	U	IM
102	Buckley Lake	1	9	639764	6422041	JL/PG	RB	92		U	IM
103	Buckley Lake	1	9	639764	6422041	JL/PG	RB	92		U	IM
104	Buckley Lake	1	9	639764	6422041	JL/PG	RB	92		U	IM
105	Buckley Lake	1	9	639764	6422041	JL/PG	RB	93	9.2	U	IM
106	Buckley Lake	1	9	639764	6422041	JL/PG	RB	93		U	IM
107	Buckley Lake	1	9	639764	6422041	JL/PG	RB	93		U	IM
108	Buckley Lake	1	9	639764	6422041	JL/PG	RB	94	9	U	IM
109	Buckley Lake	1	9	639764	6422041	JL/PG	RB	96	10.1	U	IM
110	Buckley Lake	1	9	639764	6422041	JL/PG	RB	99	10.8	U	IM
111	Buckley Lake	1	9	639764	6422041	JL/PG	RB	100		U	IM
112	Buckley Lake	1	9	639764	6422041	JL/PG	RB	135	48	U	IM
113	Buckley Lake	1	9	639764	6422041	JL/PG	RB	137	30.3	U	IM
114	Buckley Lake	1	9	639764	6422041	JL/PG	RB	143	42	U	IM
115	Buckley Lake	1	9	639764	6422041	JL/PG	RB	196		U	IM
116	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	165		U	U
117	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	170		U	U
118	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	175		U	U
119	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	180		U	U
120	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	255		U	U
121	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	280		U	U
122	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	335		U	U
123	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	340		U	U
124	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	350		U	U
125	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	360		U	U
126	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	370		U	U
127	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	375		U	U
128	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	380		U	U
129	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	405		U	U
130	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	410		U	U
131	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	430		M	U
132	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	430		F	U
133	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	465		M	U
134	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	475		M	U
135	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	500		F	U

136	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	485	1400	M	SB
137	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	490	1800	M	SB
138	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	535	2000	M	SB
139	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	550	2400	M	SB
140	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	610	2860	F	SB
141	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	275	290	M	MT
142	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	280	285	M	MT
143	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	295	390	M	MT
144	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	330	455	F	MT
145	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	330	455	M	MT
146	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	340	570	M	MT
147	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	350	570	M	MT
148	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	350	500	M	MT
149	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	360	560	M	MT
150	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	390	770	M	MT
151	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	390	770	M	MT
152	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	395	820	F	MT
153	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	430	1100	F	MT
154	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	200	90	M	M
155	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	230	185	M	M
156	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	253	205	M	M
157	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	260	210	M	M
158	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	265	235	M	M
159	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	285	285	M	M
160	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	325	400	M	M
161	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	385	690	M	M
162	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	33.5	490	F	IM
163	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	35	600	F	IM
164	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	150	40	U	IM
165	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	165	55	F	IM
166	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	180	65	U	IM
167	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	190	75	F	IM
168	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	200	105	F	IM
169	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	200	95	U	IM
170	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	205	110	M	IM
171	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	215	105	F	IM
172	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	220	125	U	IM
173	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	225	135	F	IM
174	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	230	145	F	IM
175	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	235	170	F	IM
176	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	240	170	U	IM
177	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	250	190	F	IM
178	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	280	265	F	IM
179	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	305	375	F	IM
180	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	305	360	M	IM
181	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	360	590	F	IM
182	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	395	730	F	IM
183	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	395	680	U	IM
184	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	400	700	F	IM
185	Buckley Lake	2	9	396788	6420440	JL/FG/DA/MB	RB	420	1000	F	IM
186	Buckley Lake	3				JL/PG	RB	130	25	U	U
187	Buckley Lake	4				JL/PG	RB	330	400	U	U
188	Buckley Lake	4				JL/PG	RB	362	575	U	U
189	Buckley Lake	4				JL/PG	RB	56		U	IM
190	Buckley Lake	4				JL/PG	RB	164	55	U	IM
191	Buckley Lake	4				JL/PG	RB	169	75	U	IM
192	Buckley Lake	4				JL/PG	RB	174	70	U	IM
193	Buckley Lake	4				JL/PG	RB	186	105	U	IM
194	Buckley Lake	4				JL/PG	RB	188	90	U	IM
195	Buckley Lake	4				JL/PG	RB	189	115	U	IM
196	Buckley Lake	4				JL/PG	RB	190	110	U	IM
197	Buckley Lake	4				JL/PG	RB	190	110	U	IM
198	Buckley Lake	4				JL/PG	RB	194	110	U	IM
199	Buckley Lake	4				JL/PG	RB	201	150	U	IM
200	Buckley Lake	4				JL/PG	RB	216	180	U	IM
201	Buckley Lake	4				JL/PG	RB	225	190	U	IM
202	Buckley Lake	5				JL/PG/MB/FG/DA	RB	395		F	U
203	Buckley Lake	5				JL/PG/MB/FG/DA	RB	590	2520	F	MT

204	Buckley Lake	5				JL/PG/MB/FG/DA	RB	445	1000	M	IM
205	Buckley Lake	5				JL/PG/MB/FG/DA	RB	470		F	IM
206	Buckley Lake	6				JL/PG/MB/FG/DA	RB	260	300	U	U
207	Buckley Lake	6				JL/PG/MB/FG/DA	RB	460	1500	F	U
208	Buckley Lake	6				JL/PG/MB/FG/DA	RB	575	2750	U	U
209	Buckley Lake	6				JL/PG/MB/FG/DA	RB	592	2500	M	U
210	Buckley Lake	6				JL/PG/MB/FG/DA	RB	490	1700	F	MT
211	Buckley Lake	6				JL/PG/MB/FG/DA	RB	560	2400	F	MT
212	Buckley Lake	6				JL/PG/MB/FG/DA	RB	645	3750	F	MT
213	Buckley Lake	6				JL/PG/MB/FG/DA	RB	265	230	F	IM
214	Buckley Lake	6				JL/PG/MB/FG/DA	RB	415			
215	Buckley Lake	7				JL/PG/MB/FG/DA	RB	710	3850	M	SB
216	Buckley Lake	8				JL/PG/MB/FG/DA	RB	295		U	U
217	Buckley Lake	8				JL/PG/MB/FG/DA	RB	370		U	U
218	Buckley Lake	8				JL/PG/MB/FG/DA	RB	405		M	U
219	Buckley Lake	8				JL/PG/MB/FG/DA	RB	405		M	U
220	Buckley Lake	8				JL/PG/MB/FG/DA	RB	460		U	U
221	Buckley Lake	8				JL/PG/MB/FG/DA	RB	620		U	U
222	Buckley Lake	8				JL/PG/MB/FG/DA	RB	770	6000	U	U
223	Buckley Lake	8				JL/PG/MB/FG/DA	RB	510		M	MT
224	Buckley Lake	8				JL/PG/MB/FG/DA	RB	510		F	M
225	Buckley Lake	8				JL/PG/MB/FG/DA	RB	640		F	M
226	Buckley Lake	10				JL/PG/DA	RB	325	490	M	M
227	Buckley Lake	10				JL/PG/DA	RB	60	3.7	U	IM
228	Buckley Lake	10				JL/PG/DA	RB	63	2.6	U	IM
229	Buckley Lake	10				JL/PG/DA	RB	68	3.4	U	IM
230	Buckley Lake	10				JL/PG/DA	RB	137	29	U	IM
231	Buckley Lake	10				JL/PG/DA	RB	141	35	U	IM
232	Buckley Lake	10				JL/PG/DA	RB	144	40	U	IM
233	Buckley Lake	10				JL/PG/DA	RB	152	48	U	IM
234	Buckley Lake	10				JL/PG/DA	RB	156	43	U	IM
235	Buckley Lake	10				JL/PG/DA	RB	157	54	U	IM
236	Buckley Lake	10				JL/PG/DA	RB	158	55	U	IM
237	Buckley Lake	10				JL/PG/DA	RB	159	55	U	IM
238	Buckley Lake	10				JL/PG/DA	RB	169	59	U	IM
239	Buckley Lake	10				JL/PG/DA	RB	177	74	U	IM
240	Buckley Lake	10				JL/PG/DA	RB	182	80	U	IM
241	Buckley Lake	10				JL/PG/DA	RB	188	90	U	IM
242	Buckley Lake	10				JL/PG/DA	RB	195	95	U	IM
243	Buckley Lake	10				JL/PG/DA	RB	196	95	U	IM
244	Buckley Lake	10				JL/PG/DA	RB	205	110	U	IM
245	Buckley Lake	10				JL/PG/DA	RB	207	135	U	IM
246	Buckley Lake	10				JL/PG/DA	RB	219	145	U	IM
247	Buckley Lake	10				JL/PG/DA	RB	234	168	U	IM
248	Buckley Lake	10				JL/PG/DA	RB	235	175	U	IM
249	Buckley Lake	10				JL/PG/DA	RB	241	195	U	IM
250	Buckley Lake	10				JL/PG/DA	RB	244	205	U	IM
251	Buckley Lake	10				JL/PG/DA	RB	293	355	U	IM
252	Buckley Lake	12	9	397263	6421306	JL/PG	RB	74	5.9	U	IM
253	Buckley Lake	12	9	397263	6421306	JL/PG	RB	74	5.3	U	IM
254	Buckley Lake	12	9	397263	6421306	JL/PG	RB	75	5.5	U	IM
255	Buckley Lake	12	9	397263	6421306	JL/PG	RB	90	9.9	U	IM
256	Buckley Lake	12	9	397263	6421306	JL/PG	RB	91	12.7	U	IM
257	Buckley Lake	12	9	397263	6421306	JL/PG	RB	150		U	IM
258	Buckley Lake	12	9	397263	6421306	JL/PG	RB	155	44.3	U	IM
259	Buckley Lake	12	9	397263	6421306	JL/PG	RB	161	60	U	IM
260	Buckley Lake	12	9	397263	6421306	JL/PG	RB	179		U	IM
261	Buckley Lake	12	9	397263	6421306	JL/PG	RB	185		U	IM
262	Buckley Lake	12	9	397263	6421306	JL/PG	RB	212		U	IM
263	Buckley Lake	12	9	397263	6421306	JL/PG	RB	215		U	IM

rity	Fish_Age	Age Structu	Age Sampl	Samp_StartDa	Samp_StartTin	Samp_EndDate	Samp_EndTi	NetType	Net_Lengtl	Samp_Dep
1				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
2				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
3	0	SC	114	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
4	0	SC	174	10/09/2003	00/01/1900	10/09/2003			2	1.5
5				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
6				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
7				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
8				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
9	0	SC	105	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
10				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
11	0	SC	107	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
12	0	SC	173	10/09/2003	00/01/1900	10/09/2003			2	1.5
13		SC		08/09/2003	00/01/1900	08/09/2003	00/01/1900			
14				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
15	0	SC	169	10/09/2003	00/01/1900	10/09/2003			2	1.5
16	0	SC	175	10/09/2003	00/01/1900	10/09/2003			2	1.5
17				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
18				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
19				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
20				10/09/2003	00/01/1900	10/09/2003			2	1.5
21	0	SC	113	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
22				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
23	0	SC	112	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
24	0	SC	116	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
25	0	SC	148	10/09/2003	00/01/1900	10/09/2003			2	1.5
26				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
27				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
28				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
29				10/09/2003	00/01/1900	10/09/2003			2	1.5
30	0	SC	111	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
31				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
32	0	SC	149	10/09/2003	00/01/1900	10/09/2003			2	1.5
33				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
34				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
35	0	SC	157	10/09/2003	00/01/1900	10/09/2003			2	1.5
36	0	SC	172	10/09/2003	00/01/1900	10/09/2003			2	1.5
37				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
38				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
39				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
40				10/09/2003	00/01/1900	10/09/2003			2	1.5
41				10/09/2003	00/01/1900	10/09/2003			2	1.5
42				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
43				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
44				10/09/2003	00/01/1900	10/09/2003			2	1.5
45	0	SC	106	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
46	0	SC	163	10/09/2003	00/01/1900	10/09/2003			2	1.5
47				10/09/2003	00/01/1900	10/09/2003			2	1.5
48	0	SC	109	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
49	0	SC	150	10/09/2003	00/01/1900	10/09/2003			2	1.5
50	0	SC	164	10/09/2003	00/01/1900	10/09/2003			2	1.5
51				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
52				10/09/2003	00/01/1900	10/09/2003			2	1.5
53				10/09/2003	00/01/1900	10/09/2003			2	1.5
54				10/09/2003	00/01/1900	10/09/2003			2	1.5
55				10/09/2003	00/01/1900	10/09/2003			2	1.5
56				10/09/2003	00/01/1900	10/09/2003			2	1.5
57	0	SC	167	10/09/2003	00/01/1900	10/09/2003			2	1.5
58		SC		08/09/2003	00/01/1900	08/09/2003	00/01/1900			
59				10/09/2003	00/01/1900	10/09/2003			2	1.5
60				10/09/2003	00/01/1900	10/09/2003			2	1.5
61	0	SC	159	10/09/2003	00/01/1900	10/09/2003			2	1.5
62	0	SC	165	10/09/2003	00/01/1900	10/09/2003			2	1.5
63				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
64				10/09/2003	00/01/1900	10/09/2003			2	1.5
65	0	SC	108	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
66	0	SC	115	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
67				08/09/2003	00/01/1900	08/09/2003	00/01/1900			

68				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
69				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
70				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
71				10/09/2003	00/01/1900	10/09/2003			2	1.5
72				10/09/2003	00/01/1900	10/09/2003			2	1.5
73				10/09/2003	00/01/1900	10/09/2003			2	1.5
74	0	SC	162	10/09/2003	00/01/1900	10/09/2003			2	1.5
75	0	SC	168	10/09/2003	00/01/1900	10/09/2003			2	1.5
76				10/09/2003	00/01/1900	10/09/2003			2	1.5
77	0	SC	147	10/09/2003	00/01/1900	10/09/2003			2	1.5
78	0	SC	161	10/09/2003	00/01/1900	10/09/2003			2	1.5
79				10/09/2003	00/01/1900	10/09/2003			2	1.5
80				10/09/2003	00/01/1900	10/09/2003			2	1.5
81				10/09/2003	00/01/1900	10/09/2003			2	1.5
82	0	SC	151	10/09/2003	00/01/1900	10/09/2003			2	1.5
83	0	SC	154	10/09/2003	00/01/1900	10/09/2003			2	1.5
84	0	SC	160	10/09/2003	00/01/1900	10/09/2003			2	1.5
85				10/09/2003	00/01/1900	10/09/2003			2	1.5
86	0	SC	110	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
87	0	SC	145	10/09/2003	00/01/1900	10/09/2003			2	1.5
88	0	SC	155	10/09/2003	00/01/1900	10/09/2003			2	1.5
89	0	SC	166	10/09/2003	00/01/1900	10/09/2003			2	1.5
90				10/09/2003	00/01/1900	10/09/2003			2	1.5
91				10/09/2003	00/01/1900	10/09/2003			2	1.5
92				10/09/2003	00/01/1900	10/09/2003			2	1.5
93	0	SC	158	10/09/2003	00/01/1900	10/09/2003			2	1.5
94				10/09/2003	00/01/1900	10/09/2003			2	1.5
95				10/09/2003	00/01/1900	10/09/2003			2	1.5
96				10/09/2003	00/01/1900	10/09/2003			2	1.5
97				10/09/2003	00/01/1900	10/09/2003			2	1.5
98	0	SC	152	10/09/2003	00/01/1900	10/09/2003			2	1.5
99				10/09/2003	00/01/1900	10/09/2003			2	1.5
100				10/09/2003	00/01/1900	10/09/2003			2	1.5
101	0	SC	171	10/09/2003	00/01/1900	10/09/2003			2	1.5
102				08/09/2003	00/01/1900	08/09/2003	00/01/1900			
103				10/09/2003	00/01/1900	10/09/2003			2	1.5
104				10/09/2003	00/01/1900	10/09/2003			2	1.5
105	0	SC	170	10/09/2003	00/01/1900	10/09/2003			2	1.5
106				10/09/2003	00/01/1900	10/09/2003			2	1.5
107				10/09/2003	00/01/1900	10/09/2003			2	1.5
108	0	SC	146	10/09/2003	00/01/1900	10/09/2003			2	1.5
109	0	SC	156	10/09/2003	00/01/1900	10/09/2003			2	1.5
110	0	SC	153	10/09/2003	00/01/1900	10/09/2003			2	1.5
111				10/09/2003	00/01/1900	10/09/2003			2	1.5
112	1	SC	101	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
113	1	SC	103	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
114	1	SC	102	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
115	1	SC	104	08/09/2003	00/01/1900	08/09/2003	00/01/1900			
116	1	SC	58	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
117	2	SC	59	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
118	2	SC	57	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
119	1	SC	56	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
120	1	SC	52	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
121	2	SC	51	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
122	3	SC	70	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
123		SC	53	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
124	2	SC	66	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
125	3	SC	61	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
126	2	SC	69	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
127	3	SC	62	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
128		SC	68	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
129	2	SC	54	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
130	3	SC	55	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
131	2	SC	60	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
132	2	SC	65	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
133	3	SC	67	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
134	3	SC	64	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
135	2	SC	63	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9

136	6	SC	5	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
137	2	SC	4	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
138	5	SC	3	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
139	6	SC	2	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
140	4	SC	1	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
141	2	SC	29	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
142	2	SC	31	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
143	3	SC	26	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
144	2	SC	27	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
145	4	SC	22	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
146	4	SC	14	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
147	2	SC	19	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
148	3	SC	21	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
149	4	SC	15	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
150	2	SC	9	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
151	2	SC	11	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
152	2	SC	8	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
153	2	SC	7	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
154	1	SC	43	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
155	1	SC	34	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
156	1	SC	36	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
157	1	SC	33	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
158	2	SC	35	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
159	1	SC	28	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
160	3	SC	23	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
161	4	SC	18	07/09/2003	00/01/1900	08/09/2003	00/01/1900	FL	90	6.9
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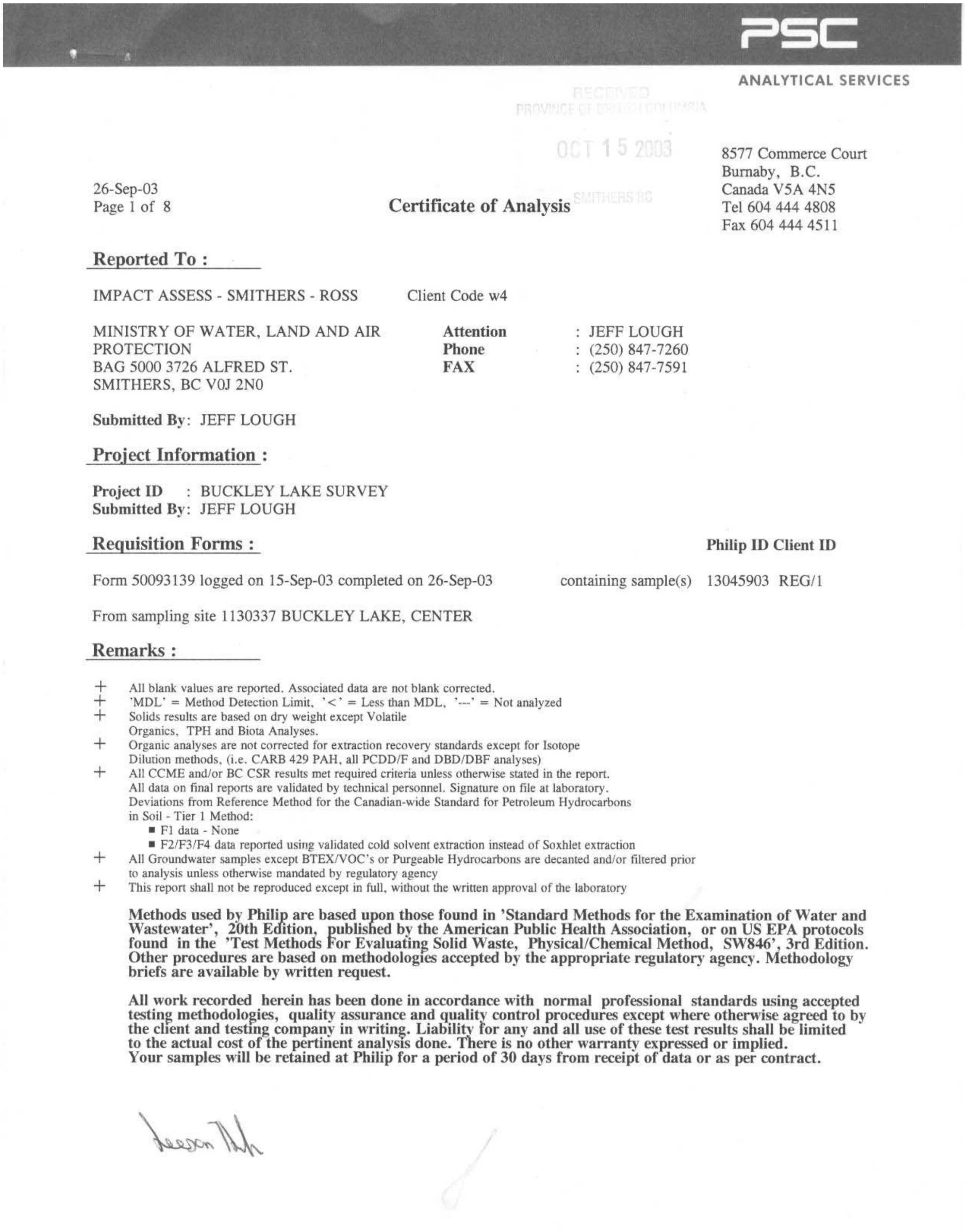
Appendix III: Water Chemistry Analytical Reports.



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ANALYTICAL SERVICES

RECEIVED
PROVINCE OF BRITISH COLUMBIA
OCT 15 2003
SMITHERS BC

8577 Commerce Court
Burnaby, B.C.
Canada V5A 4N5
Tel 604 444 4808
Fax 604 444 4511

26-Sep-03
Page 1 of 8

Certificate of Analysis

Reported To :

IMPACT ASSESS - SMITHERS - ROSS   Client Code w4

MINISTRY OF WATER, LAND AND AIR
PROTECTION
BAG 5000 3726 ALFRED ST.
SMITHERS, BC V0J 2N0

Attention : JEFF LOUGH
Phone : (250) 847-7260
FAX : (250) 847-7591

Submitted By: JEFF LOUGH

Project Information :

Project ID : BUCKLEY LAKE SURVEY
Submitted By: JEFF LOUGH

Requisition Forms :

		Philip ID	**Client ID**
Form 50093139 logged on 15-Sep-03 completed on 26-Sep-03	containing sample(s)	13045903	REG/1

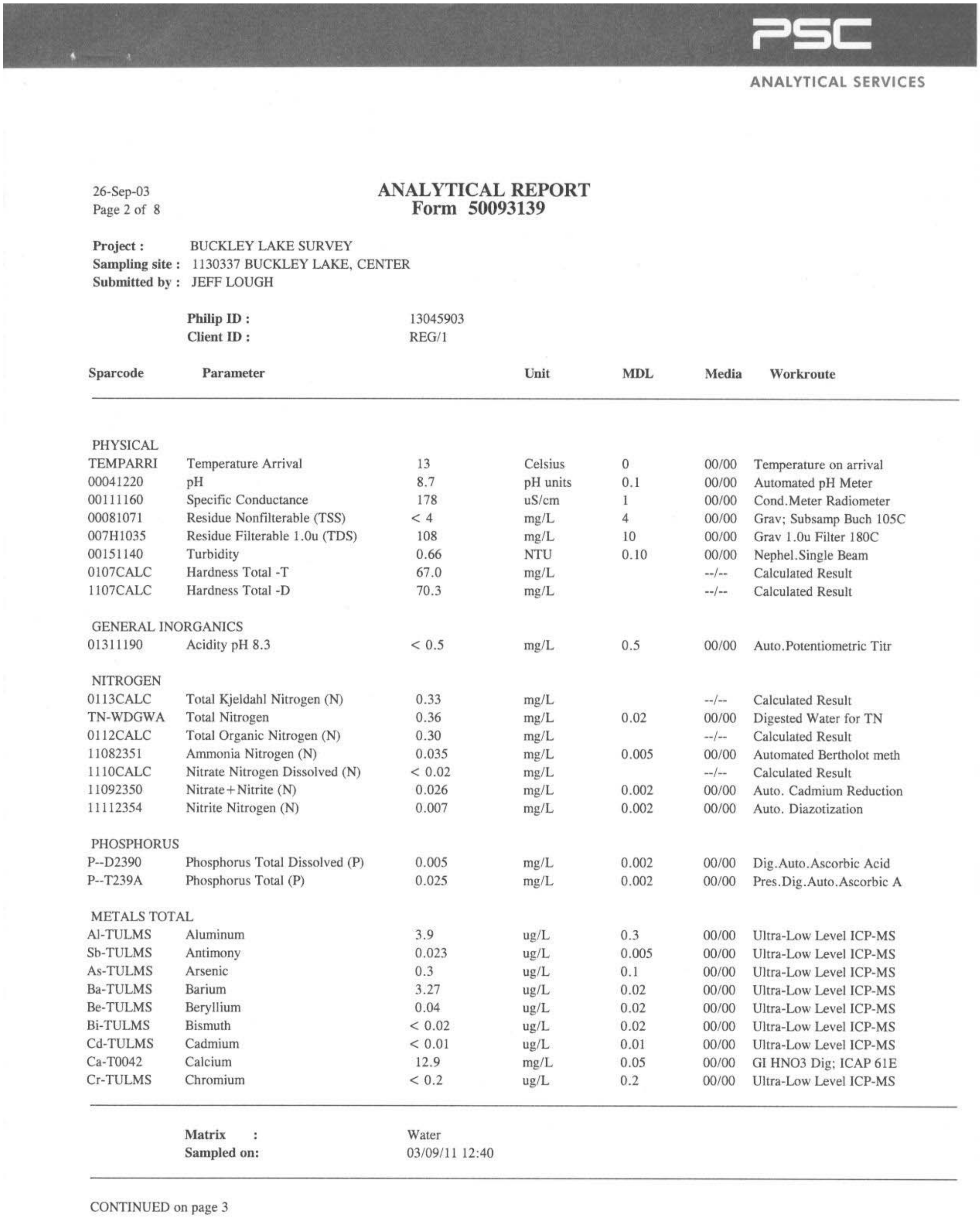
From sampling site 1130337 BUCKLEY LAKE, CENTER

Remarks :

- \+ All blank values are reported. Associated data are not blank corrected.
- \+ 'MDL' = Method Detection Limit, '<' = Less than MDL, '---' = Not analyzed
- \+ Solids results are based on dry weight except Volatile Organics, TPH and Biota Analyses.
- \+ Organic analyses are not corrected for extraction recovery standards except for Isotope Dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)
- \+ All CCME and/or BC CSR results met required criteria unless otherwise stated in the report. All data on final reports are validated by technical personnel. Signature on file at laboratory. Deviations from Reference Method for the Canadian-wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method:
  - ■ F1 data - None
  - ■ F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction
- \+ All Groundwater samples except BTEX/VOC's or Purgeable Hydrocarbons are decanted and/or filtered prior to analysis unless otherwise mandated by regulatory agency
- \+ This report shall not be reproduced except in full, without the written approval of the laboratory

Methods used by Philip are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', 20th Edition, published by the American Public Health Association, or on US EPA protocols found in the 'Test Methods For Evaluating Solid Waste, Physical/Chemical Method, SW846', 3rd Edition. Other procedures are based on methodologies accepted by the appropriate regulatory agency. Methodology briefs are available by written request.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at Philip for a period of 30 days from receipt of data or as per contract.



PSC
ANALYTICAL SERVICES

26-Sep-03
Page 2 of 8

ANALYTICAL REPORT
Form 50093139

Project : BUCKLEY LAKE SURVEY
Sampling site : 1130337 BUCKLEY LAKE, CENTER
Submitted by : JEFF LOUGH

Philip ID : 13045903
Client ID : REG/1

Sparcode	Parameter		Unit	MDL	Media	Workroute
PHYSICAL						
TEMPARRI	Temperature Arrival	13	Celsius	0	00/00	Temperature on arrival
00041220	pH	8.7	pH units	0.1	00/00	Automated pH Meter
00111160	Specific Conductance	178	uS/cm	1	00/00	Cond.Meter Radiometer
00081071	Residue Nonfilterable (TSS)	< 4	mg/L	4	00/00	Grav; Subsamp Buch 105C
007H1035	Residue Filterable 1.0u (TDS)	108	mg/L	10	00/00	Grav 1.0u Filter 180C
00151140	Turbidity	0.66	NTU	0.10	00/00	Nephel.Single Beam
0107CALC	Hardness Total -T	67.0	mg/L		--/--	Calculated Result
1107CALC	Hardness Total -D	70.3	mg/L		--/--	Calculated Result
GENERAL INORGANICS						
01311190	Acidity pH 8.3	< 0.5	mg/L	0.5	00/00	Auto.Potentiometric Titr
NITROGEN						
0113CALC	Total Kjeldahl Nitrogen (N)	0.33	mg/L		--/--	Calculated Result
TN-WDGWA	Total Nitrogen	0.36	mg/L	0.02	00/00	Digested Water for TN
0112CALC	Total Organic Nitrogen (N)	0.30	mg/L		--/--	Calculated Result
11082351	Ammonia Nitrogen (N)	0.035	mg/L	0.005	00/00	Automated Bertholot meth
1110CALC	Nitrate Nitrogen Dissolved (N)	< 0.02	mg/L		--/--	Calculated Result
11092350	Nitrate+Nitrite (N)	0.026	mg/L	0.002	00/00	Auto. Cadmium Reduction
11112354	Nitrite Nitrogen (N)	0.007	mg/L	0.002	00/00	Auto. Diazotization
PHOSPHORUS						
P--D2390	Phosphorus Total Dissolved (P)	0.005	mg/L	0.002	00/00	Dig.Auto.Ascorbic Acid
P--T239A	Phosphorus Total (P)	0.025	mg/L	0.002	00/00	Pres.Dig.Auto.Ascorbic A
METALS TOTAL						
Al-TULMS	Aluminum	3.9	ug/L	0.3	00/00	Ultra-Low Level ICP-MS
Sb-TULMS	Antimony	0.023	ug/L	0.005	00/00	Ultra-Low Level ICP-MS
As-TULMS	Arsenic	0.3	ug/L	0.1	00/00	Ultra-Low Level ICP-MS
Ba-TULMS	Barium	3.27	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Be-TULMS	Beryllium	0.04	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Bi-TULMS	Bismuth	< 0.02	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Cd-TULMS	Cadmium	< 0.01	ug/L	0.01	00/00	Ultra-Low Level ICP-MS
Ca-T0042	Calcium	12.9	mg/L	0.05	00/00	GI HNO3 Dig; ICAP 61E
Cr-TULMS	Chromium	< 0.2	ug/L	0.2	00/00	Ultra-Low Level ICP-MS

Matrix : Water
Sampled on: 03/09/11 12:40

CONTINUED on page 3

26-Sep-03
Page 3 of 8

ANALYTICAL REPORT
Form 50093139

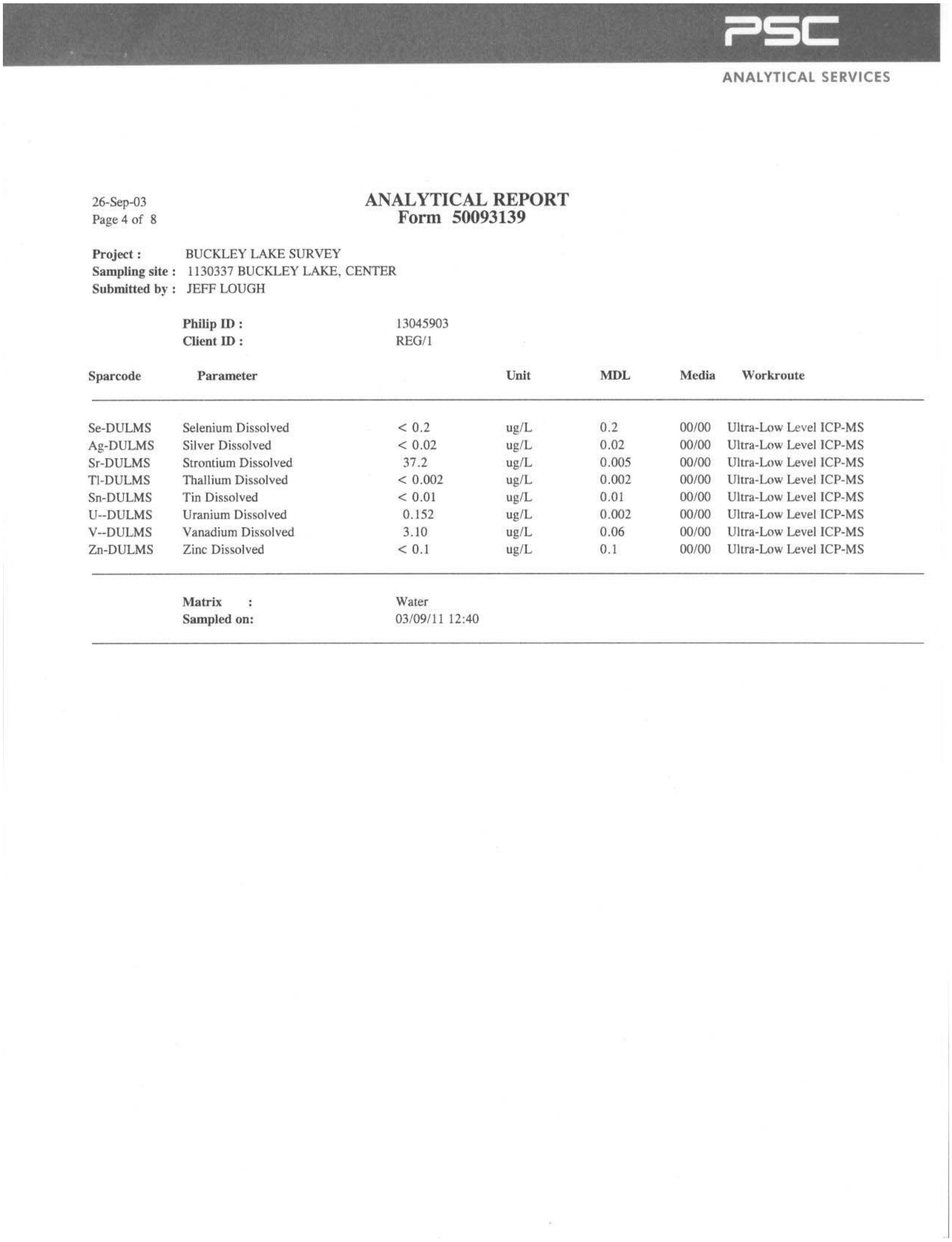
Project : BUCKLEY LAKE SURVEY
Sampling site : 1130337 BUCKLEY LAKE, CENTER
Submitted by : JEFF LOUGH

Philip ID : 13045903
Client ID : REG/1

Sparcode	Parameter		Unit	MDL	Media	Workroute
Co-TULMS	Cobalt	0.015	ug/L	0.005	00/00	Ultra-Low Level ICP-MS
Cu-TULMS	Copper	0.86	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Fe-T0042	Iron	0.015	mg/L	0.005	00/00	GI HNO3 Dig; ICAP 61E
Pb-TULMS	Lead	0.02	ug/L	0.01	00/00	Ultra-Low Level ICP-MS
Li-TULMS	Lithium	12.8	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Mg-T0042	Magnesium	8.46	mg/L	0.05	00/00	GI HNO3 Dig; ICAP 61E
Mn-TULMS	Manganese	8.97	ug/L	0.008	00/00	Ultra-Low Level ICP-MS
Mo-TULMS	Molybdenum	1.83	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Ni-TULMS	Nickel	< 0.05	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Se-TULMS	Selenium	< 0.2	ug/L	0.2	00/00	Ultra-Low Level ICP-MS
Ag-TULMS	Silver	< 0.02	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Sr-TULMS	Strontium	38.3	ug/L	0.005	00/00	Ultra-Low Level ICP-MS
Tl-TULMS	Thallium	< 0.002	ug/L	0.002	00/00	Ultra-Low Level ICP-MS
Sn-TULMS	Tin	< 0.01	ug/L	0.01	00/00	Ultra-Low Level ICP-MS
U--TULMS	Uranium	0.144	ug/L	0.002	00/00	Ultra-Low Level ICP-MS
V--TULMS	Vanadium	3.20	ug/L	0.06	00/00	Ultra-Low Level ICP-MS
Zn-TULMS	Zinc	0.2	ug/L	0.1	00/00	Ultra-Low Level ICP-MS
METALS DISSOLVED						
Al-DULMS	Aluminum Dissolved	0.9	ug/L	0.3	00/00	Ultra-Low Level ICP-MS
Sb-DULMS	Antimony Dissolved	0.018	ug/L	0.005	00/00	Ultra-Low Level ICP-MS
As-DULMS	Arsenic Dissolved	0.3	ug/L	0.1	00/00	Ultra-Low Level ICP-MS
Ba-DULMS	Barium Dissolved	2.96	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Be-DULMS	Beryllium Dissolved	0.04	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Bi-DULMS	Bismuth Dissolved	< 0.02	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Cd-DULMS	Cadmium Dissolved	< 0.01	ug/L	0.01	00/00	Ultra-Low Level ICP-MS
Ca-D0031	Calcium Dissolved	13.0	mg/L	0.05	00/00	ICAP 61E Analysis
Cr-DULMS	Chromium Dissolved	< 0.2	ug/L	0.2	00/00	Ultra-Low Level ICP-MS
Co-DULMS	Cobalt Dissolved	0.006	ug/L	0.005	00/00	Ultra-Low Level ICP-MS
Cu-DULMS	Copper Dissolved	0.70	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Fe-D0031	Iron Dissolved	< 0.005	mg/L	0.005	00/00	ICAP 61E Analysis
Pb-DULMS	Lead Dissolved	< 0.01	ug/L	0.01	00/00	Ultra-Low Level ICP-MS
Li-DULMS	Lithium Dissolved	12.3	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Mg-D0031	Magnesium Dissolved	9.20	mg/L	0.05	00/00	ICAP 61E Analysis
Mn-DULMS	Manganese Dissolved	0.262	ug/L	0.008	00/00	Ultra-Low Level ICP-MS
Mo-DULMS	Molybdenum Dissolved	1.74	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Ni-DULMS	Nickel Dissolved	0.09	ug/L	0.05	00/00	Ultra-Low Level ICP-MS

Matrix : Water
Sampled on: 03/09/11 12:40

CONTINUED on page 4



PSC
ANALYTICAL SERVICES

26-Sep-03
Page 4 of 8

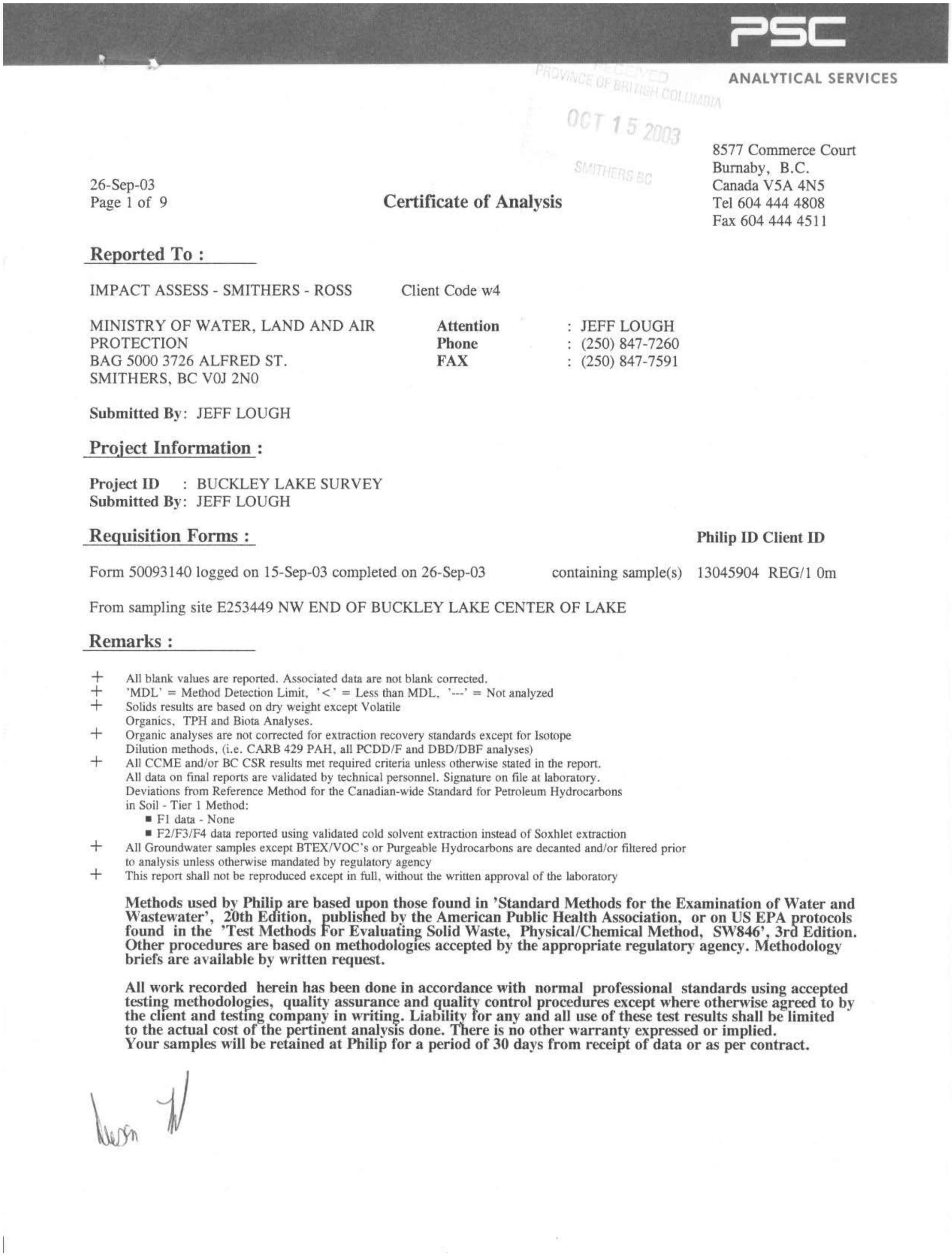
ANALYTICAL REPORT
Form 50093139

Project : BUCKLEY LAKE SURVEY
Sampling site : 1130337 BUCKLEY LAKE, CENTER
Submitted by : JEFF LOUGH

Philip ID : 13045903
Client ID : REG/1

Sparcode	Parameter		Unit	MDL	Media	Workroute
Se-DULMS	Selenium Dissolved	< 0.2	ug/L	0.2	00/00	Ultra-Low Level ICP-MS
Ag-DULMS	Silver Dissolved	< 0.02	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Sr-DULMS	Strontium Dissolved	37.2	ug/L	0.005	00/00	Ultra-Low Level ICP-MS
Tl-DULMS	Thallium Dissolved	< 0.002	ug/L	0.002	00/00	Ultra-Low Level ICP-MS
Sn-DULMS	Tin Dissolved	< 0.01	ug/L	0.01	00/00	Ultra-Low Level ICP-MS
U--DULMS	Uranium Dissolved	0.152	ug/L	0.002	00/00	Ultra-Low Level ICP-MS
V--DULMS	Vanadium Dissolved	3.10	ug/L	0.06	00/00	Ultra-Low Level ICP-MS
Zn-DULMS	Zinc Dissolved	< 0.1	ug/L	0.1	00/00	Ultra-Low Level ICP-MS

Matrix : Water
Sampled on: 03/09/11 12:40



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OCT 15 2003
SMITHERS BC

8577 Commerce Court
Burnaby, B.C.
Canada V5A 4N5
Tel 604 444 4808
Fax 604 444 4511

26-Sep-03
Page 1 of 9

Certificate of Analysis

Reported To :

IMPACT ASSESS - SMITHERS - ROSS Client Code w4

MINISTRY OF WATER, LAND AND AIR
PROTECTION
BAG 5000 3726 ALFRED ST.
SMITHERS, BC V0J 2N0

Attention : JEFF LOUGH
Phone : (250) 847-7260
FAX : (250) 847-7591

Submitted By: JEFF LOUGH

Project Information :

Project ID : BUCKLEY LAKE SURVEY
Submitted By: JEFF LOUGH

Requisition Forms :

		Philip ID	Client ID
Form 50093140 logged on 15-Sep-03 completed on 26-Sep-03	containing sample(s)	13045904	REG/1 0m

From sampling site E253449 NW END OF BUCKLEY LAKE CENTER OF LAKE

Remarks :

- \+ All blank values are reported. Associated data are not blank corrected.
- \+ 'MDL' = Method Detection Limit, '<' = Less than MDL, '---' = Not analyzed
- \+ Solids results are based on dry weight except Volatile Organics, TPH and Biota Analyses.
- \+ Organic analyses are not corrected for extraction recovery standards except for Isotope Dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)
- \+ All CCME and/or BC CSR results met required criteria unless otherwise stated in the report.
  All data on final reports are validated by technical personnel. Signature on file at laboratory.
  Deviations from Reference Method for the Canadian-wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method:
  - ■ F1 data - None
  - ■ F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction
- \+ All Groundwater samples except BTEX/VOC's or Purgeable Hydrocarbons are decanted and/or filtered prior to analysis unless otherwise mandated by regulatory agency
- \+ This report shall not be reproduced except in full, without the written approval of the laboratory

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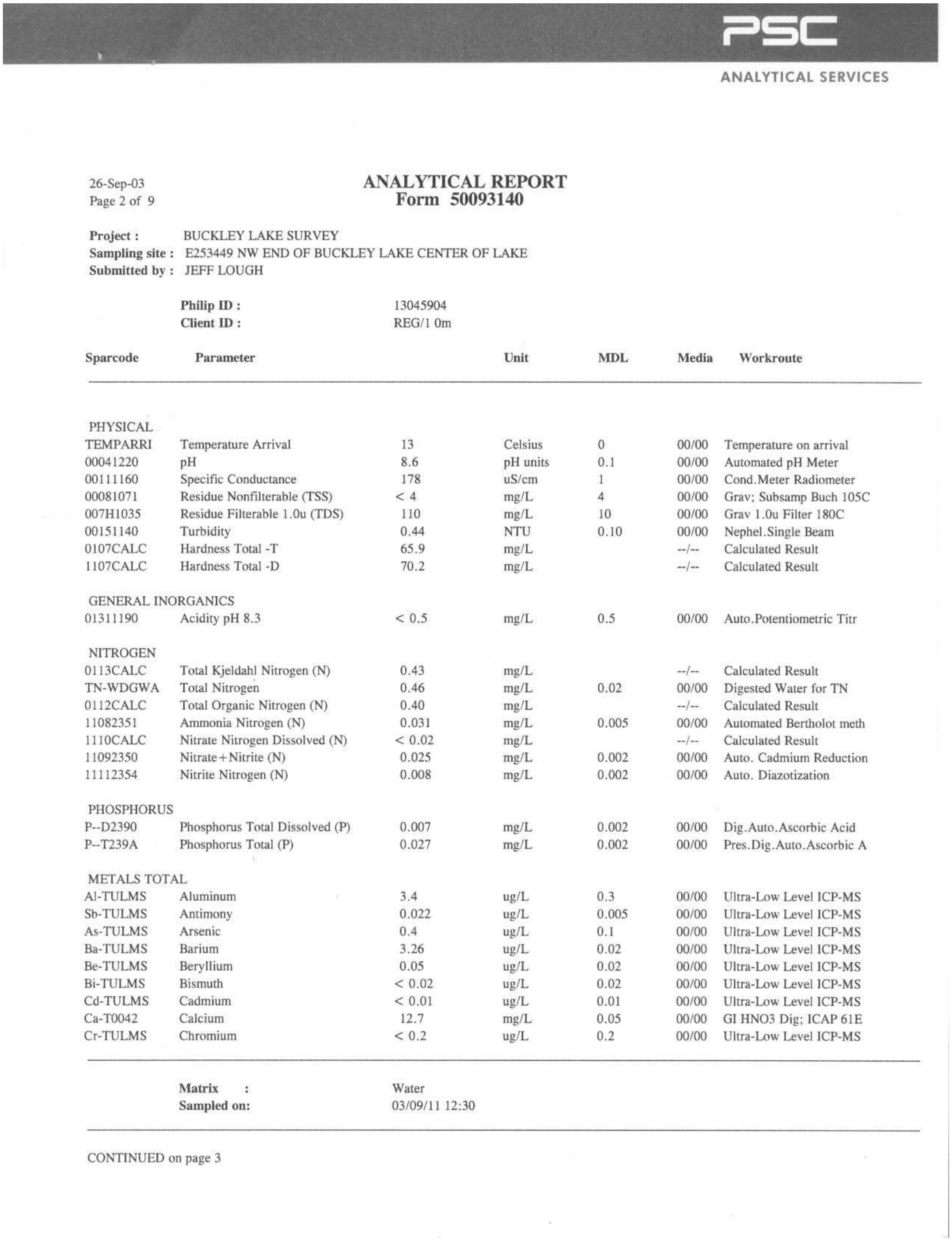
Your samples will be retained at Philip for a period of 30 days from receipt of data or as per contract.**



ANALYTICAL SERVICES

26-Sep-03
Page 2 of 9

ANALYTICAL REPORT
Form 50093140

Project : BUCKLEY LAKE SURVEY
Sampling site : E253449 NW END OF BUCKLEY LAKE CENTER OF LAKE
Submitted by : JEFF LOUGH

Philip ID : 13045904
Client ID : REG/1 0m

Sparcode	Parameter		Unit	MDL	Media	Workroute
PHYSICAL						
TEMPARRI	Temperature Arrival	13	Celsius	0	00/00	Temperature on arrival
00041220	pH	8.6	pH units	0.1	00/00	Automated pH Meter
00111160	Specific Conductance	178	uS/cm	1	00/00	Cond.Meter Radiometer
00081071	Residue Nonfilterable (TSS)	< 4	mg/L	4	00/00	Grav; Subsamp Buch 105C
007H1035	Residue Filterable 1.0u (TDS)	110	mg/L	10	00/00	Grav 1.0u Filter 180C
00151140	Turbidity	0.44	NTU	0.10	00/00	Nephel.Single Beam
0107CALC	Hardness Total -T	65.9	mg/L		--/--	Calculated Result
1107CALC	Hardness Total -D	70.2	mg/L		--/--	Calculated Result
GENERAL INORGANICS						
01311190	Acidity pH 8.3	< 0.5	mg/L	0.5	00/00	Auto.Potentiometric Titr
NITROGEN						
0113CALC	Total Kjeldahl Nitrogen (N)	0.43	mg/L		--/--	Calculated Result
TN-WDGWA	Total Nitrogen	0.46	mg/L	0.02	00/00	Digested Water for TN
0112CALC	Total Organic Nitrogen (N)	0.40	mg/L		--/--	Calculated Result
11082351	Ammonia Nitrogen (N)	0.031	mg/L	0.005	00/00	Automated Bertholot meth
1110CALC	Nitrate Nitrogen Dissolved (N)	< 0.02	mg/L		--/--	Calculated Result
11092350	Nitrate+Nitrite (N)	0.025	mg/L	0.002	00/00	Auto. Cadmium Reduction
11112354	Nitrite Nitrogen (N)	0.008	mg/L	0.002	00/00	Auto. Diazotization
PHOSPHORUS						
P--D2390	Phosphorus Total Dissolved (P)	0.007	mg/L	0.002	00/00	Dig.Auto.Ascorbic Acid
P--T239A	Phosphorus Total (P)	0.027	mg/L	0.002	00/00	Pres.Dig.Auto.Ascorbic A
METALS TOTAL						
Al-TULMS	Aluminum	3.4	ug/L	0.3	00/00	Ultra-Low Level ICP-MS
Sb-TULMS	Antimony	0.022	ug/L	0.005	00/00	Ultra-Low Level ICP-MS
As-TULMS	Arsenic	0.4	ug/L	0.1	00/00	Ultra-Low Level ICP-MS
Ba-TULMS	Barium	3.26	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Be-TULMS	Beryllium	0.05	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Bi-TULMS	Bismuth	< 0.02	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Cd-TULMS	Cadmium	< 0.01	ug/L	0.01	00/00	Ultra-Low Level ICP-MS
Ca-T0042	Calcium	12.7	mg/L	0.05	00/00	GI HNO3 Dig; ICAP 61E
Cr-TULMS	Chromium	< 0.2	ug/L	0.2	00/00	Ultra-Low Level ICP-MS

Matrix : Water
Sampled on: 03/09/11 12:30

CONTINUED on page 3

PSC

ANALYTICAL SERVICES

26-Sep-03
Page 3 of 9

ANALYTICAL REPORT
Form 50093140

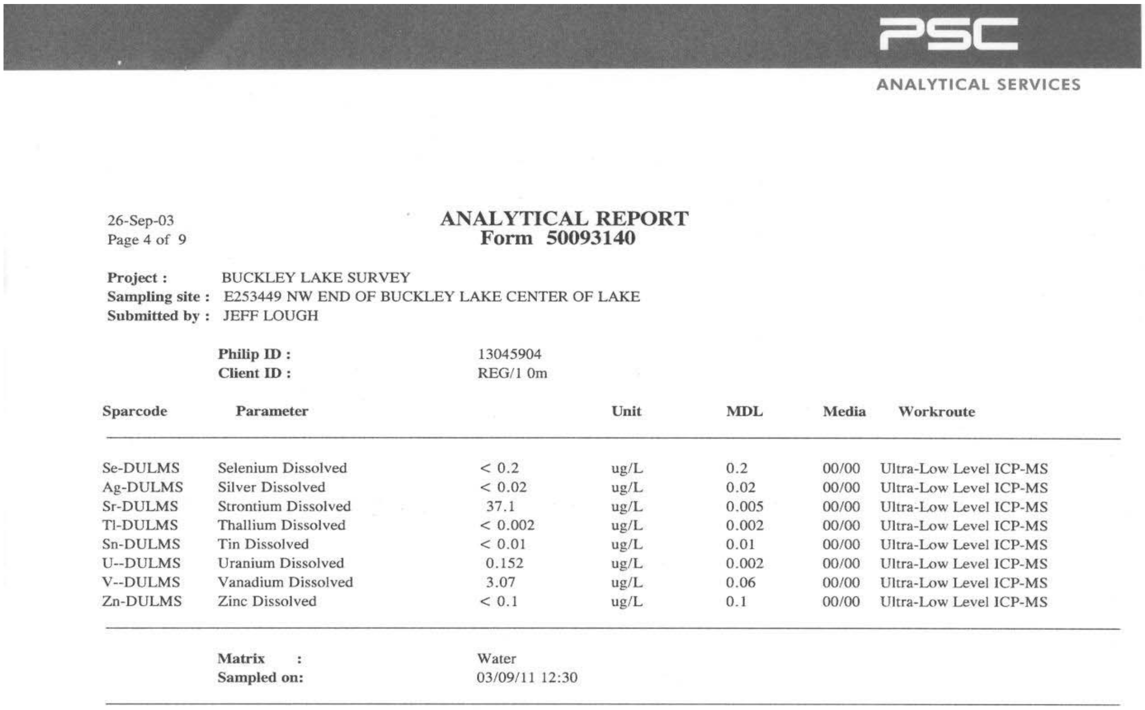
Project : BUCKLEY LAKE SURVEY
Sampling site : E253449 NW END OF BUCKLEY LAKE CENTER OF LAKE
Submitted by : JEFF LOUGH

Philip ID : 13045904
Client ID : REG/1 0m

Sparcode	Parameter		Unit	MDL	Media	Workroute
Co-TULMS	Cobalt	0.014	ug/L	0.005	00/00	Ultra-Low Level ICP-MS
Cu-TULMS	Copper	0.85	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Fe-T0042	Iron	0.017	mg/L	0.005	00/00	GI HNO3 Dig; ICAP 61E
Pb-TULMS	Lead	0.02	ug/L	0.01	00/00	Ultra-Low Level ICP-MS
Li-TULMS	Lithium	12.2	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Mg-T0042	Magnesium	8.30	mg/L	0.05	00/00	GI HNO3 Dig; ICAP 61E
Mn-TULMS	Manganese	10.2	ug/L	0.008	00/00	Ultra-Low Level ICP-MS
Mo-TULMS	Molybdenum	1.73	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Ni-TULMS	Nickel	< 0.05	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Se-TULMS	Selenium	0.3	ug/L	0.2	00/00	Ultra-Low Level ICP-MS
Ag-TULMS	Silver	< 0.02	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Sr-TULMS	Strontium	37.2	ug/L	0.005	00/00	Ultra-Low Level ICP-MS
Tl-TULMS	Thallium	< 0.002	ug/L	0.002	00/00	Ultra-Low Level ICP-MS
Sn-TULMS	Tin	< 0.01	ug/L	0.01	00/00	Ultra-Low Level ICP-MS
U--TULMS	Uranium	0.146	ug/L	0.002	00/00	Ultra-Low Level ICP-MS
V--TULMS	Vanadium	3.11	ug/L	0.06	00/00	Ultra-Low Level ICP-MS
Zn-TULMS	Zinc	0.2	ug/L	0.1	00/00	Ultra-Low Level ICP-MS
METALS DISSOLVED						
Al-DULMS	Aluminum Dissolved	1.0	ug/L	0.3	00/00	Ultra-Low Level ICP-MS
Sb-DULMS	Antimony Dissolved	0.017	ug/L	0.005	00/00	Ultra-Low Level ICP-MS
As-DULMS	Arsenic Dissolved	0.3	ug/L	0.1	00/00	Ultra-Low Level ICP-MS
Ba-DULMS	Barium Dissolved	3.09	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Be-DULMS	Beryllium Dissolved	0.04	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Bi-DULMS	Bismuth Dissolved	< 0.02	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Cd-DULMS	Cadmium Dissolved	< 0.01	ug/L	0.01	00/00	Ultra-Low Level ICP-MS
Ca-D0031	Calcium Dissolved	13.0	mg/L	0.05	00/00	ICAP 61E Analysis
Cr-DULMS	Chromium Dissolved	< 0.2	ug/L	0.2	00/00	Ultra-Low Level ICP-MS
Co-DULMS	Cobalt Dissolved	< 0.005	ug/L	0.005	00/00	Ultra-Low Level ICP-MS
Cu-DULMS	Copper Dissolved	0.73	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Fe-D0031	Iron Dissolved	< 0.005	mg/L	0.005	00/00	ICAP 61E Analysis
Pb-DULMS	Lead Dissolved	< 0.01	ug/L	0.01	00/00	Ultra-Low Level ICP-MS
Li-DULMS	Lithium Dissolved	12.3	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Mg-D0031	Magnesium Dissolved	9.17	mg/L	0.05	00/00	ICAP 61E Analysis
Mn-DULMS	Manganese Dissolved	0.291	ug/L	0.008	00/00	Ultra-Low Level ICP-MS
Mo-DULMS	Molybdenum Dissolved	1.74	ug/L	0.05	00/00	Ultra-Low Level ICP-MS
Ni-DULMS	Nickel Dissolved	< 0.05	ug/L	0.05	00/00	Ultra-Low Level ICP-MS

Matrix : Water
Sampled on: 03/09/11 12:30

CONTINUED on page 4



PSC

ANALYTICAL SERVICES

26-Sep-03
Page 4 of 9

ANALYTICAL REPORT
Form 50093140

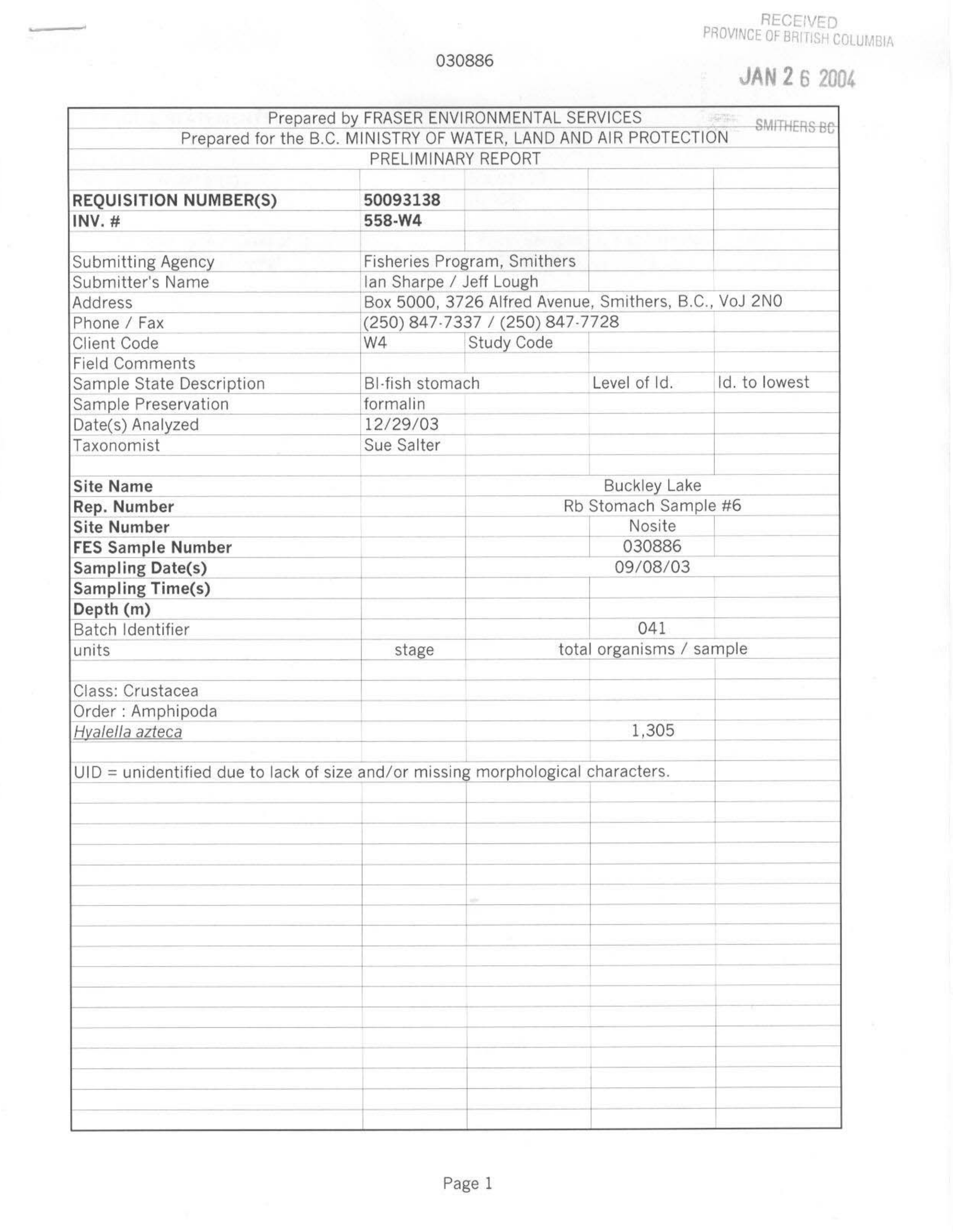
Project : BUCKLEY LAKE SURVEY
Sampling site : E253449 NW END OF BUCKLEY LAKE CENTER OF LAKE
Submitted by : JEFF LOUGH

Philip ID : 13045904
Client ID : REG/1 0m

Sparcode	Parameter		Unit	MDL	Media	Workroute
Se-DULMS	Selenium Dissolved	< 0.2	ug/L	0.2	00/00	Ultra-Low Level ICP-MS
Ag-DULMS	Silver Dissolved	< 0.02	ug/L	0.02	00/00	Ultra-Low Level ICP-MS
Sr-DULMS	Strontium Dissolved	37.1	ug/L	0.005	00/00	Ultra-Low Level ICP-MS
Tl-DULMS	Thallium Dissolved	< 0.002	ug/L	0.002	00/00	Ultra-Low Level ICP-MS
Sn-DULMS	Tin Dissolved	< 0.01	ug/L	0.01	00/00	Ultra-Low Level ICP-MS
U--DULMS	Uranium Dissolved	0.152	ug/L	0.002	00/00	Ultra-Low Level ICP-MS
V--DULMS	Vanadium Dissolved	3.07	ug/L	0.06	00/00	Ultra-Low Level ICP-MS
Zn-DULMS	Zinc Dissolved	< 0.1	ug/L	0.1	00/00	Ultra-Low Level ICP-MS

Matrix : Water
Sampled on: 03/09/11 12:30

Appendix IV: Buckley Lake Rainbow Trout Stomach Samples Analytical Report



RECEIVED
PROVINCE OF BRITISH COLUMBIA
JAN 26 2004
SMITHERS BC

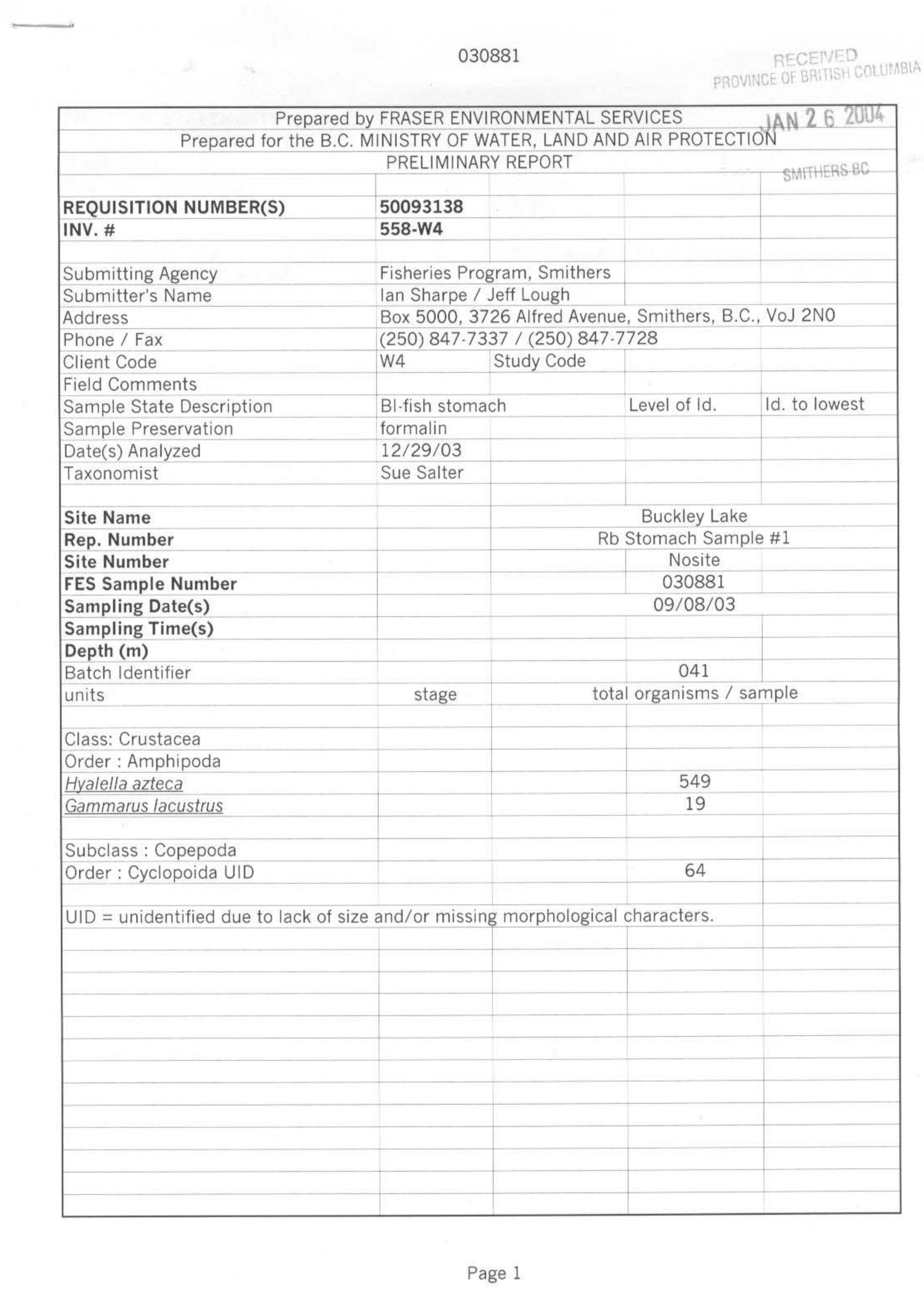
030886

Prepared by FRASER ENVIRONMENTAL SERVICES
Prepared for the B.C. MINISTRY OF WATER, LAND AND AIR PROTECTION
PRELIMINARY REPORT

REQUISITION NUMBER(S)	**50093138**			
INV. #	**558-W4**			
Submitting Agency	Fisheries Program, Smithers			
Submitter's Name	Ian Sharpe / Jeff Lough			
Address	Box 5000, 3726 Alfred Avenue, Smithers, B.C., VoJ 2N0			
Phone / Fax	(250) 847-7337 / (250) 847-7728			
Client Code	W4	Study Code		
Field Comments				
Sample State Description	BI-fish stomach		Level of Id.	Id. to lowest
Sample Preservation	formalin			
Date(s) Analyzed	12/29/03			
Taxonomist	Sue Salter			
Site Name			Buckley Lake	
Rep. Number			Rb Stomach Sample #6	
Site Number			Nosite	
FES Sample Number			030886	
Sampling Date(s)			09/08/03	
Sampling Time(s)				
Depth (m)				
Batch Identifier			041	
units	stage		total organisms / sample	
Class: Crustacea				
Order : Amphipoda				
Hyalella azteca			1,305	

UID = unidentified due to lack of size and/or missing morphological characters.

Page 1



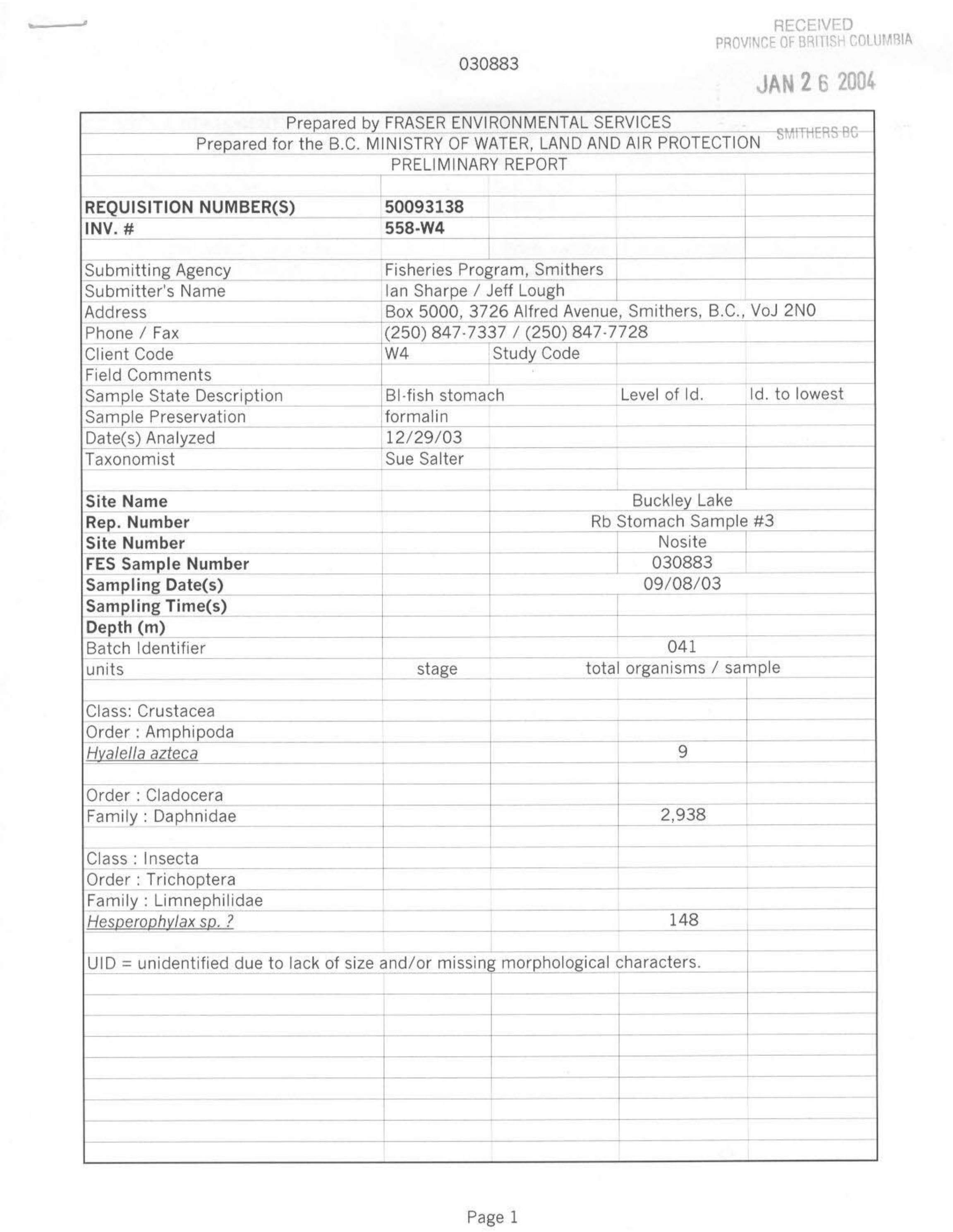
030881

Prepared by FRASER ENVIRONMENTAL SERVICES
Prepared for the B.C. MINISTRY OF WATER, LAND AND AIR PROTECTION
PRELIMINARY REPORT

REQUISITION NUMBER(S)	**50093138**			
INV. #	**558-W4**			
Submitting Agency	Fisheries Program, Smithers			
Submitter's Name	Ian Sharpe / Jeff Lough			
Address	Box 5000, 3726 Alfred Avenue, Smithers, B.C., VoJ 2N0			
Phone / Fax	(250) 847-7337 / (250) 847-7728			
Client Code	W4	Study Code		
Field Comments				
Sample State Description	Bl-fish stomach		Level of Id.	Id. to lowest
Sample Preservation	formalin			
Date(s) Analyzed	12/29/03			
Taxonomist	Sue Salter			
Site Name			Buckley Lake	
Rep. Number			Rb Stomach Sample #1	
Site Number			Nosite	
FES Sample Number			030881	
Sampling Date(s)			09/08/03	
Sampling Time(s)				
Depth (m)				
Batch Identifier			041	
units	stage		total organisms / sample	
Class: Crustacea				
Order : Amphipoda				
Hyalella azteca			549	
Gammarus lacustrus			19	
Subclass : Copepoda				
Order : Cyclopoida UID			64	

UID = unidentified due to lack of size and/or missing morphological characters.

Page 1

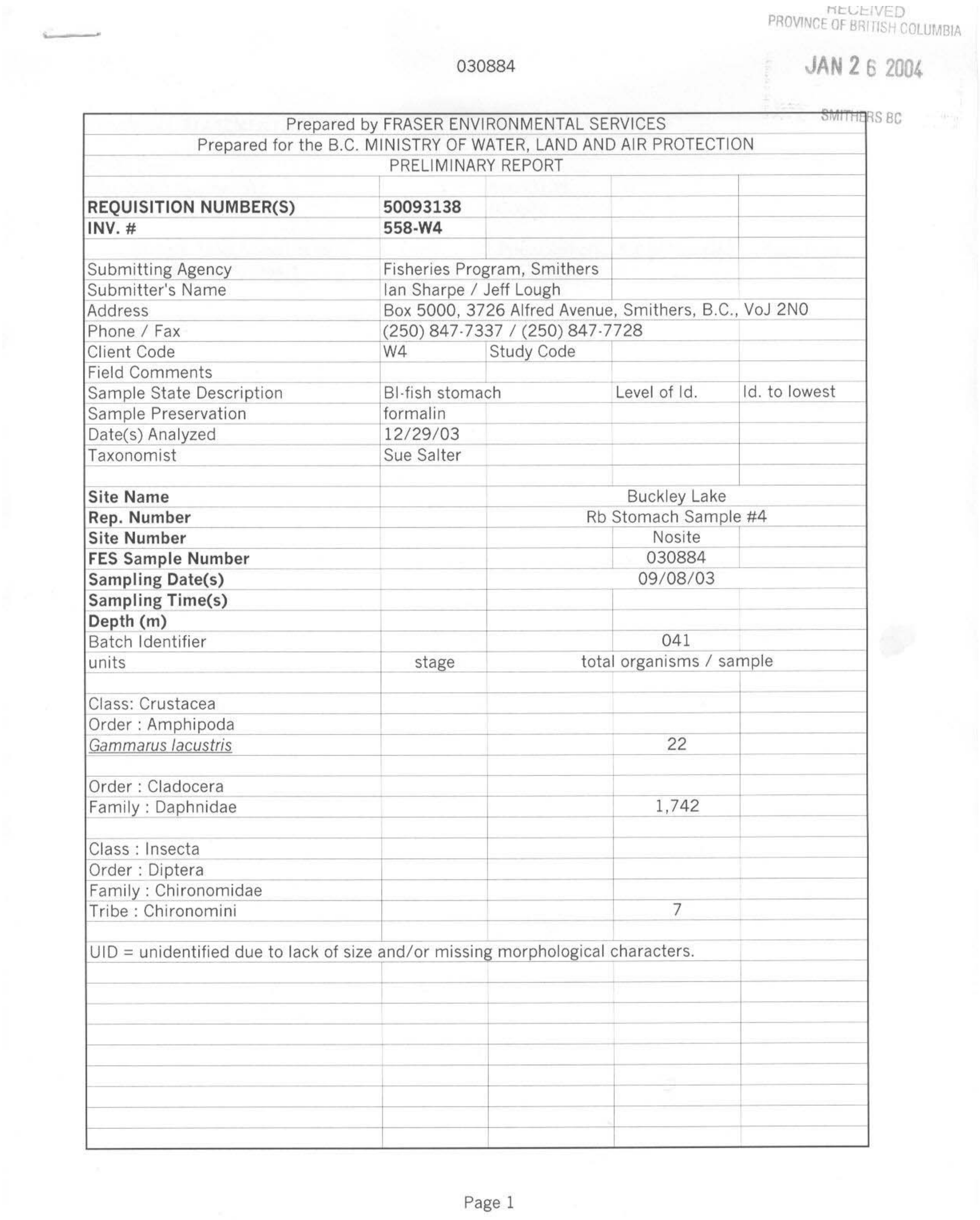


030883

Prepared by FRASER ENVIRONMENTAL SERVICES
Prepared for the B.C. MINISTRY OF WATER, LAND AND AIR PROTECTION
PRELIMINARY REPORT

REQUISITION NUMBER(S)	**50093138**			
INV. #	**558-W4**			
Submitting Agency	Fisheries Program, Smithers			
Submitter's Name	Ian Sharpe / Jeff Lough			
Address	Box 5000, 3726 Alfred Avenue, Smithers, B.C., VoJ 2N0			
Phone / Fax	(250) 847-7337 / (250) 847-7728			
Client Code	W4	Study Code		
Field Comments				
Sample State Description	Bl-fish stomach		Level of Id.	Id. to lowest
Sample Preservation	formalin			
Date(s) Analyzed	12/29/03			
Taxonomist	Sue Salter			
Site Name			Buckley Lake	
Rep. Number			Rb Stomach Sample #3	
Site Number			Nosite	
FES Sample Number			030883	
Sampling Date(s)			09/08/03	
Sampling Time(s)				
Depth (m)				
Batch Identifier			041	
units	stage		total organisms / sample	
Class: Crustacea				
Order : Amphipoda				
Hyalella azteca			9	
Order : Cladocera				
Family : Daphnidae			2,938	
Class : Insecta				
Order : Trichoptera				
Family : Limnephilidae				
Hesperophylax sp. ?			148	
UID = unidentified due to lack of size and/or missing morphological characters.				

Page 1

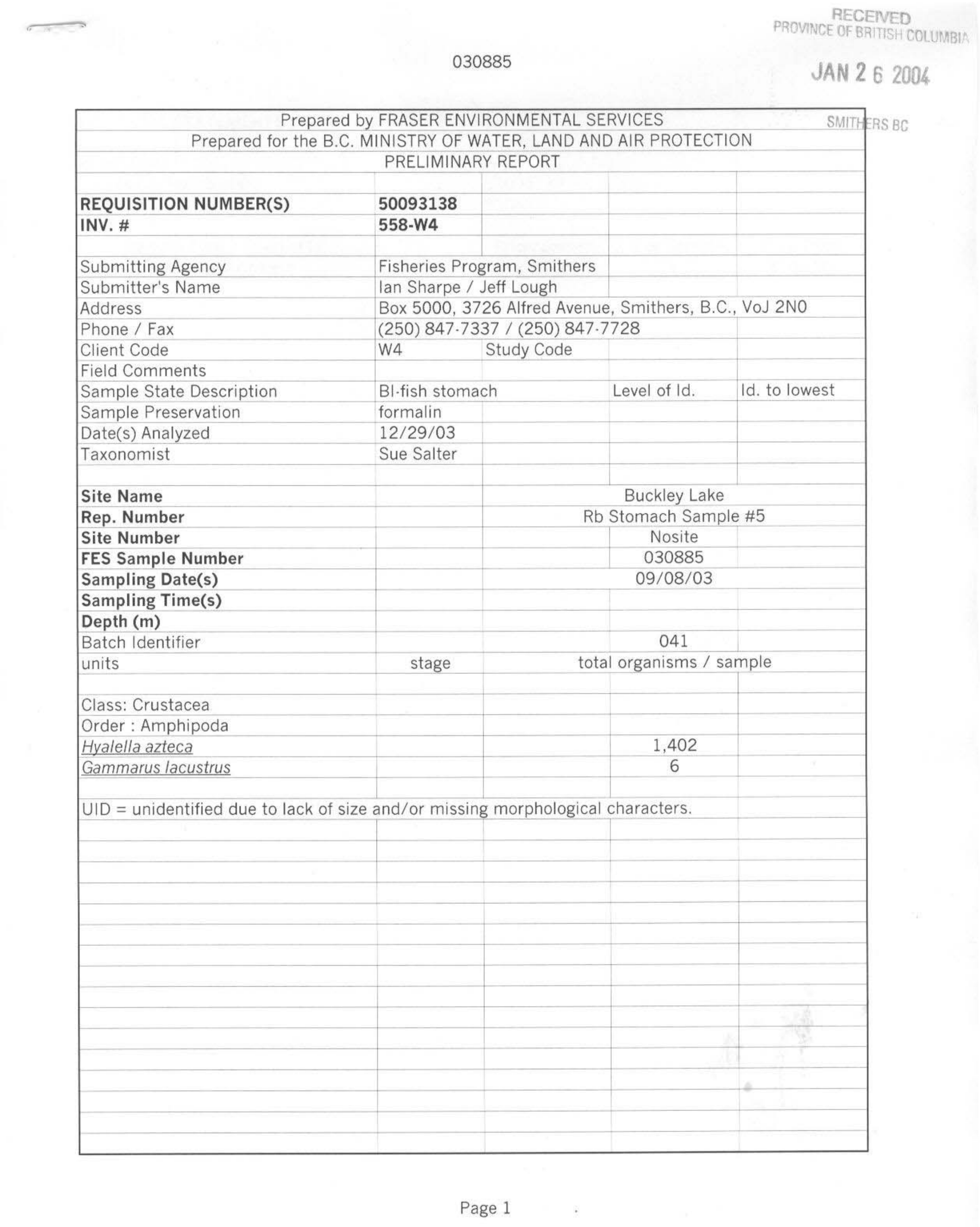


030884

Prepared by FRASER ENVIRONMENTAL SERVICES
Prepared for the B.C. MINISTRY OF WATER, LAND AND AIR PROTECTION
PRELIMINARY REPORT

REQUISITION NUMBER(S)	**50093138**			
INV. #	**558-W4**			
Submitting Agency	Fisheries Program, Smithers			
Submitter's Name	Ian Sharpe / Jeff Lough			
Address	Box 5000, 3726 Alfred Avenue, Smithers, B.C., VoJ 2N0			
Phone / Fax	(250) 847-7337 / (250) 847-7728			
Client Code	W4	Study Code		
Field Comments				
Sample State Description	Bl-fish stomach		Level of Id.	Id. to lowest
Sample Preservation	formalin			
Date(s) Analyzed	12/29/03			
Taxonomist	Sue Salter			
Site Name			Buckley Lake	
Rep. Number			Rb Stomach Sample #4	
Site Number			Nosite	
FES Sample Number			030884	
Sampling Date(s)			09/08/03	
Sampling Time(s)				
Depth (m)				
Batch Identifier			041	
units	stage		total organisms / sample	
Class: Crustacea				
Order : Amphipoda				
Gammarus lacustris			22	
Order : Cladocera				
Family : Daphnidae			1,742	
Class : Insecta				
Order : Diptera				
Family : Chironomidae				
Tribe : Chironomini			7	
UID = unidentified due to lack of size and/or missing morphological characters.				

Page 1



030885

Prepared by FRASER ENVIRONMENTAL SERVICES
Prepared for the B.C. MINISTRY OF WATER, LAND AND AIR PROTECTION
PRELIMINARY REPORT

REQUISITION NUMBER(S)	**50093138**			
INV. #	**558-W4**			
Submitting Agency	Fisheries Program, Smithers			
Submitter's Name	Ian Sharpe / Jeff Lough			
Address	Box 5000, 3726 Alfred Avenue, Smithers, B.C., VoJ 2N0			
Phone / Fax	(250) 847-7337 / (250) 847-7728			
Client Code	W4	Study Code		
Field Comments				
Sample State Description	Bl-fish stomach		Level of Id.	Id. to lowest
Sample Preservation	formalin			
Date(s) Analyzed	12/29/03			
Taxonomist	Sue Salter			
Site Name			Buckley Lake	
Rep. Number			Rb Stomach Sample #5	
Site Number			Nosite	
FES Sample Number			030885	
Sampling Date(s)			09/08/03	
Sampling Time(s)				
Depth (m)				
Batch Identifier			041	
units	stage		total organisms / sample	
Class: Crustacea				
Order : Amphipoda				
Hyalella azteca			1,402	
Gammarus lacustrus			6	

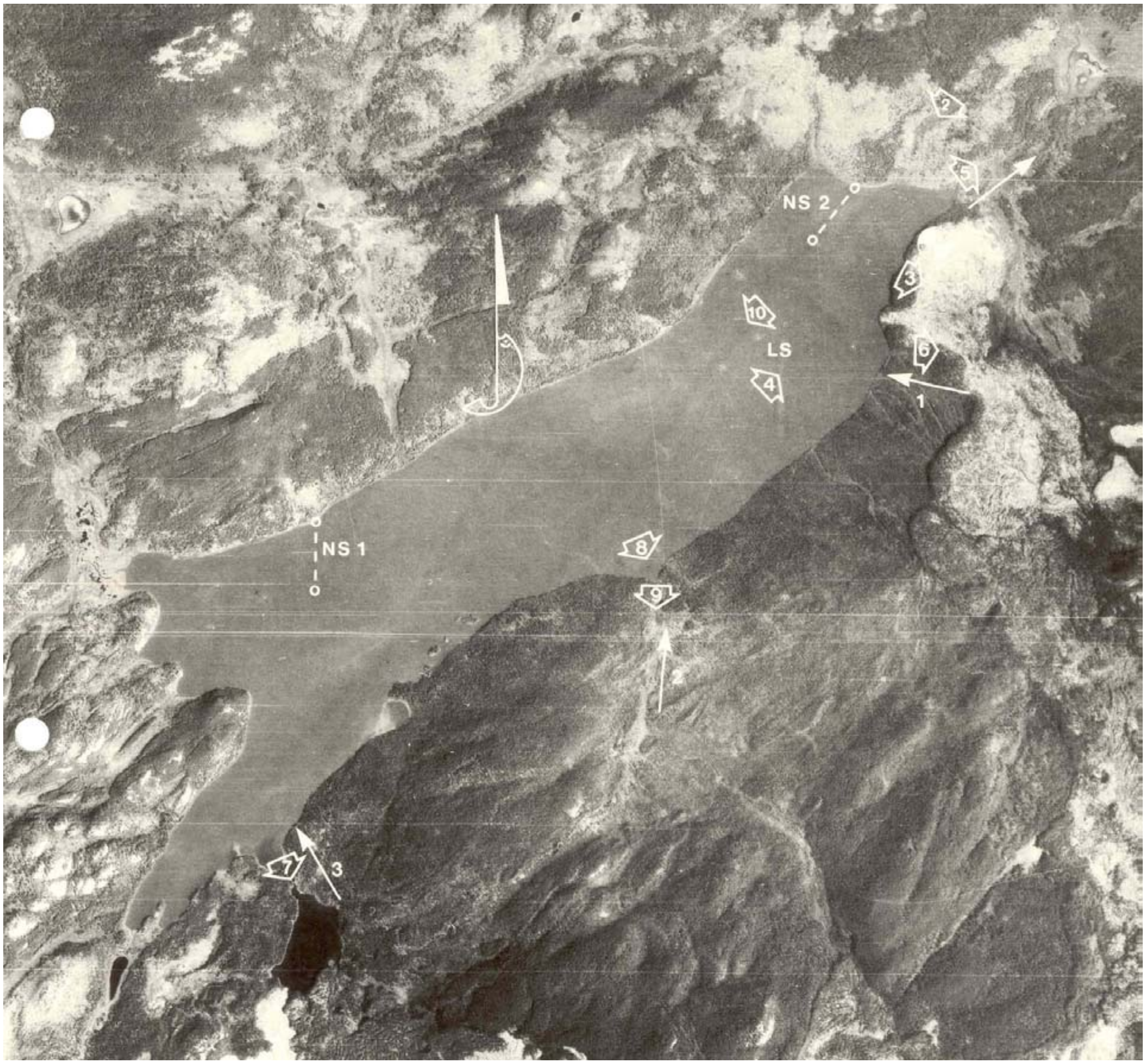
UID = unidentified due to lack of size and/or missing morphological characters.

Page 1

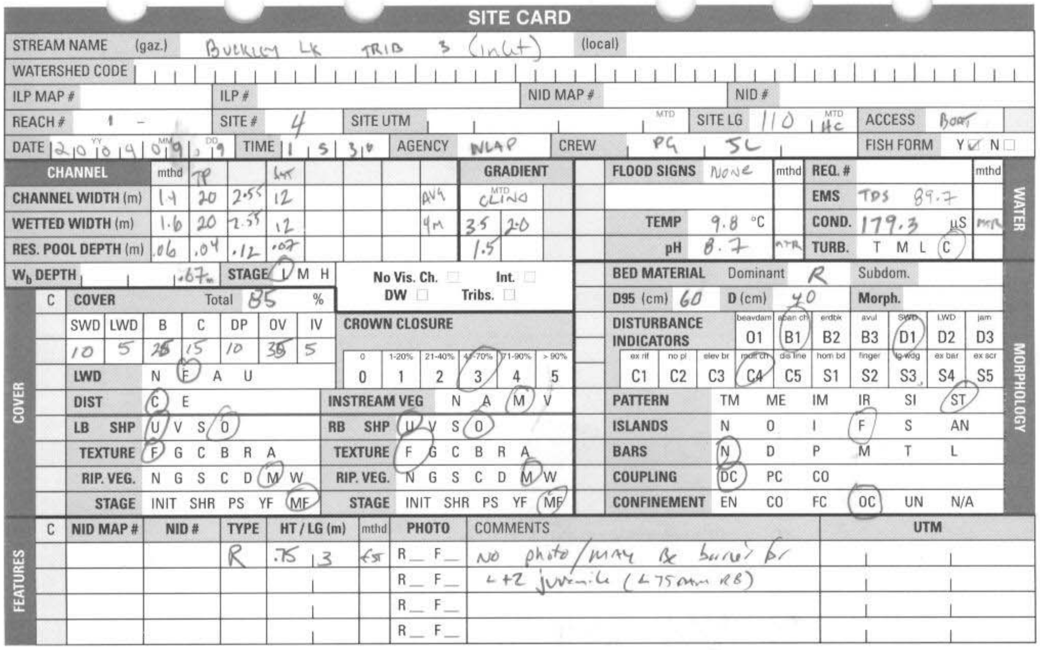
Appendix V: Buckley Lake Plankton Haul Analytical Summary & Report

Invertebrate Taxa	Abundance				% Frequency				Density/m^3			
	Haul 1	Haul 2	Haul 3	Total	Haul 1	Haul 2	Haul 3	Total	Haul 1	Haul 2	Haul 3	Total
Nauplii (cyclops larvae)	15,866	10,000	10,513	36,379	22.8	17.8	14.7	18.4	14,573	9,185	9,656	33,414
Cyclops scutifer (adult)	527	440	874	1,841	0.8	0.8	1.2	0.9	484	404	803	1,691
Cyclops scutifer (copepodid)	43,800	30,733	46,993	121,526	62.9	54.7	65.5	61.5	40,230	28,228	43,162	111,620
***Cyclops scutifer* combined**	**60,193**	**41,173**	**58,380**	**159,746**	**86.5**	**73.3**	**81.4**	**80.9**	**55,286**	**37,817**	**53,621**	**146,724**
Diaptomus ashlandi (adult)	800	1,267	1,267	3,334	1.1	2.3	1.8	1.7	735	1,164	1,164	3,062
Diaptomus ashlandi (copepodid)	2,220	7,000	3,420	12,640	3.2	12.5	4.8	6.4	2,039	6,429	3,141	11,610
***Diaptomus ashlandi* combined**	**3,020**	**8,267**	**4,687**	**15,974**	**4.3**	**14.7**	**6.5**	**8.1**	**2,774**	**7,593**	**4,305**	**14,672**
Heterocope septentrionales (adult)	113	111	82	306	0.2	0.2	0.1	0.2	104	102	75	281
Daphnia middendorffiana	400	200	578	1,178	0.6	0.4	0.8	0.6	367	184	531	1,082
Gammarus lacustrus	12	6	22	40	0.0	0.0	0.0	0.0	11	6	20	37
Coelenterata*	1,667	1,333	1,393	4,393	2.4	2.4	1.9	2.2	1,531	1,224	1,279	4,035
Conochilus sp	240	2,667	2,153	5,060	0.3	4.7	3.0	2.6	220	2,450	1,977	4,648
Euchlanis sp.	15	--	--	15	0.0	--	--	0.0	14	--	--	14
Kellicottia longispina	3,933	2,333	4,433	10,699	5.7	4.2	6.2	5.4	3,612	2,143	4,072	9,827
Keratella cochlearis	present	80	--	80	--	0.1	--	0.0	--	73	--	73
Unidentified	--	--	19	19	--	--	0.0	0.0	--	--	17	13
TOTAL	69,593	56,170	71,747	197,510	35.2%	28.4%	36.3%	100.0	63,920	51,591	65,898	181,406

Appendix V: Historical Air Photo of Buckley Lake



Appendix VI: Project Field Data Forms and Notes



SITE CARD

STREAM NAME (gaz.) Buckley Lk TRIB 3 (inlet) (local)

WATERSHED CODE

ILP MAP # | ILP # | NID MAP # | NID #

REACH # 1 – | SITE # 4 | SITE UTM MTD | SITE LG 110 MTD Hc | ACCESS Boat

DATE YY 2004 MM 09 DD 19 | TIME 15 30 | AGENCY WLAP | CREW PG SL | FISH FORM Y ☑ N ☐

CHANNEL	mthd	TP		LAT					GRADIENT	
CHANNEL WIDTH (m)	1.4	20	2.55	12				AVG	MTD CLINO	
WETTED WIDTH (m)	1.6	20	2.55	12				4m	3.5	2.0
RES. POOL DEPTH (m)	.06	.04	.12	.07					1.5	

W$_b$ DEPTH .67m | STAGE [✓ L] M H | No Vis. Ch. ☐ Int. ☐ DW ☐ Tribs. ☐

FLOOD SIGNS None | mthd | REQ. # | mthd

EMS TDS 89.7

TEMP 9.8 °C | COND. 179.3 µS MTR

pH 8.7 MTR | TURB. T M L [✓ C]

COVER C | COVER Total 85 %

SWD	LWD	B	C	DP	OV	IV
10	5	25	15	10	35	5

LWD N [✓ F] A U

CROWN CLOSURE

0	1-20%	21-40%	41-70%	71-90%	> 90%
0	1	2	[✓ 3]	4	5

DIST [✓ C] E

INSTREAM VEG N A [✓ M] V

LB SHP [✓ U] V S [✓ O] | RB SHP [✓ U] V S [✓ O]

TEXTURE [✓ F] G C B R A | TEXTURE [✓ F] G C B R A

RIP. VEG. N G S C D [✓ M] W | RIP. VEG. N G S C D [✓ M] W

STAGE INIT SHR PS YF [✓ MF] | STAGE INIT SHR PS YF [✓ MF]

MORPHOLOGY

BED MATERIAL Dominant R | Subdom.

D95 (cm) 60 | D (cm) 40 | Morph.

DISTURBANCE INDICATORS

beavdam	aban ch	erdbk	avul	SWD	LWD	jam
01	[✓ B1]	B2	B3	[✓ D1]	D2	D3

ex rif	no pl	elev br	mult ch	dis line	hom bd	finger	lg wdg	ex bar	ex scr
C1	C2	C3	[✓ C4]	C5	S1	S2	S3	S4	S5

PATTERN TM ME IM IR SI [✓ ST]

ISLANDS N O I [✓ F] S AN

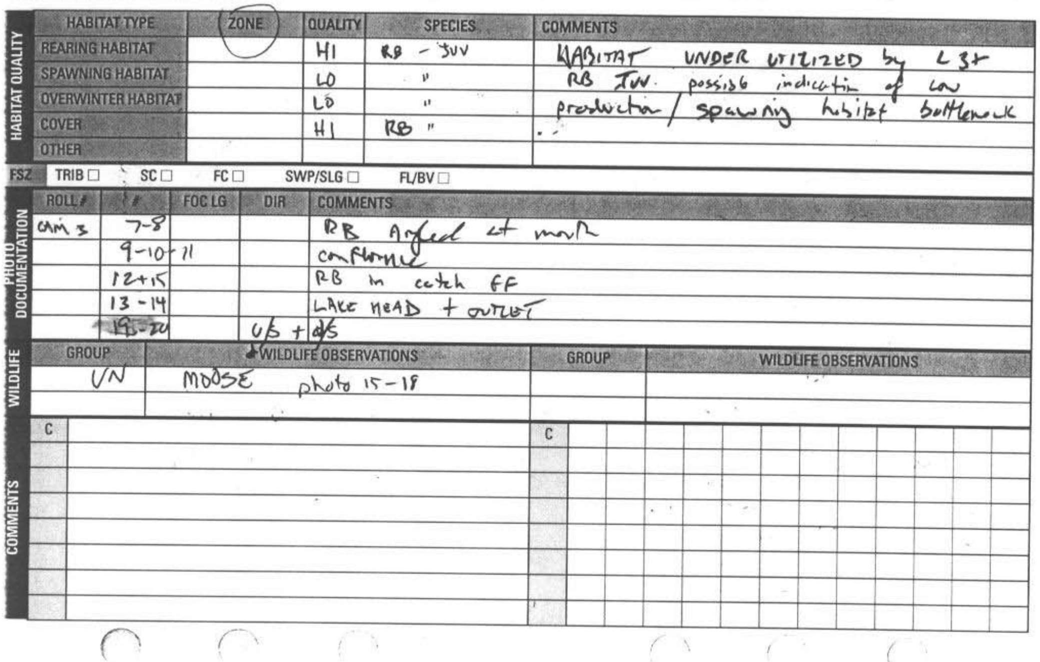
BARS [✓ N] D P M T L

COUPLING [✓ DC] PC CO

CONFINEMENT EN CO FC [✓ OC] UN N/A

FEATURES

C	NID MAP #	NID #	TYPE	HT / LG (m)	mthd	PHOTO	COMMENTS	UTM
			R	.75 3	Est	R__ F__	No photo / may be barrier for	
						R__ F__	L+2 juvenile (L75mm RB)	
						R__ F__		
						R__ F__		



HABITAT QUALITY

HABITAT TYPE	ZONE	QUALITY	SPECIES	COMMENTS
REARING HABITAT		HI	RB - JUV	HABITAT UNDER UTILIZED by L3+
SPAWNING HABITAT		LO	"	RB JUV. possible indication of low
OVERWINTER HABITAT		LO	"	production / spawning habitat bottleneck
COVER		HI	RB "	
OTHER				

FSZ TRIB ☐ SC ☐ FC ☐ SWP/SLG ☐ FL/BV ☐

PHOTO DOCUMENTATION

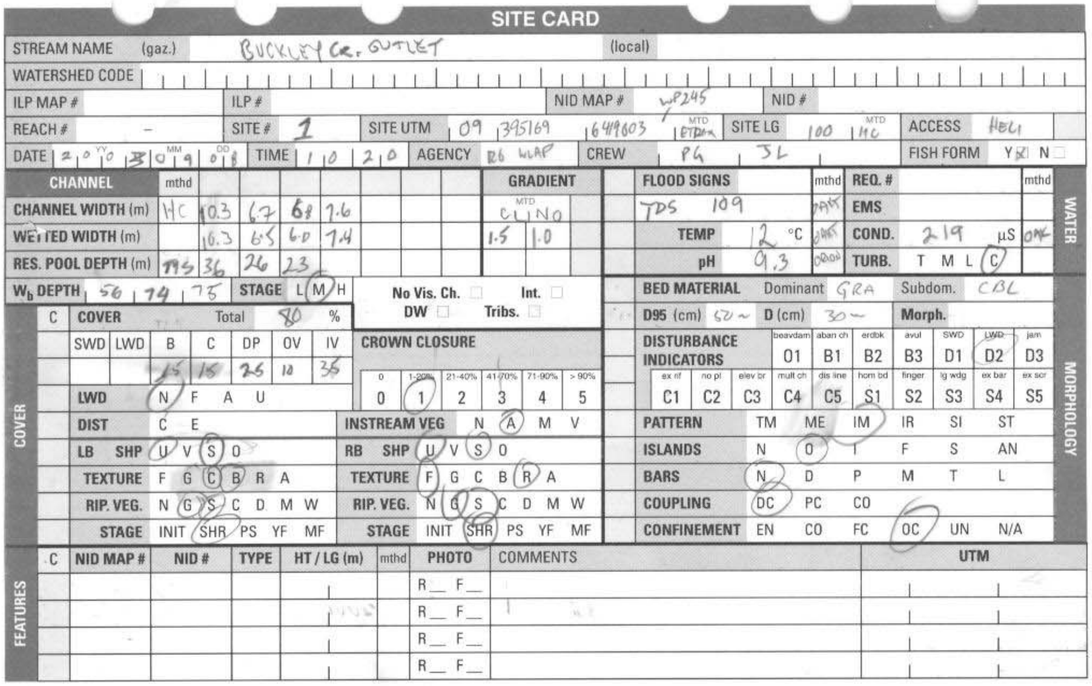
ROLL #	#	FOC LG	DIR	COMMENTS
CAM 3	7-8			RB Angled at mouth
	9-10-11			confluence
	12+15			RB in catch FF
	13 - 14			LAKE HEAD + OUTLET
	19-20		U/S + D/S	

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
UN	MOOSE photo 15-18		

COMMENTS

C | C



SITE CARD

STREAM NAME (gaz.)	BUCKLEY CR. OUTLET			(local)			
WATERSHED CODE							
ILP MAP #		ILP #		NID MAP #	WP245	NID #	
REACH #	-	SITE #	1	SITE UTM	09 395169 6449603 MTD ETRex	SITE LG	100 MTD HC
DATE	2 0 1 0 ~~3~~ 0 9 0 8	TIME	1 0 2 0	AGENCY	R6 WLAP	CREW	PG JL

ACCESS HELI

FISH FORM Y ☒ N ☐

CHANNEL	mthd					GRADIENT (MTD CLINO)	
CHANNEL WIDTH (m)	HC	10.3	6.7	6.8	7.6		
WETTED WIDTH (m)		10.3	6.5	6.0	7.4	1.5	1.0
RES. POOL DEPTH (m)	195	36	26	23			

W$_b$ DEPTH 56 74 75 STAGE L [✓ M] H

No Vis. Ch. ☐ Int. ☐ DW ☐ Tribs. ☐

FLOOD SIGNS		mthd	REQ. #		mthd
TDS	109	PART	EMS		
TEMP	12 °C	PART	COND.	219 µS	OAK
pH	9.3	ORION	TURB.	T M L [✓ C]	

WATER

BED MATERIAL Dominant GRA Subdom. CBL

D95 (cm) 60~ D (cm) 30~ Morph.

COVER C COVER Total 80 %

SWD	LWD	B	C	DP	OV	IV
		15	15	25	10	35

LWD [✓ N] F A U

DIST C E

LB SHP [✓ U] V [✓ S] O

TEXTURE F G [✓ C] [✓ B] R A

RIP. VEG. N [✓ G] [✓ S] C D M W

STAGE INIT [✓ SHR] PS YF MF

CROWN CLOSURE

0	1-20%	21-40%	41-70%	71-90%	> 90%
0	[✓ 1]	2	3	4	5

INSTREAM VEG N [✓ A] M V

RB SHP [✓ U] V [✓ S] O

TEXTURE [✓ F] G C B [✓ R] A

RIP. VEG. N [✓ G] [✓ S] C D M W

STAGE INIT [✓ SHR] PS YF MF

MORPHOLOGY

DISTURBANCE INDICATORS

beavdam	aban ch	erdbk	avul	SWD	LWD	jam
01	B1	B2	B3	D1	[✓ D2]	D3

ex rif	no pl	elev br	mult ch	dis line	hom bd	finger	lg wdg	ex bar	ex scr
C1	C2	C3	C4	C5	S1	S2	S3	S4	S5

PATTERN TM ME [✓ IM] IR SI ST

ISLANDS N [✓ O] I F S AN

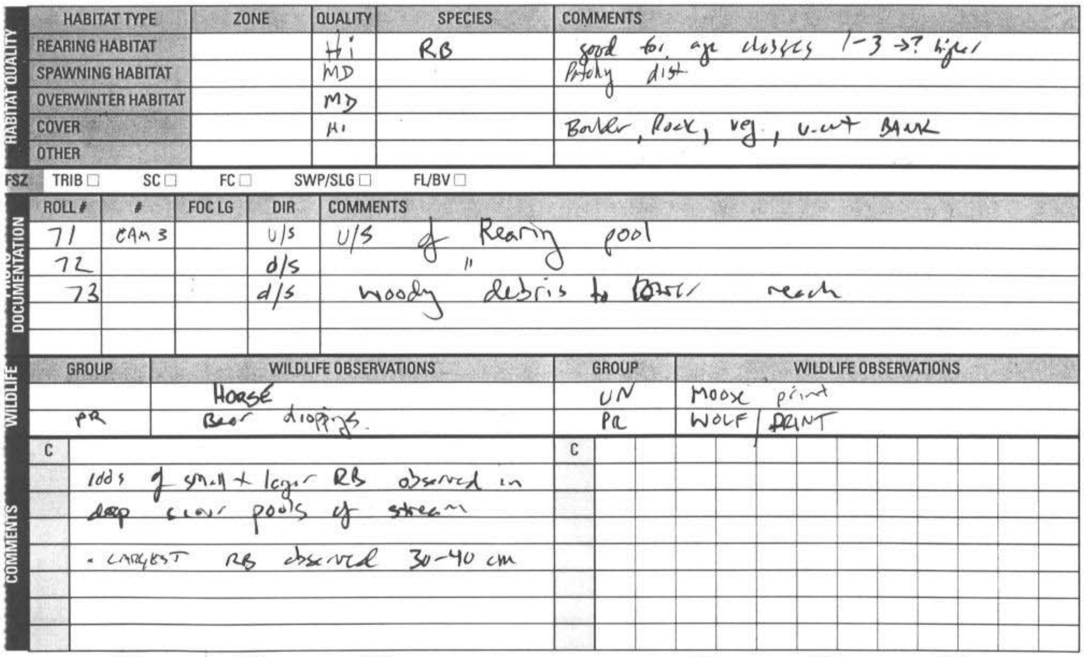
BARS [✓ N] D P M T L

COUPLING [✓ DC] PC CO

CONFINEMENT EN CO FC [✓ OC] UN N/A

FEATURES

C	NID MAP #	NID #	TYPE	HT / LG (m)	mthd	PHOTO	COMMENTS	UTM
						R__ F__		
						R__ F__		
						R__ F__		
						R__ F__		



HABITAT QUALITY

HABITAT TYPE	ZONE	QUALITY	SPECIES	COMMENTS
REARING HABITAT		Hi	RB	good for age classes 1-3 ->? higher
SPAWNING HABITAT		MD		Patchy dist
OVERWINTER HABITAT		MD		
COVER		Hi		Boulder, Rock, veg, u-cut BANK
OTHER				

FSZ TRIB ☐ SC ☐ FC ☐ SWP/SLG ☐ FL/BV ☐

PHOTO DOCUMENTATION

ROLL #	#	FOC LG	DIR	COMMENTS
71	CAM 3		U/S	U/S of Rearing pool
72			d/s	"
73			d/s	woody debris to [illegible] reach

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
	HORSE	UN	MOOSE print
PR	Bear droppings.	PR	WOLF / PRINT

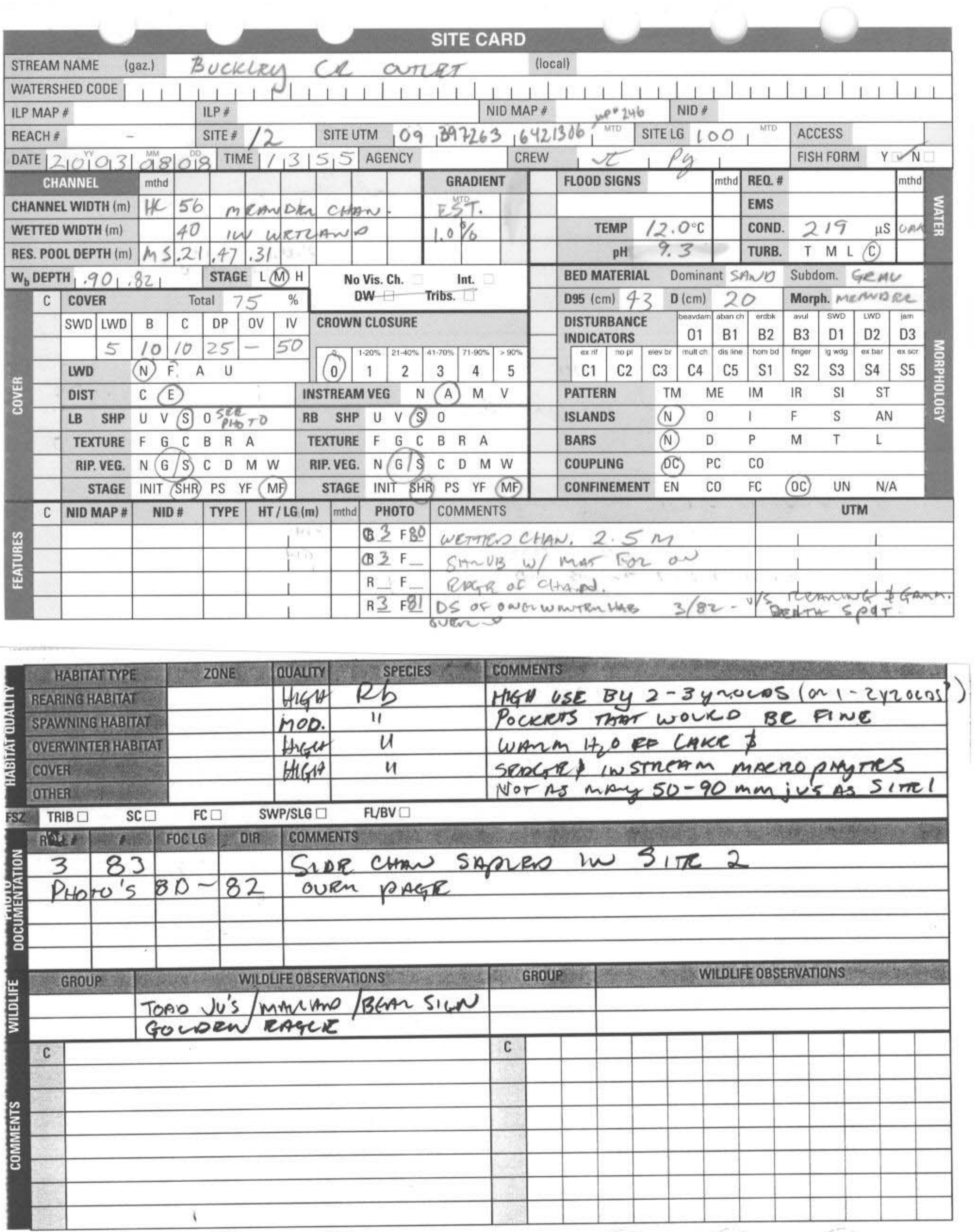
COMMENTS

C

lots of small + larger RB observed in deep clear pools of stream

- LARGEST RB observed 30-40 cm

C



SITE CARD

STREAM NAME (gaz.) BUCKLEY CR OUTLET (local)

WATERSHED CODE

ILP MAP # | ILP # | NID MAP # WP# 246 | NID #

REACH # – | SITE # 12 | SITE UTM 09 397263 6421306 MTD | SITE LG 100 MTD | ACCESS

DATE YY 2003 MM 08 DD 018 | TIME 1355 | AGENCY | CREW JT, PG | FISH FORM Y ✓ N ☐

CHANNEL	mthd								GRADIENT	
CHANNEL WIDTH (m)	HC	56	MEANDER CHAN.						MTD EST.	
WETTED WIDTH (m)		40	IN WETLAND						1.0 %	
RES. POOL DEPTH (m)	MS	.21	.47	.31						

W_b DEPTH .90 .82 | STAGE L [✓ M] H

No Vis. Ch. ☐ Int. ☐ ~~DW ☐ Tribs. ☐~~

COVER C | Total 75 %

SWD	LWD	B	C	DP	OV	IV
	5	10	10	25	–	50

CROWN CLOSURE [✓ 0] 1 (1-20%) 2 (21-40%) 3 (41-70%) 4 (71-90%) 5 (> 90%)

LWD [✓ N] F A U

DIST C [✓ E]

INSTREAM VEG N [✓ A] M V

	LB	RB
SHP	U V [✓ S] O SEE PHOTO	U V [✓ S] O
TEXTURE	F G C B R A	F G C B R A
RIP. VEG.	N [✓ G/S] C D M W	N [✓ G/S] C D M W
STAGE	INIT [✓ SHR] PS YF [✓ MF]	INIT [✓ SHR] PS YF [✓ MF]

WATER

FLOOD SIGNS | mthd

TEMP 12.0 °C | pH 9.3

REQ. # | mthd

EMS

COND. 219 µS | UA

TURB. T M L [✓ C]

MORPHOLOGY

BED MATERIAL Dominant SAND | Subdom. GRAV

D95 (cm) 43 | D (cm) 20 | Morph. MEANDER

DISTURBANCE INDICATORS	beavdam	aban ch	erdbk	avul	SWD	LWD	jam
	01	B1	B2	B3	D1	D2	D3

ex rif	no pl	elev br	mult ch	dis line	hom bd	finger	lg wdg	ex bar	ex scr
C1	C2	C3	C4	C5	S1	S2	S3	S4	S5

PATTERN TM ME IM IR SI ST

ISLANDS [✓ N] O I F S AN

BARS [✓ N] D P M T L

COUPLING [✓ DC] PC CO

CONFINEMENT EN CO FC [✓ OC] UN N/A

FEATURES

C	NID MAP #	NID #	TYPE	HT / LG (m)	mthd	PHOTO	COMMENTS	UTM
						R 3 F 80	WETTED CHAN. 2.5 M	
						R 3 F __	SHRUB W/ MAT FOR OV	
						R __ F __	EDGE OF CHAN.	
						R 3 F 81	DS OF OVERWINTER HAB 3/82 - U/S REARING & GRAV. DEPTH SPOT OVER	

HABITAT QUALITY

HABITAT TYPE	ZONE	QUALITY	SPECIES	COMMENTS
REARING HABITAT		HIGH	Rb	HIGH USE BY 2-3 YR OLDS (OR 1-2 YR OLDS?)
SPAWNING HABITAT		MOD.	"	POCKETS THAT WOULD BE FINE
OVERWINTER HABITAT		HIGH	"	WARM H_2O OF LAKE &
COVER		HIGH	"	SEDGE & INSTREAM MACROPHYTES
OTHER				NOT AS MANY 50-90 mm JUVS AS SITE 1

FSZ TRIB ☐ SC ☐ FC ☐ SWP/SLG ☐ FL/BV ☐

PHOTO DOCUMENTATION

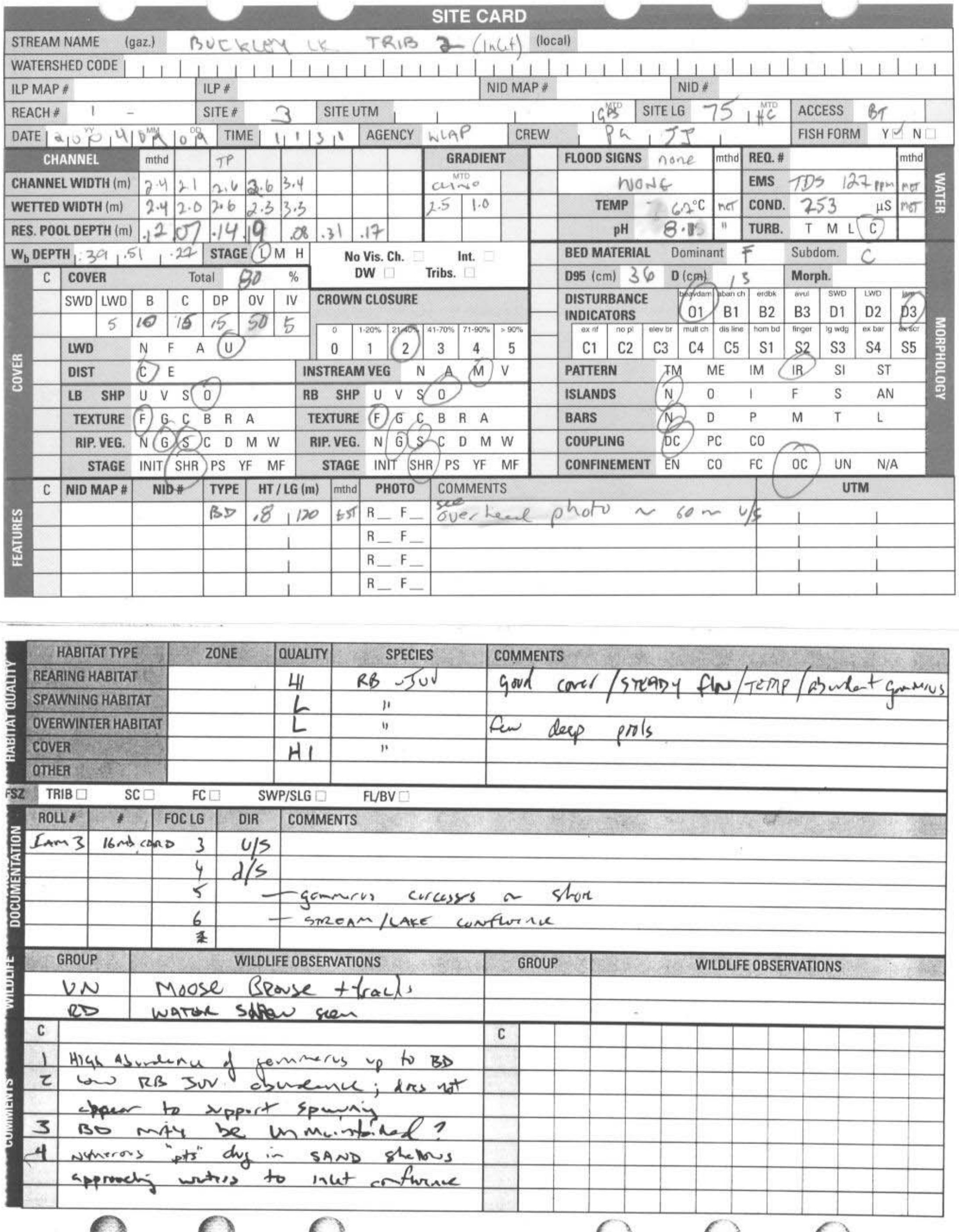
ROLL #	#	FOC LG	DIR	COMMENTS
3	83			SIDE CHAN SAMPLED IN SITE 2
PHOTO'S	80 ~	82		OVER PAGE

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
	TOAD JU'S / MALLARD / BEAR SIGN GOLDEN EAGLE		

COMMENTS

C | C



SITE CARD

STREAM NAME (gaz.) BUCKLEY LK. TRIB 2 (Inlet) (local)

WATERSHED CODE

ILP MAP # | ILP # | NID MAP # | NID #

REACH # 1 – | SITE # 3 | SITE UTM | | MTD GPS | SITE LG 75 | MTD HC | ACCESS BT

DATE YY 2 0 0 8 | MM 4 0 | DD 0 9 | TIME 1 1 3 1 | AGENCY WLAP | CREW Pa, JJ | FISH FORM Y ☑ N ☐

CHANNEL	mthd		TP						GRADIENT	
CHANNEL WIDTH (m)	2.4	2.1	2.6	2.6	3.4				MTD clino	
WETTED WIDTH (m)	2.4	2.0	2.6	2.3	3.3				2.5	1.0
RES. POOL DEPTH (m)	.12	.07	.14	.19	.08	.31	.17			

W_b DEPTH .39 .51 .22 | STAGE [✓ L] M H | No Vis. Ch. ☐ Int. ☐ DW ☐ Tribs. ☐

FLOOD SIGNS	none	mthd	REQ. #		mthd
	NONE		EMS	TDS 127 ppm	MET
TEMP	6.2°C	MET	COND.	253 µS	MET
pH	8.15	"	TURB.	T M L [✓ C]	

WATER

BED MATERIAL Dominant F | Subdom. C

D95 (cm) 36 | D (cm) 15 | Morph.

DISTURBANCE INDICATORS

beavdam	aban ch	erdbk	avul	SWD	LWD	jam
[✓ O1]	B1	B2	B3	D1	D2	[✓ D3]

ex rif	no pl	elev br	mult ch	dis line	hom bd	finger	lg wdg	ex bar	ex scr
C1	C2	C3	C4	C5	S1	S2	S3	S4	S5

PATTERN TM ME IM [✓ IR] SI ST

ISLANDS [✓ N] O I F S AN

BARS [✓ N] D P M T L

COUPLING [✓ DC] PC CO

CONFINEMENT EN CO FC [✓ OC] UN N/A

MORPHOLOGY

COVER

C | COVER Total 80 %

SWD	LWD	B	C	DP	OV	IV
	5	10	15	15	50	5

LWD N F A [✓ U]

CROWN CLOSURE

0	1-20%	21-40%	41-70%	71-90%	> 90%
0	1	[✓ 2]	3	4	5

DIST [✓ C] E | INSTREAM VEG N A [✓ M] V

LB SHP U V S [✓ O] | RB SHP U V S [✓ O]

TEXTURE [✓ F] G C B R A | TEXTURE [✓ F] G C B R A

RIP. VEG. N [✓ G] [✓ S] C D M W | RIP. VEG. N [✓ G] [✓ S] C D M W

STAGE INIT [✓ SHR] PS YF MF | STAGE INIT [✓ SHR] PS YF MF

FEATURES

C	NID MAP #	NID #	TYPE	HT / LG (m)	mthd	PHOTO	COMMENTS	UTM
			BD	.8 / 120	EST	R__ F__	see overhead photo ~ 60 m u/s	
						R__ F__		
						R__ F__		
						R__ F__		

HABITAT QUALITY

HABITAT TYPE	ZONE	QUALITY	SPECIES	COMMENTS
REARING HABITAT		H	RB - JUV	Good cover / STEADY flow / TEMP / abundant gammarus
SPAWNING HABITAT		L	"	
OVERWINTER HABITAT		L	"	few deep pools
COVER		H	"	
OTHER				

FSZ TRIB ☐ SC ☐ FC ☐ SWP/SLG ☐ FL/BV ☐

DOCUMENTATION

ROLL #	#	FOC LG	DIR	COMMENTS
Cam 3	16mb card	3	u/s	
		4	d/s	
		5		– gammarus carcasses on shore
		6		– STREAM / LAKE confluence
		7		

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
VN	Moose Browse + tracks		
BD	WATER SHREW seen		

COMMENTS

C	
1	HIGH Abundance of gammarus up to BD
2	low RB JUV abundance; does not appear to support spawning
3	BD may be unmaintained ?
4	numerous "pits" dug in SAND shallows approaching waters to inlet confluence

Life History, Stock Assessment and Recommendations for a Sustainable Recreational Fishery of Buckley Lake Rainbow Trout

7655000585

FISH COLLECTION FORM

GAZETTED NAME Buckley Cr. (local) LAKE [✓ STREAM] WETLAND

WATERSHED CODE

WATERBODY ID ILP MAP # ILP # SITE/LAKE CARD ATTACHED Y N

PROJECT ID REACH # FISH PERMIT #

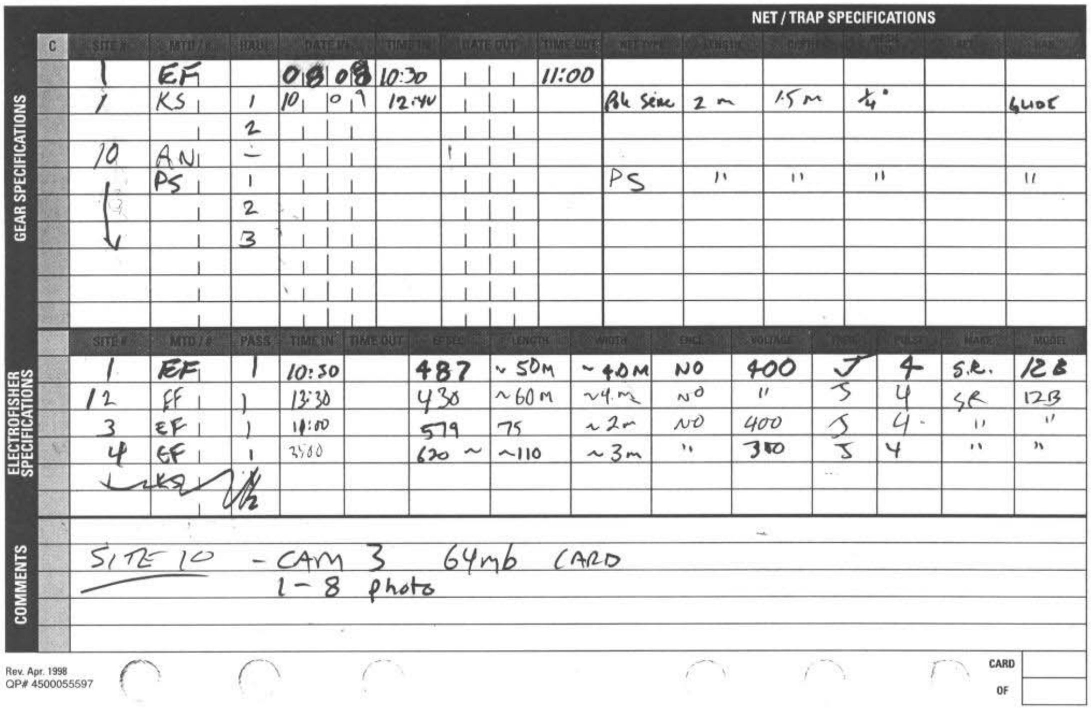
DATE 2003 09 08 to 2003 09 08 AGENCY CREW JG PG RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	MTD / NO.	STREAM CONDITION TEMP	CON	TURB	COMMENTS
1	OUTLET		09 6397644 6422041 eTRex	EF				D/S OF WETLAND
12	"		LP 247	EF				@ 400 VOLTS @ J4
3	TRIB 2			EF				385 sec.
1				SN				
10	OUTLET			AN				
"	"			SN				

FISH SUMMARY

SITE #	MTD / #	H / P	SPECIES	STAGE	AGE	TOTAL #	MIN LENGTH	MAX LENGTH	FISH ACT	COMMENTS
10	PS 1	1	RB	JW	0+?	70	<90		Rear	Released
		2	"	"		12	60	90		
		3	"	"		4	100	115		



GEAR SPECIFICATIONS

C	SITE #	MTD / #	HAUL	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB
	1	EF		08 08	10:30		11:00						
	1	KS	1	10 09	12:40			Bk Seine	2 m	1.5 m	1/4"		GLIDE
			2										
	10	AN	–										
		PS	1					PS	"	"	"		"
			2										
			3										

ELECTROFISHER SPECIFICATIONS

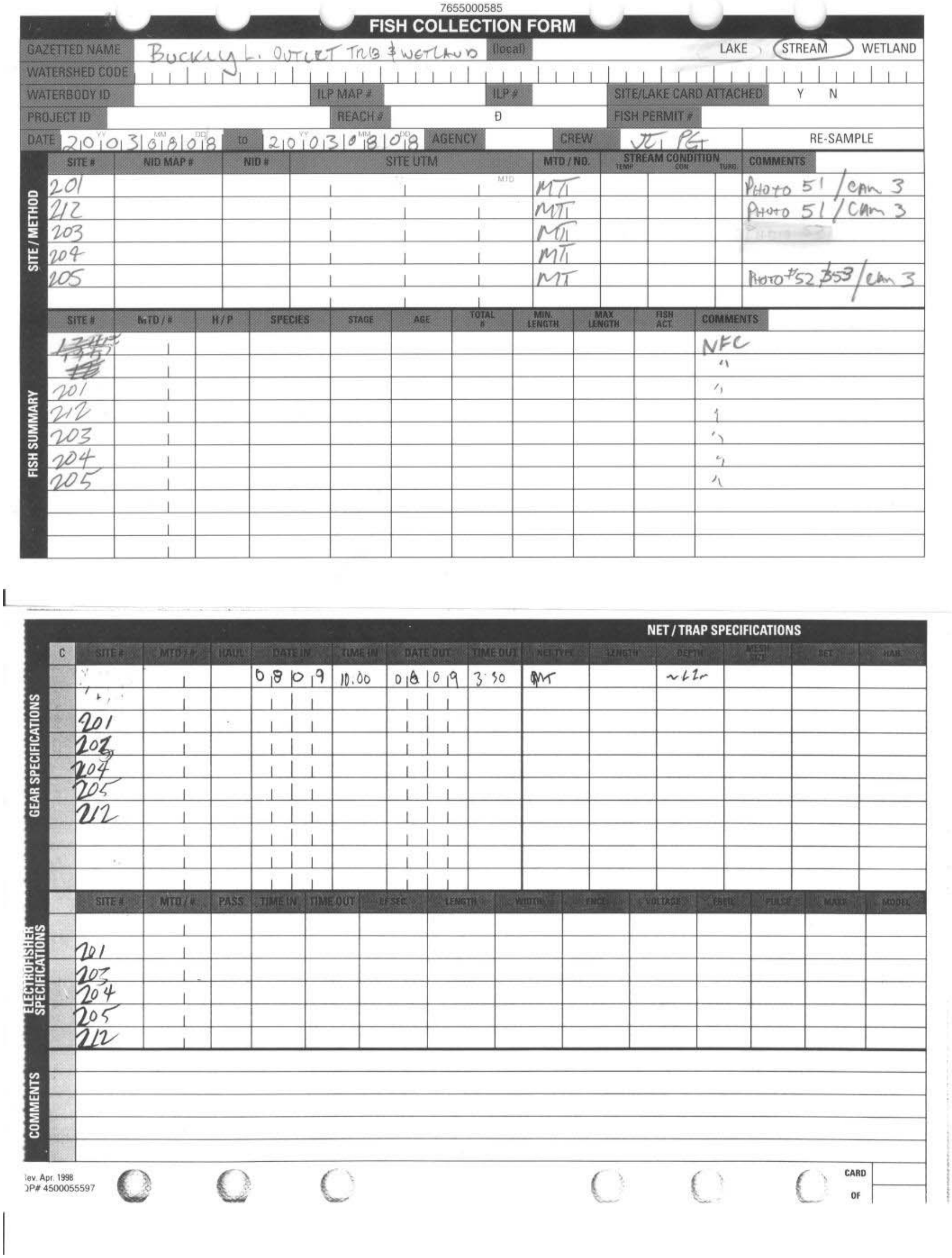
SITE #	MTD / #	PASS	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLTAGE	FREQ	PULSE	MAKE	MODEL
1	EF	1	10:30		487	~50M	~4.0M	NO	400	J	4	S.R.	12B
12	EF	1	13:30		430	~60 m	~4.m	NO	"	J	4	SR	12B
3	EF	1	11:00		579	75	~2m	NO	400	J	4	"	"
4	EF	1	3500		620 ~	~110	~3m	"	300	J	4	"	"

COMMENTS

SITE 10 - CAM 3 64mb CARD
1-8 photo

Rev. Apr. 1998
QP# 4500055597

CARD
OF



7655000585

FISH COLLECTION FORM

GAZETTED NAME	Buckley L. Outlet Trib & Wetland	(local)		LAKE [✓ STREAM] WETLAND			
WATERSHED CODE							
WATERBODY ID		ILP MAP #		ILP #		SITE/LAKE CARD ATTACHED	Y N
PROJECT ID		REACH #	Đ			FISH PERMIT #	
DATE	2003 08 08	to	2003 08 08	AGENCY		CREW	JC, PG
RE-SAMPLE							

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	MTD / NO.	STREAM CONDITION TEMP	CON.	TURB.	COMMENTS
201				MT				Photo 51 / cam 3
212				MT				Photo 51 / Cam 3
203				MT				
204				MT				
205				MT				Photo #52 & 53 / cam 3

FISH SUMMARY

SITE #	MTD / #	H / P	SPECIES	STAGE	AGE	TOTAL #	MIN. LENGTH	MAX LENGTH	FISH ACT.	COMMENTS
[illegible]										NFC
[illegible]										〃
201										〃
212										〃
203										〃
204										〃
205										〃

GEAR SPECIFICATIONS — NET / TRAP SPECIFICATIONS

C	SITE #	MTD / #	HAUL	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB.
				08 09	10.00	08 09	3:30	MT		~12m			
	201												
	203												
	204												
	205												
	212												

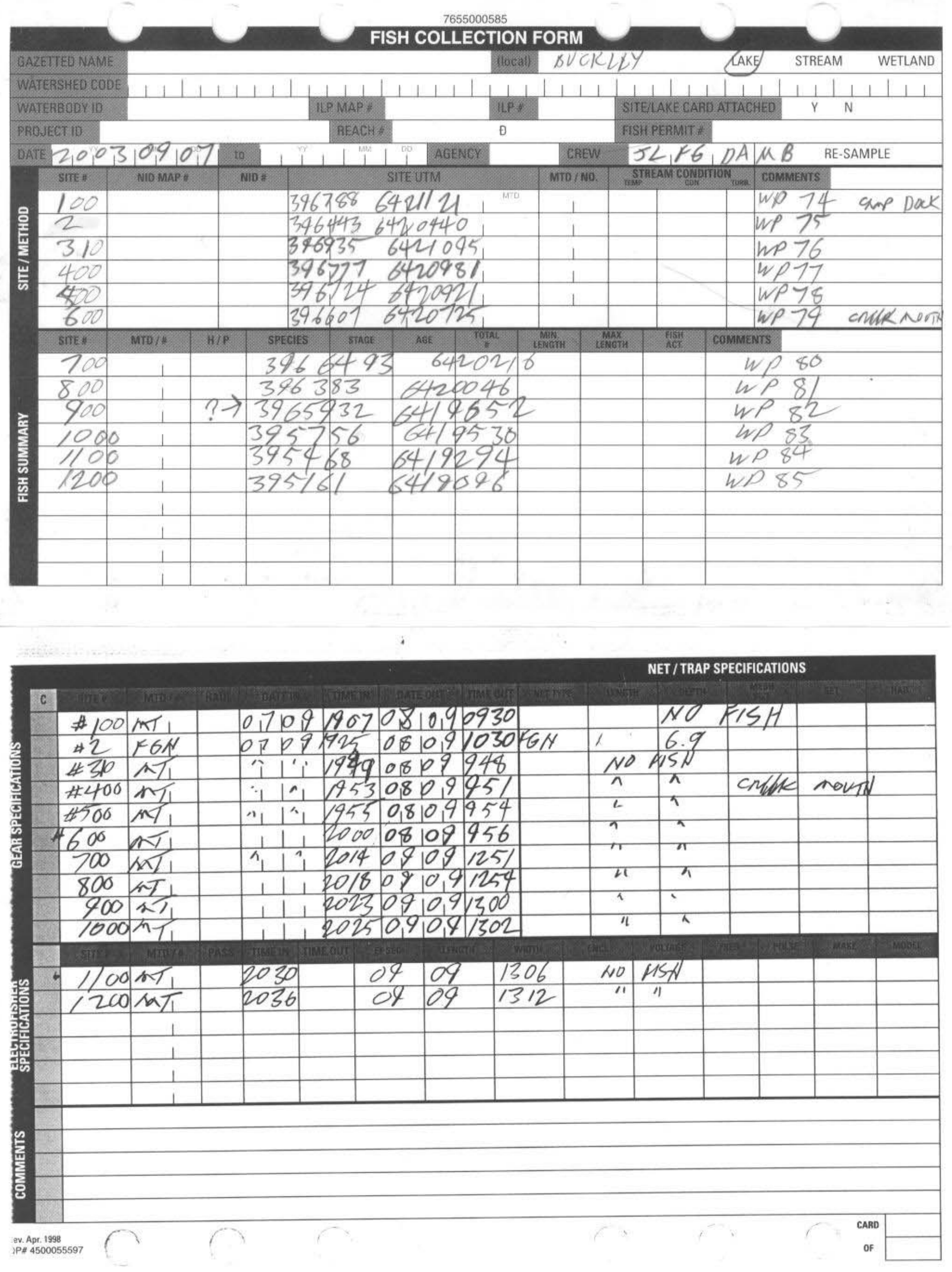
ELECTROFISHER SPECIFICATIONS

SITE #	MTD / #	PASS	TIME IN	TIME OUT	EF SEC.	LENGTH	WIDTH	ENCL.	VOLTAGE	FREQ.	PULSE	MAKE	MODEL
201													
203													
204													
205													
212													

COMMENTS

ev. Apr. 1998
P# 4500055597

CARD ___ OF ___



7655000585

FISH COLLECTION FORM

GAZETTED NAME (local) BUCKLEY [✓ LAKE] STREAM WETLAND

WATERSHED CODE

WATERBODY ID ILP MAP # ILP # SITE/LAKE CARD ATTACHED Y N

PROJECT ID REACH # Đ FISH PERMIT #

DATE 2003 09 07 to YY MM DD AGENCY CREW JL FG DA MB RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	MTD / NO.	STREAM CONDITION TEMP	CON	TURB	COMMENTS
100			396788 6421121					WP 74 SNAP DOCK
2			346443 6420440					WP 75
310			396935 6421095					WP 76
400			396777 6420981					WP 77
500			396724 6420921					WP 78
600			396601 6420725					WP 79 CREEK MOUTH

FISH SUMMARY

SITE #	MTD / #	H / P	SPECIES	STAGE	AGE	TOTAL #	MIN LENGTH	MAX LENGTH	FISH ACT.	COMMENTS
700			396 6493		6420216					WP 80
800			396 383		6420046					WP 81
900		?→	3965932		6419652					WP 82
1000			395756		6419538					WP 83
1100			395468		6419294					WP 84
1200			395161		6419096					WP 85

GEAR SPECIFICATIONS — NET / TRAP SPECIFICATIONS

C	SITE #	MTD / #	HAUL	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAUL
	#100	MT		07 09	1907	08 09	0930			NO	FISH		
	#2	FGN		07 09	1925	08 09	1030	FGN	1	6.9			
	#310	MT		" "	1949	08 09	948		NO	FISH			
	#400	MT		" "	1953	08 09	951		"	"	CREEK	MOUTH	
	#500	MT		" "	1955	08 09	954		"	"			
	#600	MT			2000	08 09	956		"	"			
	700	MT		" "	2014	09 09	1251		"	"			
	800	MT			2018	09 09	1254		"	"			
	900	MT			2023	09 09	1300		"	"			
	1000	MT			2025	09 09	1302		"	"			

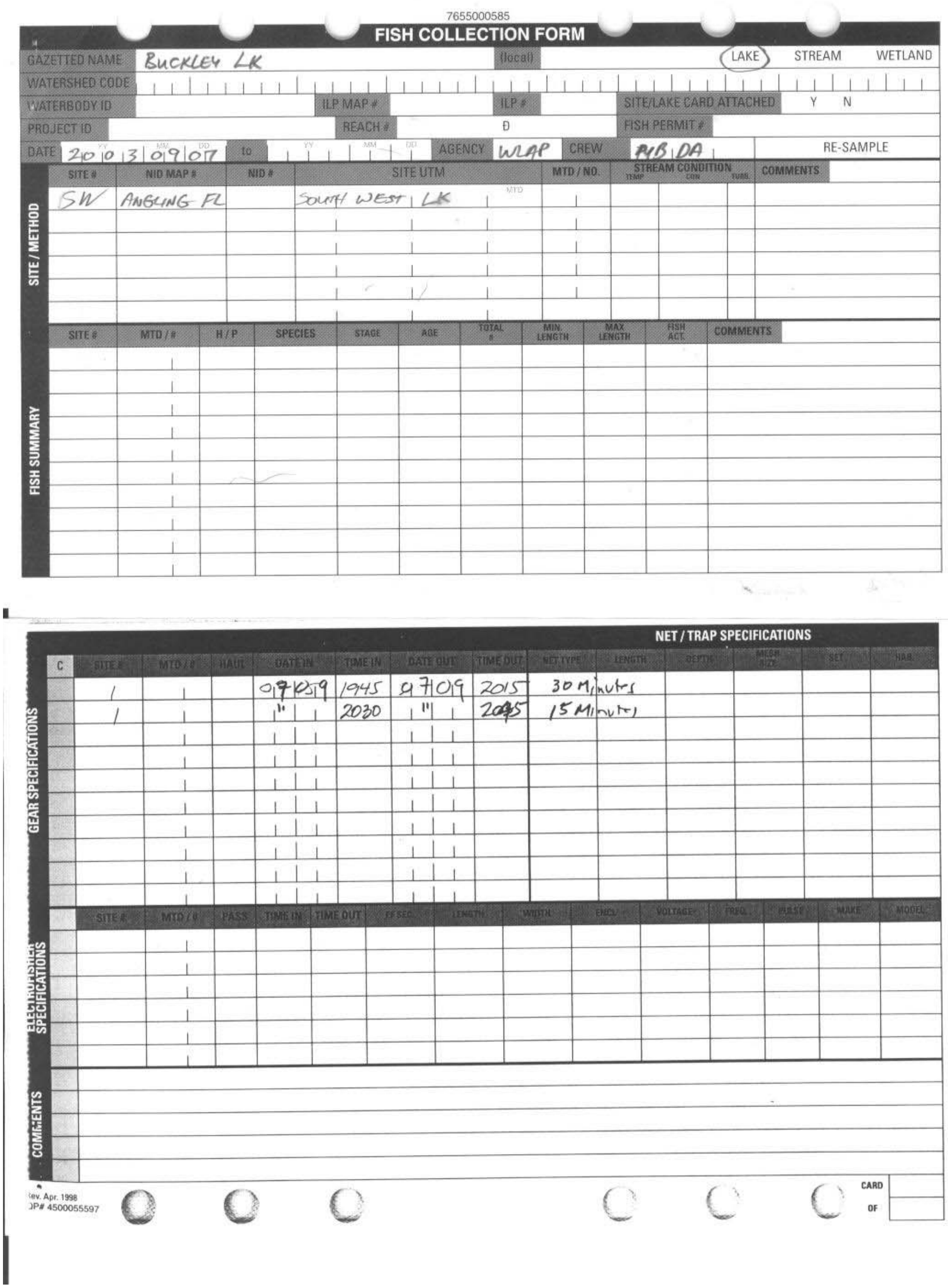
ELECTROFISHER SPECIFICATIONS

SITE #	MTD / #	PASS	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLTAGE	FREQ	PULSE	MAKE	MODEL
1100	MT		2030		09	09	1306	NO	FISH				
1200	MT		2036		09	09	1312	"	"				

COMMENTS

ev. Apr. 1998
P# 4500055597

CARD
OF



7655000585

FISH COLLECTION FORM

GAZETTED NAME Buckley LK (local) [✓ LAKE] STREAM WETLAND

WATERSHED CODE

WATERBODY ID ILP MAP # ILP # SITE/LAKE CARD ATTACHED Y N

PROJECT ID REACH # FISH PERMIT #

DATE YY 2010 MM 3 DD 09 07 to YY MM DD AGENCY WLAP CREW RJB DA RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	MTD / NO.	STREAM CONDITION TEMP	CON	TURB	COMMENTS
SW	ANGLING FL		SOUTH WEST LK					

FISH SUMMARY

SITE #	MTD / #	H / P	SPECIES	STAGE	AGE	TOTAL #	MIN. LENGTH	MAX LENGTH	FISH ACT.	COMMENTS

GEAR SPECIFICATIONS — NET / TRAP SPECIFICATIONS

C	SITE #	MTD / #	HAUL	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB.
	1			0 7 05 9	1945	9 7 09	2015	30 Minutes					
	1			"	2030	"	2045	15 Minutes					

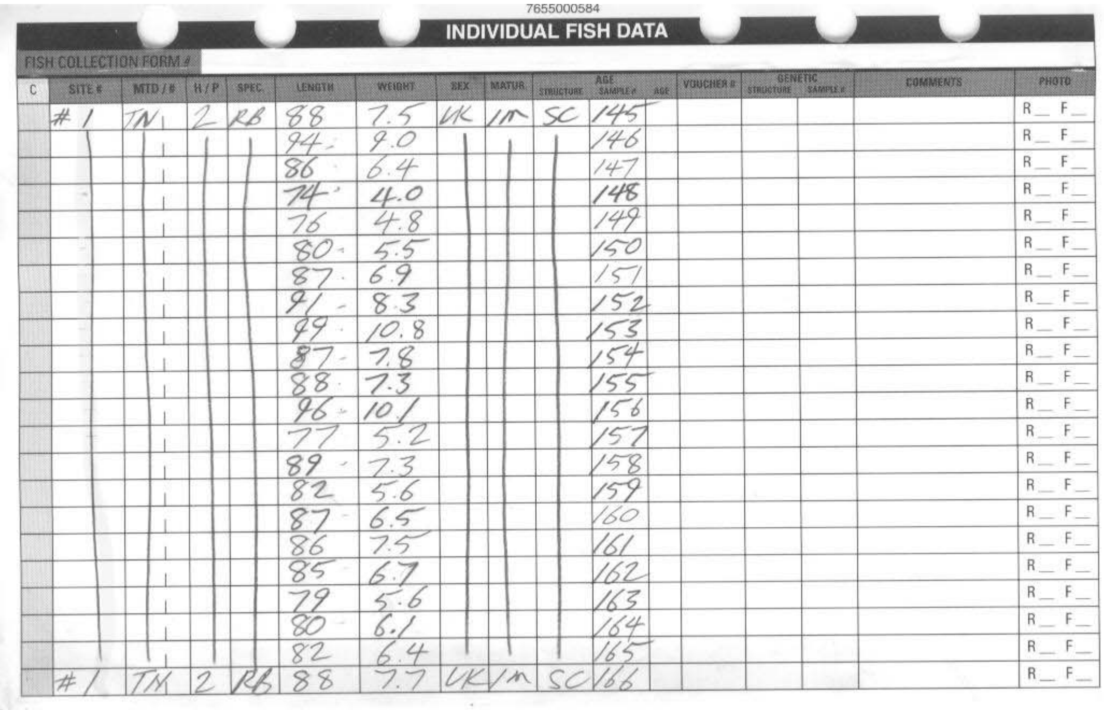
ELECTROFISHER SPECIFICATIONS

SITE #	MTD / #	PASS	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLTAGE	FREQ.	PULSE	MAKE	MODEL

COMMENTS

Rev. Apr. 1998
OP# 4500055597

CARD
OF

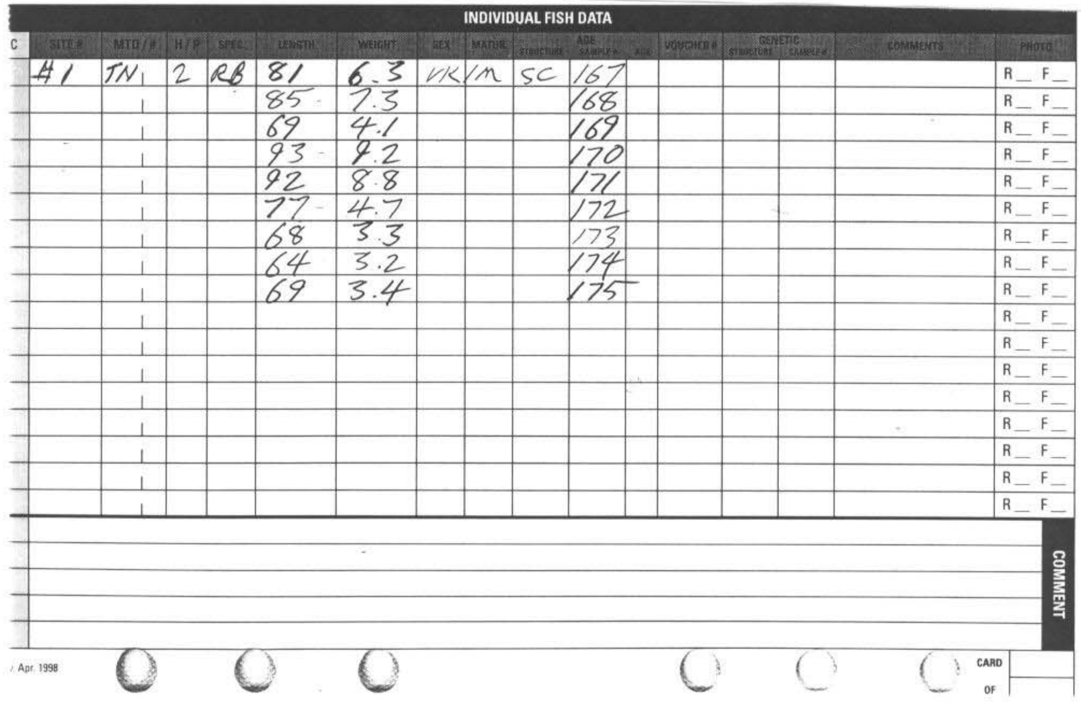


7655000584

INDIVIDUAL FISH DATA

FISH COLLECTION FORM #

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE			VOUCHER #	GENETIC		COMMENTS	PHOTO
									STRUCTURE	SAMPLE #	AGE		STRUCTURE	SAMPLE #		
	#1	TN	2	RB	88	7.5	UK	IM	SC	145						R__ F__
					94	9.0				146						R__ F__
					86	6.4				147						R__ F__
					74	4.0				148						R__ F__
					76	4.8				149						R__ F__
					80	5.5				150						R__ F__
					87	6.9				151						R__ F__
					91	8.3				152						R__ F__
					99	10.8				153						R__ F__
					87	7.8				154						R__ F__
					88	7.3				155						R__ F__
					96	10.1				156						R__ F__
					77	5.2				157						R__ F__
					89	7.3				158						R__ F__
					82	5.6				159						R__ F__
					87	6.5				160						R__ F__
					86	7.5				161						R__ F__
					85	6.7				162						R__ F__
					79	5.6				163						R__ F__
					80	6.1				164						R__ F__
					82	6.4				165						R__ F__
	#1	TN	2	RB	88	7.7	UK	Im	SC	166						R__ F__



INDIVIDUAL FISH DATA

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE			VOUCHER #	GENETIC		COMMENTS	PHOTO
									STRUCTURE	SAMPLE #	AGE		STRUCTURE	SAMPLE #		
	#1	TN	2	RB	81	6.3	UK	Im	SC	167						R__ F__
					85	7.3				168						R__ F__
					69	4.1				169						R__ F__
					93	9.2				170						R__ F__
					92	8.8				171						R__ F__
					77	4.7				172						R__ F__
					68	3.3				173						R__ F__
					64	3.2				174						R__ F__
					69	3.4				175						R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__

COMMENT

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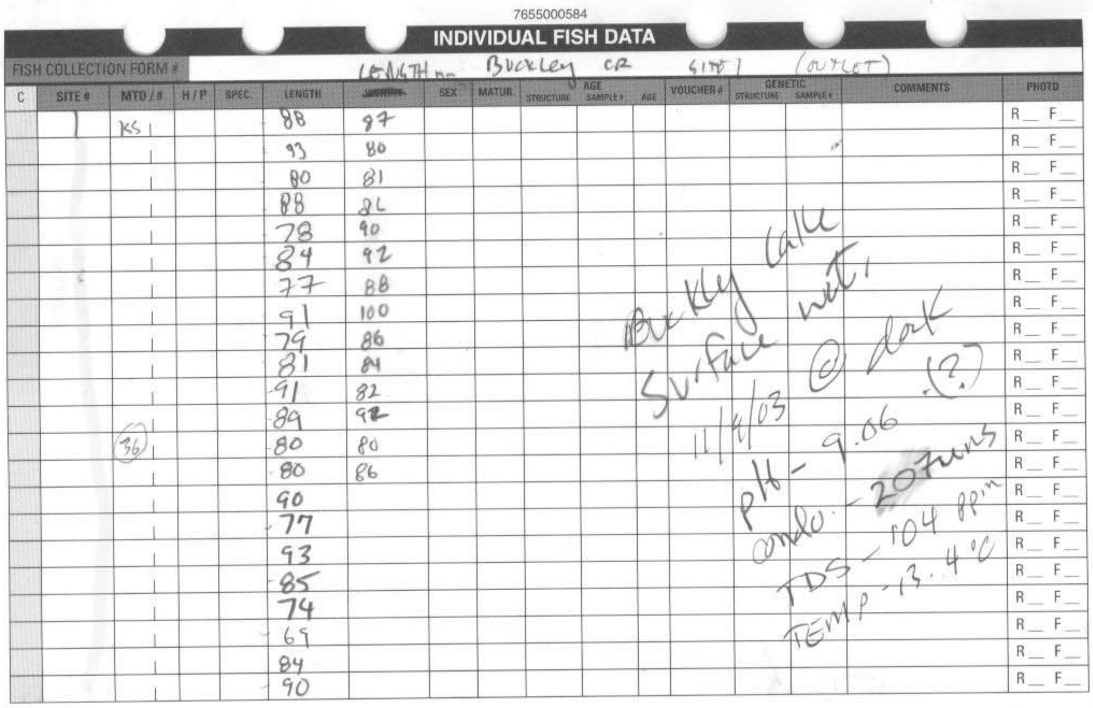
CARD

OF



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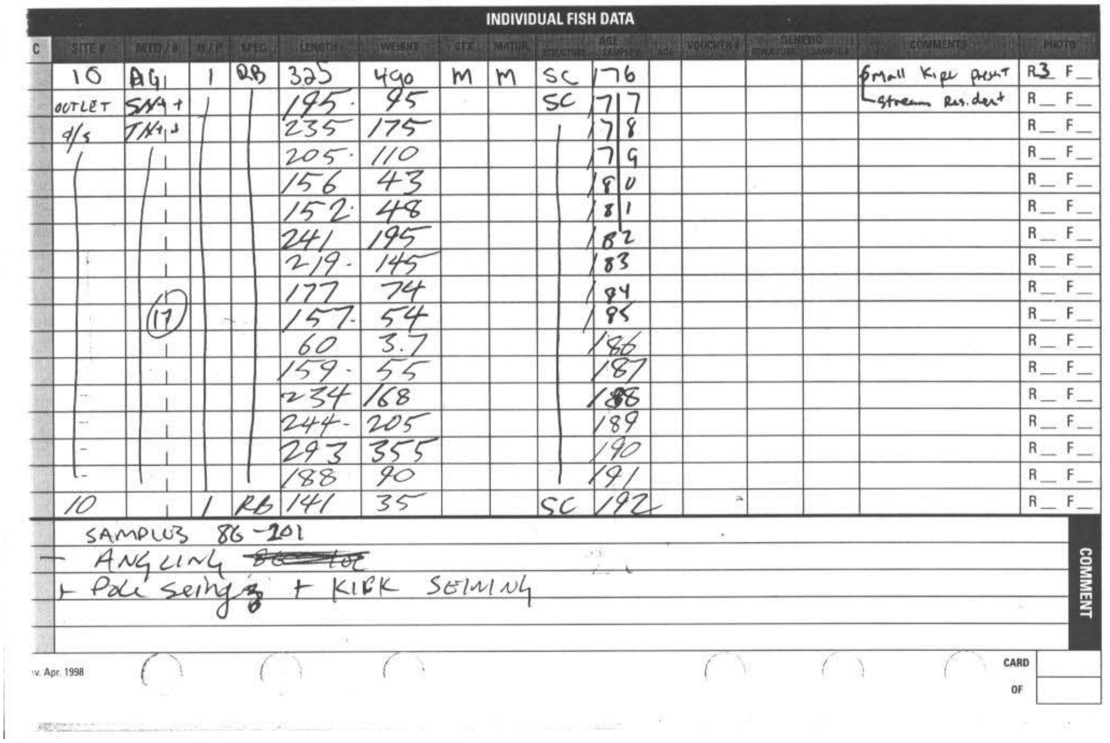
INDIVIDUAL FISH DATA

FISH COLLECTION FORM # LENGTH mm Buckley CR SITE 1 (OUTLET)

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	~~WEIGHT~~	SEX	MATUR.	AGE STRUCTURE	AGE SAMPLE #	AGE	VOUCHER #	GENETIC STRUCTURE	GENETIC SAMPLE #	COMMENTS	PHOTO
	1	KS 1			88	87										R_ F_
		1			93	80										R_ F_
		1			80	81										R_ F_
		1			88	86										R_ F_
		1			78	90										R_ F_
		1			84	92										R_ F_
		1			77	88										R_ F_
		1			91	100										R_ F_
		1			79	86										R_ F_
		1			81	84										R_ F_
		1			91	82										R_ F_
		1			89	92										R_ F_
		(36) 1			80	80										R_ F_
		1			80	86										R_ F_
		1			90											R_ F_
		1			77											R_ F_
		1			93											R_ F_
		1			85											R_ F_
		1			74											R_ F_
		1			69											R_ F_
		1			84											R_ F_
		1			90											R_ F_

Buckly Lake
Surface water
11/4/03 @ dock (?)
pH - 9.06
condu. - 207µmS
TDS - 104 ppm
TEMP - 13.4°C



INDIVIDUAL FISH DATA

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE STRUCTURE	AGE SAMPLE #	AGE	VOUCHER #	GENETIC STRUCTURE	GENETIC SAMPLE #	COMMENTS	PHOTO
	10	AG 1	1	RB	325	490	M	M	SC	176					Small Kipe present	R3 F_
	OUTLET	SN4 +			195	95			SC	177					stream Resident	R_ F_
	d/s	TN4 1			235	175				178						R_ F_
		1			205	110				179						R_ F_
		1			156	43				180						R_ F_
		1			152	48				181						R_ F_
		1			241	195				182						R_ F_
		1			219	145				183						R_ F_
		1			177	74				184						R_ F_
		(17) 1			157	54				185						R_ F_
		1			60	3.7				186						R_ F_
		1			159	55				187						R_ F_
		1			234	168				188						R_ F_
		1			244	205				189						R_ F_
		1			293	355				190						R_ F_
		1			188	90				191						R_ F_
	10	1	1	RB	141	35			SC	192						R_ F_

COMMENT

SAMPLES 86-201
– ANGLING ~~86-101~~
+ Pole seining + KICK SEINING

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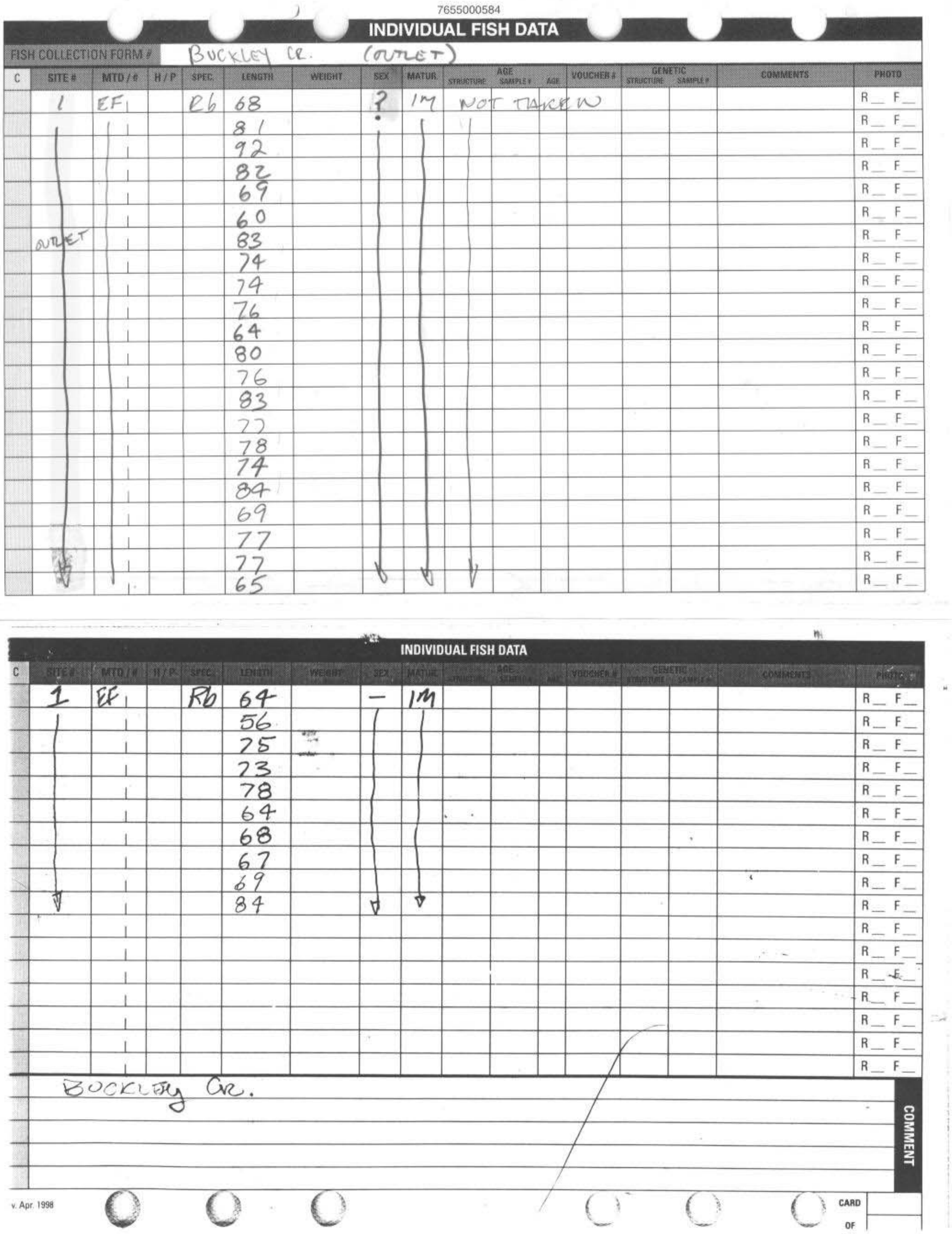

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INDIVIDUAL FISH DATA

FISH COLLECTION FORM # Buckley Cr. (outlet)

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE			VOUCHER #	GENETIC		COMMENTS	PHOTO
									STRUCTURE	SAMPLE #	AGE		STRUCTURE	SAMPLE #		
	1	EF		Rb	68		?	IM	NOT TAKEN							R__ F__
					81											R__ F__
					92											R__ F__
					82											R__ F__
					69											R__ F__
					60											R__ F__
	OUTLET				83											R__ F__
					74											R__ F__
					74											R__ F__
					76											R__ F__
					64											R__ F__
					80											R__ F__
					76											R__ F__
					83											R__ F__
					77											R__ F__
					78											R__ F__
					74											R__ F__
					84											R__ F__
					69											R__ F__
					77											R__ F__
					77											R__ F__
					65											R__ F__

INDIVIDUAL FISH DATA

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE			VOUCHER #	GENETIC		COMMENTS	PHOTO
									STRUCTURE	SAMPLE #	AGE		STRUCTURE	SAMPLE #		
	1	EF		Rb	64		–	IM								R__ F__
					56											R__ F__
					75											R__ F__
					73											R__ F__
					78											R__ F__
					64											R__ F__
					68											R__ F__
					67											R__ F__
					69											R__ F__
					84											R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__

COMMENT

Buckley Cr.

v. Apr. 1998

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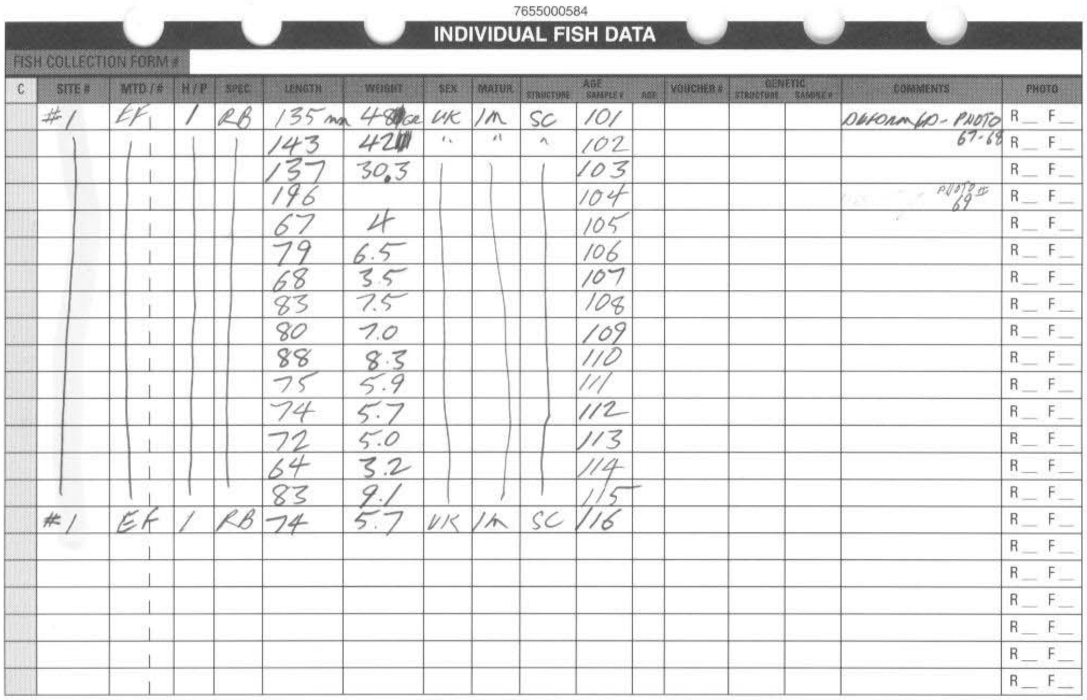

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INDIVIDUAL FISH DATA

FISH COLLECTION FORM #

C	SITE #	MTD / #	H / P	SPEC	LENGTH	WEIGHT	SEX	MATUR	AGE			VOUCHER #	GENETIC		COMMENTS	PHOTO
									STRUCTURE	SAMPLE #	AGE		STRUCTURE	SAMPLE #		
	#1	EF	1	RB	135 mm	48 gr	UK	IM	SC	101					DEFORMED - PHOTO 67-68	R__ F__
					143	42	''	''	^	102						R__ F__
					137	30.3				103						R__ F__
					196					104					PHOTO # 69	R__ F__
					67	4				105						R__ F__
					79	6.5				106						R__ F__
					68	3.5				107						R__ F__
					83	7.5				108						R__ F__
					80	7.0				109						R__ F__
					88	8.3				110						R__ F__
					75	5.9				111						R__ F__
					74	5.7				112						R__ F__
					72	5.0				113						R__ F__
					64	3.2				114						R__ F__
					83	9.1				115						R__ F__
	#1	EF	1	RB	74	5.7	UK	IM	SC	116						R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__

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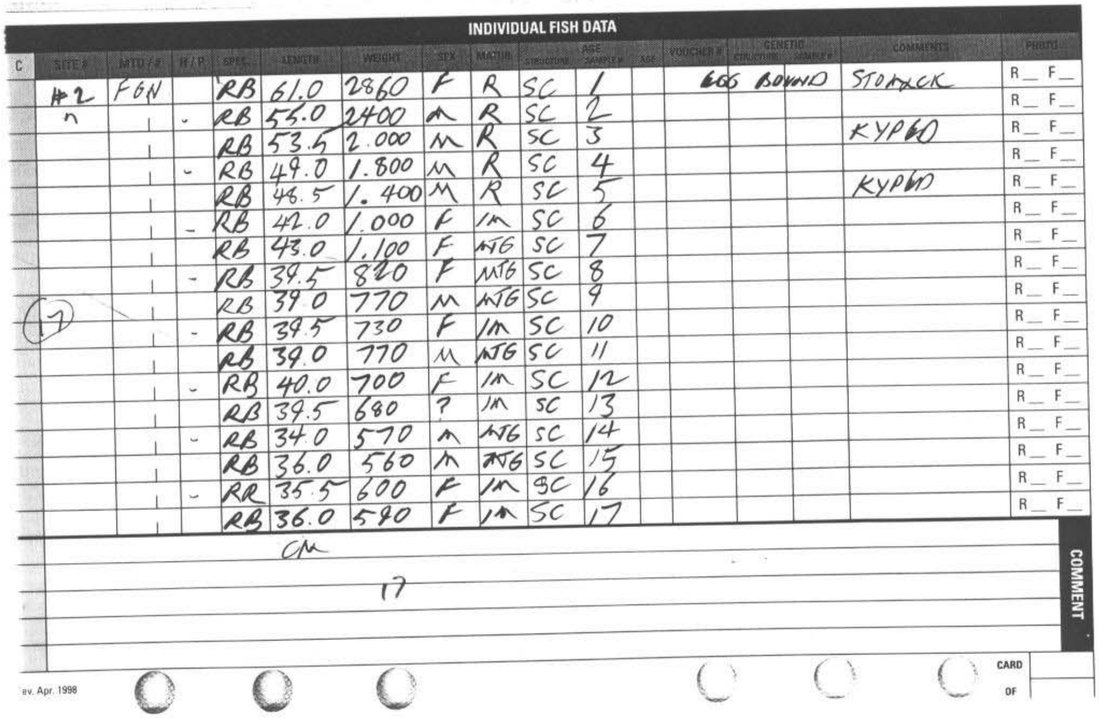
INDIVIDUAL FISH DATA

FISH COLLECTION FORM # Cm

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE STRUCTURE	AGE SAMPLE #	AGE	VOUCHER #	GENETIC STRUCTURE	GENETIC SAMPLE #	COMMENTS	PHOTO
	#2			RB	38.5	690	M	M	SC	18	/					R__ F__
				RB	35.0	570	M	MTG	SC	19						R__ F__
				RB	33.5	490	F	IM	SC	20						R__ F__
				RB	35.0	500	M	MTG	SC	21						R__ F__
				RB	33.0	455	M	MTG	SC	22						R__ F__
				RB	32.5	400	M	M	SC	23						R__ F__
			0	RB	30.5	375	F	IM	SC	24						R__ F__
				RB	30.5	360	M	IM	SC	25						R__ F__
			D	RB	29.5	340	M	MTG	SC	26						R__ F__
	㉒		^	RB	33.0	455	F	MTG	SC	27						R__ F__
			^	RB	28.5	285	M	M	SC	28						R__ F__
			D	RB	27.5	290	M	MTG	SC	29						R__ F__
			^	RB	28.0	265	F	IM	SC	30						R__ F__
			D	RB	28.0	285	M	MTG	SC	31						R__ F__
			D	RB	25.0	190	F	IM	SC	32						R__ F__
			^	RB	26.0	210	M	M	SC	33						R__ F__
			D	RB	23.0	185	M	M	SC	34						R__ F__
			^	RB	26.5	235	M	M	SC	35						R__ F__
			D	RB	23.5	205	M	M	SC	36						R__ F__
			^	RB	24.0	170	?	M	SC	37						R__ F__
			D	RB	22.0	125	?	IM	SC	38						R__ F__
	#2	-	D	RB	23.5	170	F	IM	SC	39						R__ F__



INDIVIDUAL FISH DATA

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE STRUCTURE	AGE SAMPLE #	AGE	VOUCHER #	GENETIC STRUCTURE	GENETIC SAMPLE #	COMMENTS	PHOTO
	#2	FGN		RB	61.0	2860	F	R	SC	1		EGG BOUND			STOMACK	R__ F__
	n			RB	55.0	2400	M	R	SC	2						R__ F__
				RB	53.5	2.000	M	R	SC	3					KYPED	R__ F__
				RB	49.0	1.800	M	R	SC	4						R__ F__
				RB	48.5	1.400	M	R	SC	5					KYPED	R__ F__
				RB	42.0	1.000	F	IM	SC	6						R__ F__
				RB	43.0	1.100	F	MTG	SC	7						R__ F__
				RB	39.5	820	F	MTG	SC	8						R__ F__
				RB	39.0	770	M	MTG	SC	9						R__ F__
	⑰			RB	39.5	730	F	IM	SC	10						R__ F__
				RB	39.0	770	M	MTG	SC	11						R__ F__
				RB	40.0	700	F	IM	SC	12						R__ F__
				RB	39.5	680	?	IM	SC	13						R__ F__
				RB	34.0	570	M	MTG	SC	14						R__ F__
				RB	36.0	560	M	MTG	SC	15						R__ F__
				RR	35.5	600	F	IM	SC	16						R__ F__
				RB	36.0	540	F	IM	SC	17						

COMMENT

CM

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ev. Apr. 1998

CARD

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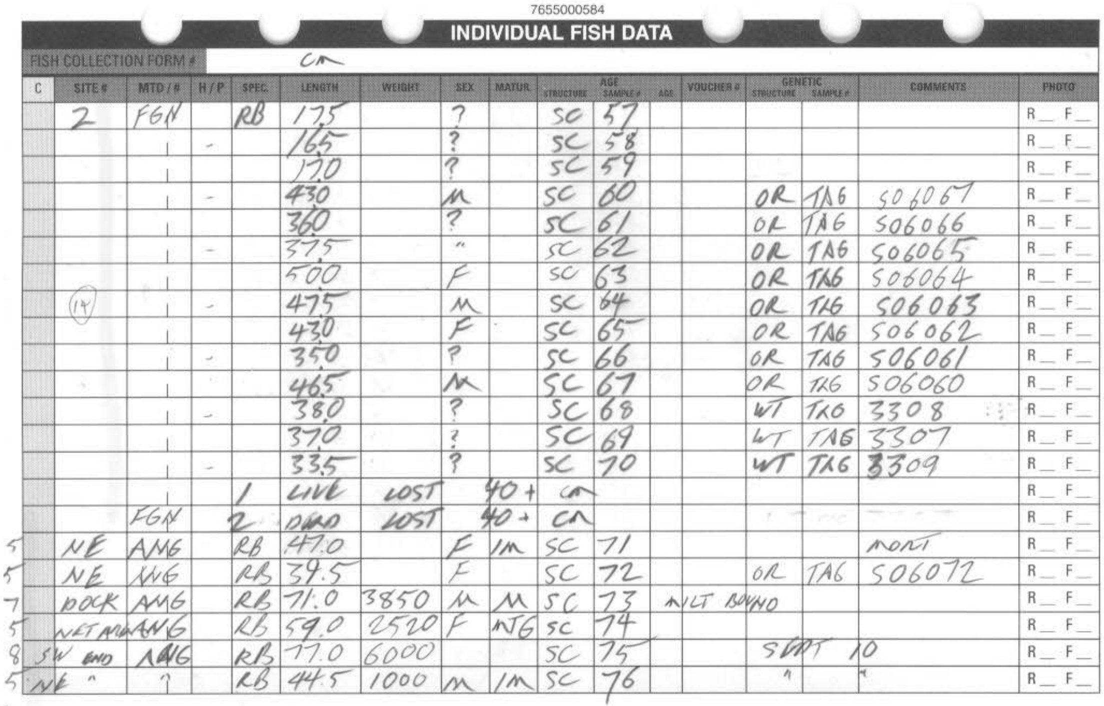

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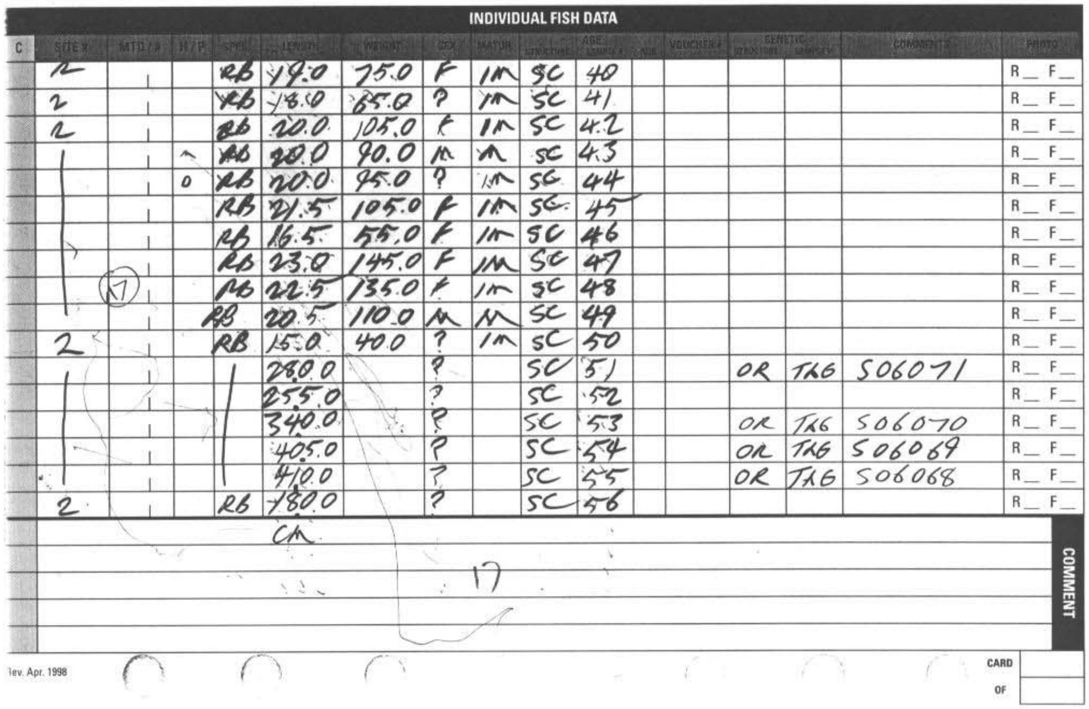
INDIVIDUAL FISH DATA

FISH COLLECTION FORM # CM

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE			VOUCHER #	GENETIC		COMMENTS	PHOTO
									STRUCTURE	SAMPLE #	AGE		STRUCTURE	SAMPLE #		
	2	FGN		RB	175		?		SC	57						R__ F__
		|	-		165		?		SC	58						R__ F__
		|			170		?		SC	59						R__ F__
		|	-		430		M		SC	60			OR	TAG	506067	R__ F__
		|			360		?		SC	61			OR	TAG	506066	R__ F__
		|	-		375		"		SC	62			OR	TAG	506065	R__ F__
		|			500		F		SC	63			OR	TAG	506064	R__ F__
	⑭	|	-		475		M		SC	64			OR	TAG	506063	R__ F__
		|			430		F		SC	65			OR	TAG	506062	R__ F__
		|	-		350		?		SC	66			OR	TAG	506061	R__ F__
		|			465		M		SC	67			OR	TAG	506060	R__ F__
		|	-		380		?		SC	68			WT	TAG	3308	R__ F__
		|			370		?		SC	69			WT	TAG	3307	R__ F__
		|	-		335		?		SC	70			WT	TAG	3309	R__ F__
		|		1	LIVE	LOST		40+	CM							R__ F__
		FGN		2	DEAD	LOST		40+	CM							R__ F__
5	NE	AMG		RB	47.0		F	IM	SC	71					MORT	R__ F__
5	NE	ANG		RB	39.5		F		SC	72			OR	TAG	506072	R__ F__
7	DOCK	AMG		RB	71.0	3850	M	M	SC	73	MILT BOUND					R__ F__
5	NET MAN	ANG		RB	59.0	2520	F	MTG	SC	74						R__ F__
8	SW END	ANG		RB	77.0	6000			SC	75			SPNT		10	R__ F__
5	NE "	"		RB	44.5	1000	M	IM	SC	76			"		"	R__ F__



INDIVIDUAL FISH DATA

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE			VOUCHER #	GENETIC		COMMENTS	PHOTO
									STRUCTURE	SAMPLE #	AGE		STRUCTURE	SAMPLE #		
	2	|		RB	19.0	75.0	F	IM	SC	40						R__ F__
	2	|		RB	18.0	65.0	?	IM	SC	41						R__ F__
	2	|		RB	20.0	105.0	F	IM	SC	42						R__ F__
	|	|	^	RB	20.0	90.0	M	M	SC	43						R__ F__
	|	|	0	RB	20.0	95.0	?	IM	SC	44						R__ F__
	|	|		RB	21.5	105.0	F	IM	SC	45						R__ F__
	|	|		RB	16.5	55.0	F	IM	SC	46						R__ F__
	|	|		RB	23.0	145.0	F	IM	SC	47						R__ F__
	|	⑰ |		RB	22.5	135.0	F	IM	SC	48						R__ F__
	|	|		RB	20.5	110.0	M	M	SC	49						R__ F__
	2	|		RB	15.0	40.0	?	IM	SC	50						R__ F__
	|	|		|	280.0		?		SC	51			OR	TAG	506071	R__ F__
	|	|		|	255.0		?		SC	52						R__ F__
	|	|		|	340.0		?		SC	53			OR	TAG	506070	R__ F__
	|	|		|	405.0		?		SC	54			OR	TAG	506069	R__ F__
	|	|		|	410.0		?		SC	55			OR	TAG	506068	R__ F__
	2	|		RB	180.0		?		SC	56						R__ F__

COMMENT

CM

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lev. Apr. 1998

CARD

OF

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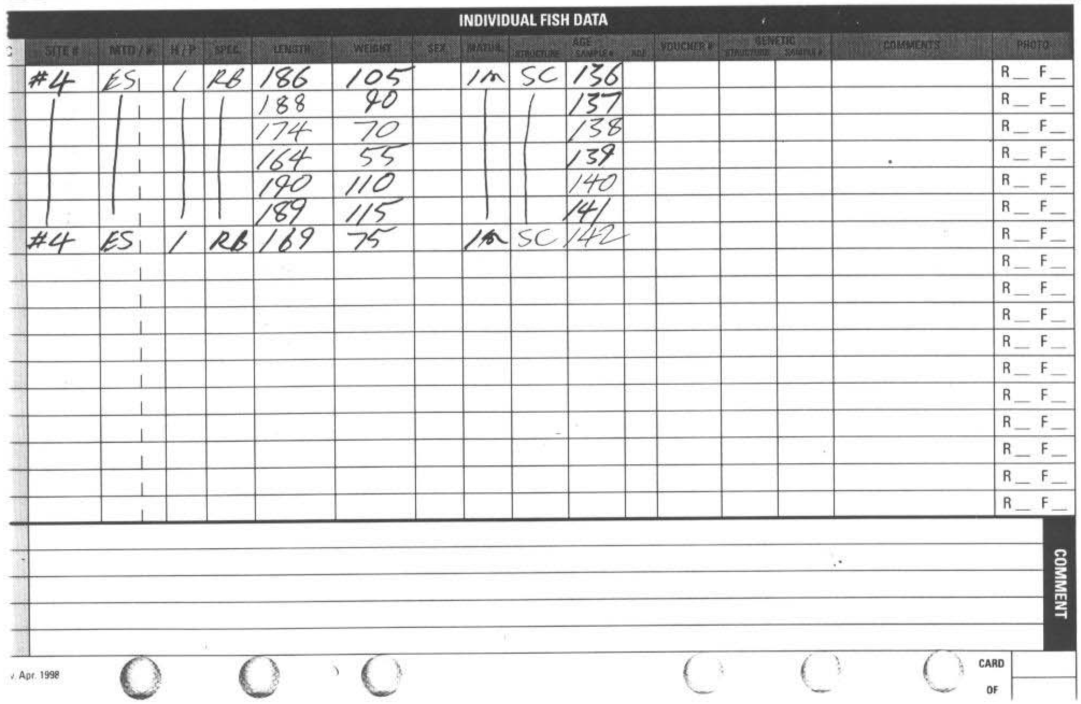
INDIVIDUAL FISH DATA

FISH COLLECTION FORM # Buckley Ar. (inlet)

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE			VOUCHER #	GENETIC		COMMENTS	PHOTO
									STRUCTURE	SAMPLE #	AGE		STRUCTURE	SAMPLE #		
	12	EF	1	RB	74	5.9			SC	117						R_ F_
	12				212					118						R_ F_
	OUTLET 12				161	60				119						R_ F_
	12				179					120						R_ F_
	12				185					121						R_ F_
	12				155	44.3				122						R_ F_
	12				150					123						R_ F_
	12				90	9.9				124						R_ F_
	12				75	5.5				125						R_ F_
	12	AG		RB	21.5											R_ F_
	12	AG		RB	91	12.7			SC	126						R_ F_
	12	AG		RB	74	5.3			SC	127						R_ F_
INLET	3	ES		RB	130	25g			SC	128					TRIB 2	R_ F_
																R_ F_
	4	AG		RB	330	400			SC	129						R_ F_
	4	"		RB	362	575			SC	130						R_ F_
	4	ES		RB	56										caught + released	R_ F_
	4	"		RB	201	150			SC	131						R_ F_
					225	190				132						R_ F_
					216	180				133						R_ F_
					190	110				134						R_ F_
					194	110				135						R_ F_



INDIVIDUAL FISH DATA

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE			VOUCHER #	GENETIC		COMMENTS	PHOTO
									STRUCTURE	SAMPLE #	AGE		STRUCTURE	SAMPLE #		
	#4	ES	1	RB	186	105		1m	SC	136						R_ F_
					188	90				137						R_ F_
					174	70				138						R_ F_
					164	55				139						R_ F_
					190	110				140						R_ F_
					189	115				141						R_ F_
	#4	ES	1	RB	169	75		1m	SC	142						R_ F_
																R_ F_
																R_ F_
																R_ F_
																R_ F_
																R_ F_
																R_ F_
																R_ F_
																R_ F_
																R_ F_

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INDIVIDUAL FISH DATA

C	SITE #	MTD / #	H / P	SPEC	LENGTH	WEIGHT	SEX	MATUR.	AGE STRUCTURE	AGE SAMPLE #	AGE	VOUCHER #	GENETIC STRUCTURE	GENETIC SAMPLE #	COMMENTS	PHOTO
8	BAY SW. 6ND	AMG		RB	51.0		M		SC	77			WT TAG		3348	R__ F__
8	"	"		RB	51.0		F	MTG	SC	78			DNA			R__ F__
8	"	"		RB	64.0		F	M	SC	79			"			R__ F__
8	"	"		RB	40.5		M	M	SC	80						R__ F__
8	"	"		RB	40.5		M		SC	81			WT	TAG	3370	R__ F__
8	"	"		RB	37.0		?			82			WT	TAG	3349	R__ F__
8	"	"		RB	29.5		?		SC	83			WT	TAG	3345	R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__

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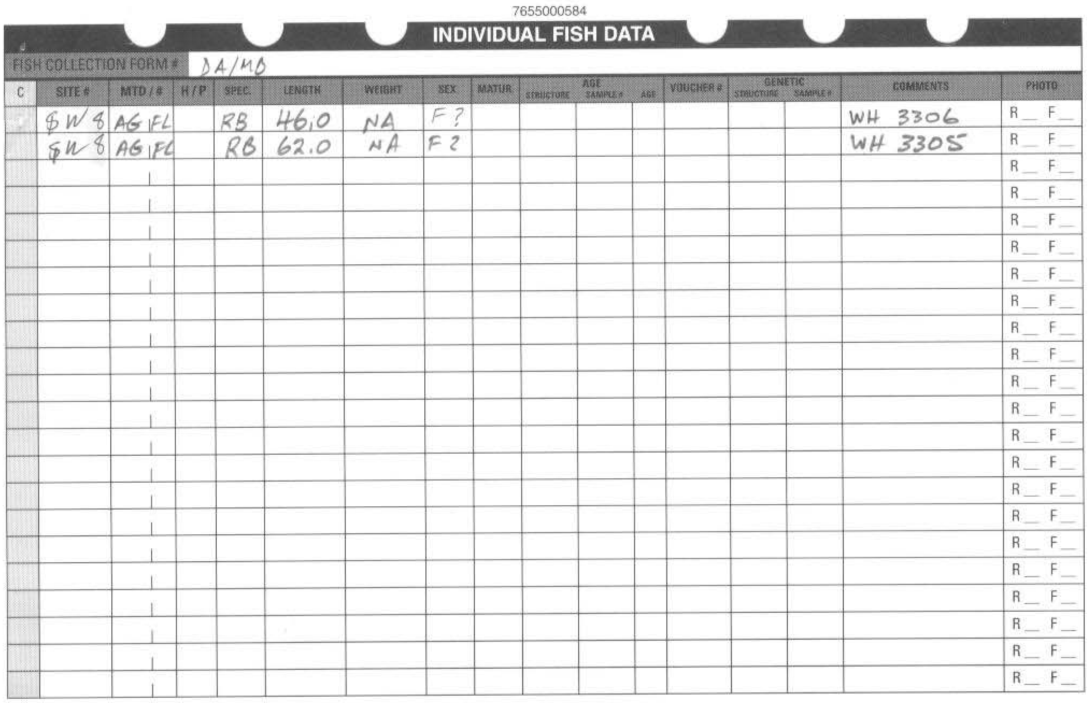
CARD ____ OF ____



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INDIVIDUAL FISH DATA

FISH COLLECTION FORM # DA/MB

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE STRUCTURE	AGE SAMPLE #	AGE	VOUCHER #	GENETIC STRUCTURE	GENETIC SAMPLE #	COMMENTS	PHOTO
	$W 8	AG FL		RB	46.0	NA	F ?								WH 3306	R__ F__
	$W 8	AG FL		RB	62.0	NA	F ?								WH 3305	R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
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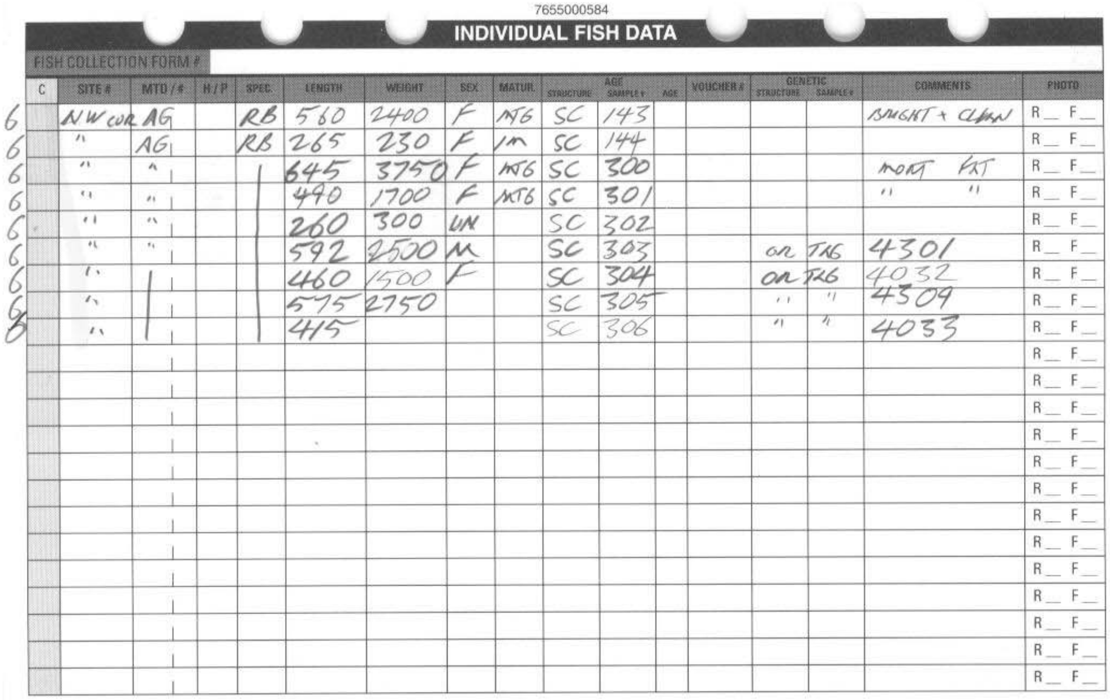

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INDIVIDUAL FISH DATA

FISH COLLECTION FORM #

	C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE			VOUCHER #	GENETIC		COMMENTS	PHOTO
										STRUCTURE	SAMPLE #	AGE		STRUCTURE	SAMPLE #		
6		NW COR	AG		RB	560	2400	F	MTG	SC	143					BRIGHT + CLEAN	R__ F__
6		"	AG		RB	265	230	F	IM	SC	144						R__ F__
6		"	"			645	3750	F	MTG	SC	300					MORT FAT	R__ F__
6		"	"			490	1700	F	MTG	SC	301					" "	R__ F__
6		"	"			260	300	UN		SC	302						R__ F__
6		"	"			592	2500	M		SC	303			OR	TAG	4301	R__ F__
6		"				460	1500	F		SC	304			OR	TAG	4032	R__ F__
6		"				575	2750			SC	305			"	"	4309	R__ F__
6		"				415				SC	306			"	"	4033	R__ F__
																	R__ F__
																	R__ F__
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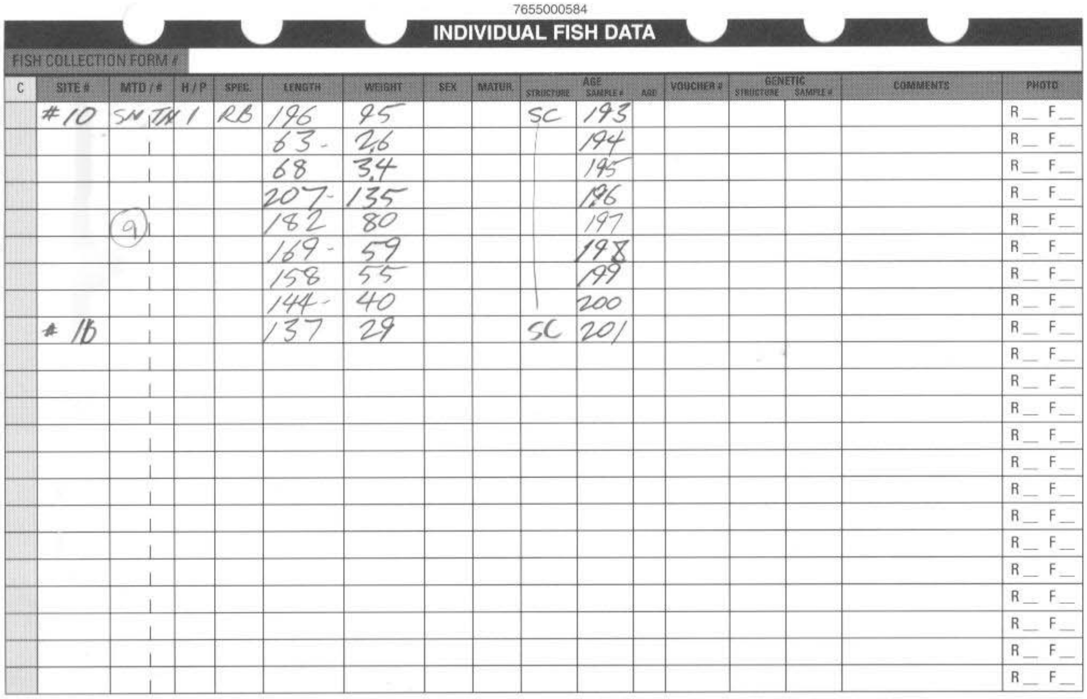

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INDIVIDUAL FISH DATA

FISH COLLECTION FORM #

C	SITE #	MTD / #	H / P	SPEC.	LENGTH	WEIGHT	SEX	MATUR.	AGE			VOUCHER #	GENETIC		COMMENTS	PHOTO
									STRUCTURE	SAMPLE #	AGE		STRUCTURE	SAMPLE #		
	#10	SN TN 1		RB	196	95			SC	193						R__ F__
					63-	26				194						R__ F__
					68	34				195						R__ F__
					207-	135				196						R__ F__
		⑨			182	80				197						R__ F__
					169-	59				198						R__ F__
					158	55				199						R__ F__
					144-	40				200						R__ F__
	# 1B				137	29			SC	201						R__ F__
																R__ F__
																R__ F__
																R__ F__
																R__ F__
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