

RECONNAISSANCE SURVEY OF

BRISTOL LAKE

WATERSHED CODE 480 - 6972 - 657 - 01

SURVEY DATES : 08 - 10 OCTOBER 1995

Prepared for:

MINISTRY OF ENVIRONMENT, LANDS AND PARKS

Fisheries Branch

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1. SUMMARY

Bristol Lake is located in the Bulkley Forest District, 41 km northeast of the town of Smithers. Reconnaissance inventory of the lake was made 08 - 10 October 1995. The lake covers 81 surface hectares and is round in shape and shallow (mean and maximum depths of 1.9 m and 5.7 m). It lies 814 m above sea level and drains via Bristol Creek to the Fulton River, Babine Lake and the Skeena system. More than 95 % of the shoreline consists of cutblocks or sedge wetlands. Access was achieved by 2WD forest road to near the lake margin.

On the survey dates, the lake was thermally well-mixed with only slight near-bottom oxygen depletion. Lake water was neutral with very low specific conductance. Phosphorus and nitrogen concentrations imply oligotrophy and low productivity.

Lake fish populations were sampled by an overnight set of one standard 91m experimental multi-mesh sinking gillnet and 5 minnow traps baited with salmon roe. Nine species of fish were captured in Bristol Lake: cutthroat trout (*Oncorhynchus clarki*), rainbow trout (*Oncorhynchus mykiss*), mountain whitefish (*Prosopium williamsoni*), longnose sucker (*Catostomus catostomus*), coarsescale sucker (*Catostomus macrocheilus*), lake chub (*Couesius plumbeus*), reidside shiner (*Richardsonius balteatus*), peamouth chub (*Mylocheilus caurinus*) and northern squawfish (*Ptycheilus oregonensis*). Gillnet catch per effort for cutthroat trout indicated intermediate population density for the species. Peamouth chub were very abundant, while rainbow trout, mountain whitefish, lake chub and reidside shiner were captured in low numbers. Cutthroat trout maximum length was typical of Skeena region small lakes. The population condition factor was good.

The lake outlet stream and five inlet channels were examined for fisheries potential. A beaver dam at the lake outlet probably blocks fish passage except at higher flows. Salmonid spawning habitat occurs downstream of the lake and the size of the channel implies that it conveys high early season discharge, so it is likely the most important spawning stream for Bristol Lake trout populations. Four of the five inlet channels appeared to have low fisheries potential, though survey access was limited to flooded reaches near the lake.

The landscape of the Bristol Lake area is dominated by timber harvest. The lake supports a diverse fish community, probably because of its proximity to the Fulton River, Chapman and Fulton Lakes. Protection of the fish populations of Bristol Lake is not of particular concern at this time. Further industrial activity in the area will probably not occur within the next half-century. Despite its fishery potential, the lake is unlikely to attract significant recreational angling in the near future because of the condition of its surroundings. Special regulations or access management status are not recommended.

2. DATA ON FILE

Location	<u>√</u>	Dissolved Oxygen Profile	<u>√</u> -
Physical Data	<u>√</u>	Temperature Profile	<u>√</u>
Bench Mark	<u>√</u>	Netting Record	<u>√</u>
Terrain Features	<u>√</u>	Lake Catch Summary	<u>√</u>
Access	<u>√</u>	Fisheries Comments	<u>√</u>
Resorts & Campsites	<u>√</u>	Individual Fish Data	<u>√</u>
Other Developments	<u>√</u>	Fish Preserved	-
Obstructions and Pollutions	<u>√</u>	Stomach Analysis	-
Special Restrictions	<u>√</u>	Scale Reading	<u>√</u>
Aquatic Plants	<u>√</u>	History of Previous Surveys	<u>√</u>
Wildlife Observations	<u>√</u>	Location of Inventory Sites	<u>√</u>
Miscellaneous Comments	<u>√</u>	Photograph Directory	<u>√</u>
Lake Drainage	<u>√</u>	Appendices	<u>√</u>
Inlets/Outlets	<u>√</u>	Bathymetric Reduction	<u>√</u>
Water Chemistry	<u>√</u>	Contour Map	<u>√</u>

3. GEOGRAPHIC AND MORPHOLOGIC INFORMATION

3.1 Location

Location	41 km NE of the town of Smithers
Drainage	Bristol C → Fulton R → Babine L → Babine R → Skeena R → Chatham Sound
Watershed Code	480-6972-657-01
Latitude / Longitude.....	55° 02' / 126° 43'
U.T.M.....	09.645803.6100298 (WCD)
Management Unit.....	06 - 08
N.T.S. Map #.....	93M/02 (1:50,000)
Forest Region.....	Prince Rupert
Forest District.....	Bulkley
Forest Cover Map	93M.007 (1:20,000)
Native Land Claims	Sekanni - Carrier, Natooten

Figure 1. Location of Bristol Lake. Inset map shows the location within the province of British Columbia. Map scale is approximately 1 : 250,000.

Figure 2. Bristol Lake, enlargement from air photo 30BCB92077 No. 109.

3.2 Physical Data

Elevation	814 m	Elevation Source.....	Casio ALT6100 altimeter
Water Surface Area.....	806795 m ²	Volume.....	1525720 m ³
Area Above 6 m Contour	806795 m ²	Flushing Rate	NA
Shoreline Perimeter.....	3859 m	Perimeter of Islands.....	NA
Maximum Depth	5.7 m	Mean Depth.....	1.93 m
Sounding Device	Lowrance X-15B	Lake Drainage Area	NA
Filterable Residue (T.S.S.)..	< 4 mg/L	Secchi Disc.....	1.53 m

3.3 Benchmark

The benchmark was established in a 0.25 m (dbh) spruce on the south shore, 25 m E of the narrow outlet bay (Figure 2). An iron spike was placed in an orange circle painted on the tree trunk, 0.85 m above the current lake level.

3.4 Prior Surveys

A search of Skeena Region inventory files yielded no records for Bristol Lake, Bristol Creek or Fulton Lake. A 1952 inventory of Chapman Lake, located about 10 km downstream of Bristol Lake on the Fulton River, captured lake char, cutthroat trout, lake whitefish, peamouth chub and longnose sucker.

3.5 Lake Drainage

Quantitative characteristics of the stream surveys and fish collection can be found on the stream survey forms in Appendix B and the fish sampling data sheets in Appendix C. Numbering of the streams (S1, S2, etc.) in this section corresponds to labels on Figure 2 and other figures and tables in this report.

Six channels were examined.

- S1. Bristol Creek, WC 480-6972-657, outlet stream of Bristol Lake surveyed at UTM 09.645803.6100298 (WCD). A beaver dam at the lake outlet creates an immediate barrier to fish passage at lower flows. Channel dimensions suggest that it carries seasonally substantial flow, though at the time of survey flow was mostly subsurface. Passage is probably possible during higher flows. The stream may support salmonid spawning during spring and early summer high flows, as suitable gravels were present. Lakeward migration would be difficult for young fish at late season flows. An overnight set of two minnow traps captured one cutthroat trout and one longnose sucker.
- S2. Unnamed channel WC 480-6972-657-112, inlet to the south shore of Bristol Lake and surveyed at UTM 09.646200.6100500 (NAD27). At the time of the survey, the channel was watered but at low stage. A barrier 75 m upstream from the lake is likely passable at higher flows. The surveyed section did not bear salmonid spawning habitat, though gravel substrate may occur upstream of this reach. An overnight set of one minnow trap captured no fish.

- S3. Unnamed channel WC 480-6972-657-237, southern inlet to the east shore of Bristol Lake and surveyed at UTM 09.646500.6101200 (NAD27). This flooded channel traverses a sedge wetland to reach the lake. There are no barriers to fish migration, but the surveyed section bears only fine substrate unsuited for salmonid reproduction. An overnight set of one minnow trap capture a lake chub and two juvenile longnose suckers.
- S4. Bristol Creek, WC 480-6972-657, northern inlet to the east shore of Bristol Lake and surveyed at UTM 09.646500.6101300 (NAD27). The channel is flooded near the lake, traversing a sedge wetland at the lakeshore. The surveyed section bears only fine substrate unsuited for salmonid reproduction. Air photos show beaver dams on the channel upstream from the lake. It is unclear whether habitat suitable for salmonid reproduction is accessible from the lake. An overnight set of one minnow trap near the lake and another where the access road crosses the channel, 300 m upstream from the lake, each captured one longnose sucker juvenile.
- S5. Unnamed channel WC 480-6972-657-183, inlet to the northwest shore of Bristol Lake and surveyed at UTM 09.645800.6101500 (NAD27). The channel was completely dry upstream of the flooded portion adjacent to the lake. Flow is intermittent and the substrate is composed of fines unsuited for salmonid spawning. An overnight set of one minnow trap in the flooded section captured a single lake chub.
- S6. Unnamed channel, inlet to the west shore of Bristol Lake and surveyed at UTM 09.645600.6100800 (NAD27). The channel was completely dry upstream of a flooded section of length 15 m, adjacent to the lake. There are no barriers to fish passage, but flow is intermittent and the substrate is composed of fines unsuited for salmonid spawning.

3.6 Terrain and Vegetation

3.6.1 Immediate Shore

Much of the shallow substrate is composed of large cobble. Sand and compact clay are found in some areas, and organic fines occur near the inlets and adjacent sedge wetlands. More than 95 % of the shoreline consists of cutblocks or sedge wetlands.

3.6.2 Surrounding Country

The lake is located within a zone of low rolling terrain, width 4 - 5 km, extending from Babine Lake SW to the Fulton River. Distinctly steeper hills occur on either side of this zone. The area was originally forested by spruce, lodgepole pine and subalpine fir. Extensive cutblocks replanted in lodgepole pine now dominate the surroundings. The Babine Mountains are visible to the southwest, 10 km distant.

4. ACCESS, DEVELOPMENTS AND LAND USE

4.1 Access

The lake was accessed by road from the town of Smithers. All surfaces were in good 2WD condition. Odometer distances are cumulative from Smithers.

Beginning at the intersection of 5th Avenue and Main Street in Smithers:

1. Proceed SE on 5th Avenue (Highway 16) to odometer 6.2 km. Turn left onto Babine Lake Road.

2. Proceed E and NE to odometer 57.8 km. Turn left onto Nilkitkwa Forest Service Road.
3. Proceed NW and N to odometer 70.2 km, just past road marker 4011. Turn left onto an unmarked forestry road.
4. Proceed W to odometer 74.1 km. Turn left onto an unmarked forestry road.
5. Proceed S to near lake margin at odometer 75.1 km.

High clearance 4WD vehicles could likely reach the lake shore; 2WD access ends about 50 m before the lake.

4.2 Development and Land Use

4.2.1 Resorts and Campsites

None.

4.2.2 Mining Claims

Placer staking is not allowed in this area of the province. Omineca Mining Division four-post registration files for the locale showed no claims. No evidence of mineral exploration or mining activity was observed at the lake.

4.2.3 Timber Harvest

Bristol Lake is located within Supply Block B of the Bulkley TSA. The lake lies in the SE quadrant of a 25 km² area of which 80 % was logged between 1978 and 1984, due to a huge blowdown. Most of the cutblocks were replanted in lodgepole pine, from 1983 to 1987.

4.2.4 Waste Permits

A search of Skeena Region waste permit files yielded no records for Bristol Lake.

4.2.5 Water Permits

A search of Skeena Region water permit files yielded no records for Bristol Lake.

4.2.6 Obstructions and Pollutions

A beaver dam at the lake outlet is likely a barrier to fish passage only at lower flows. Beavers are currently active at the dam site. Dams are also located upstream of the lake on the Bristol Creek channel.

4.2.7 Recreation Resource Inventory

The latest Forest Service Recreation Resource Inventory for the Bristol Lake area was completed 11 November 1991. IGDS-format coding for the polygon which includes the lake:

A2 E3 --
a c i D1
4

ROS status is thus "Roaded Resource Land".

4.2.8 Special Regulations and Restrictions

None known.

4.2.9 Comments

A derelict building is located on the east side of the final access road, at odometer 74.3 km.

5. FISH POPULATION SAMPLING

Details of fish population sampling in Bristol Lake and its inlets and outlet are given in Table 1. Raw data were recorded on RIC standard “Fish Collection Method Information Forms” and “Fish Collection Data Forms” which are reproduced in Appendix C.

Table 1. Fish sampling effort and catch for all methods used at Bristol Lake and its inlet-outlet streams, 08 - 10 October 1995. **Loc** gives the location where the gear was fished. L = Bristol Lake; S1 = Bristol Creek, WC 480-6972-657, outlet stream of Bristol Lake; S2 = unnamed inlet channel WC 480-6972-657-112; S3 = unnamed inlet channel WC 480-6972-657-237; S4 = Bristol Creek WC 460-1017-439-616 inlet to the east shore of Bristol Lake; S5 = unnamed channel WC 480-6972-657-183 inlet to the north shore of Bristol Lake; S6 = unnamed inlet to the west shore of Bristol Lake. **G#** gives the net or trap number. **Meth** refers to the collection method. GN = MOE / RIC standard experimental sinking gillnet, length 91.2 m and depth 2.4 m with panels (in order) of 25, 76, 51, 89, 38, and 64 mm mesh. The set was made perpendicular to shore with the smallest mesh at shore. MT = Gee-type minnow trap baited with salmon roe; VO = visual observation. **Set** and **Haul** are 24 hour clock times. **Soak** gives the time in minutes for which the gear was deployed. **Depth** unit is metres. The final six columns give the total catch by that gear, by species: **CT** = cutthroat trout, **RT** = cutthroat trout, **MW** = mountain whitefish, **LSU** = longnose sucker, **CSU** = coarsescale sucker, **LKC** = lake chub, **PMC** = peamouth chub, **RSC** = redbside shiner, **NSC** = northern squawfish. Number of captured fish which were sampled for length (non-salmonids) or all appropriate parameters (salmonids) is listed in parentheses after the total number caught. Where no number is listed in parentheses, the entire catch was sampled.

Loc	Site	G #	Meth	Set	Haul	Soak	Depth	CT	RT	MW	LSU	CSU	LKC	PMC	RSC	NSC
L	1	1	MT	2000	1335	1055	0.5						1			
L	1	2	MT	2000	1335	1055	1									
L	2	1	MT	1351	930	1179	2.5									
L	3	1	MT	1355	934	1179	2									
L	4	1	MT	1400	1003	1203	2									
L	5	1	GN	1745	751	846	0-2.5	31	1	5	11	12 (11)		120 (30)	6	15
S1	1	1	MT	1000	1057	1497	0.5				1					
S1	1	2	MT	1000	1059	1499	0.5	1								
S2	1	1	MT	1045	1043	1438	0.7									
S3	1	1	MT	1215	1018	1323	0.7				2		1			
S4	1	1	MT	1225	1012	1307	0.5				1					
S4	2	1	MT	1540	1640	1500	1				1					
S5	1	1	MT	1445	947	1142	0.3						1			
S6	1	-	VO	1620	1621	1	-									

5.1 Fish Species Composition

Nine species of fish were captured in Bristol Lake and its watershed: cutthroat trout (*Oncorhynchus clarki*), rainbow trout (*Oncorhynchus mykiss*), mountain whitefish (*Prosopium williamsoni*), longnose sucker (*Catostomus catostomus*), coarsescale sucker (*Catostomus macrocheilus*), lake chub (*Couesius plumbeus*), redbside shiner (*Richardsonius balteatus*), peamouth chub (*Mylocheilus caurinus*) and northern

squawfish (*Ptycheilus oregonensis*). Special status in MOE Region 6 is not currently attached to any of these species. The presence of salmonids in Bristol Lake requires that its low-gradient inlets and outlet be considered fish-bearing streams under the Forest Practices Code.

5.2 Relative Abundance

Gillnet catch per effort for cutthroat trout was 2.2 fish per net-hr, indicating intermediate population density for the species relative to other small lake populations. Peamouth chub were very abundant, while rainbow trout, mountain whitefish, lake chub and reidside shiner were captured in low numbers (Table 1).

5.3 Size, Age, and Growth

Characteristics of the length distributions of fish captured by gillnet and minnow trap in Bristol Lake and its inlets and outlet, are shown in Table 2, Figure 3, and Figure 4. Due to gear selectivity, the samples are probably not representative of the true length structure of Bristol Lake fish populations. Cutthroat trout growth in Bristol Lake does not conform well to the Von Bertalanffy model (Figure 7). This may be for any combination of the following reasons: early ages follow a different growth trajectory, sample sizes are small, or the growth model is inappropriate for this population. Maximum fork length observed was typical to slightly high for Skeena region small lake cutthroat trout populations.

Table 2. Descriptive statistics for length distributions of fish species captured in Bristol Lake and its inlets and outlet stream, 08 - 10 October 1995. Fork lengths are given in mm. **CT(L)** = cutthroat trout captured in Bristol Lake, **CT(S)** = cutthroat trout captured in streams adjacent to Bristol Lake, **MW** = mountain whitefish, **RB** = rainbow trout, **CSU** = coarsescale sucker, **LSU(L)** = longnose sucker captured in Bristol Lake, **LSU(S)** = longnose sucker captured in streams adjacent to Bristol Lake, **NSC** = northern squawfish, **RSC** = reidside shiner, **LKC(S)** = stream-captured lake chub.

Parameter	CT (L)	CT (S)	MW	RB	CSU	LSU(L)	LSU(S)	NSC	RSC	PMC	LKC(S)
Mean	269	145	276	296	418	277	78	287	108	197	70
Standard Error	9.0		16.4		12.9	6.3	16.2	13.4	1.4	2.3	17.0
Median	269		264		415	280	64	271	108	198	70
Mode	315		-		408	-	-	-	105	202	-
Standard Deviation	49.9		36.7		42.6	21.0	36.3	51.8	3.4	12.8	24.0
Minimum	133		235		336	221	47	238	105	171	53
Maximum	329		326		495	295	135	432	114	223	87
Count	31	1	5	1	11	11	5	15	6	30	2

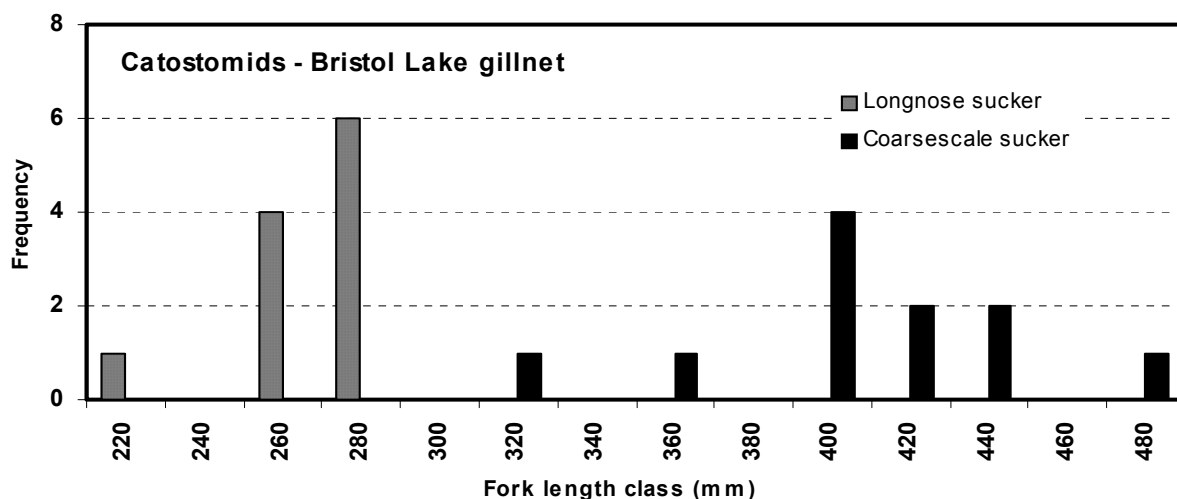
5.3.1 Non-salmonid Species

Figure 3. Length-frequency histograms for catostomid species captured by gillnet in Bristol Lake. Length class width is 20 mm. X-axis class labels are the lower bounds for the length classes.

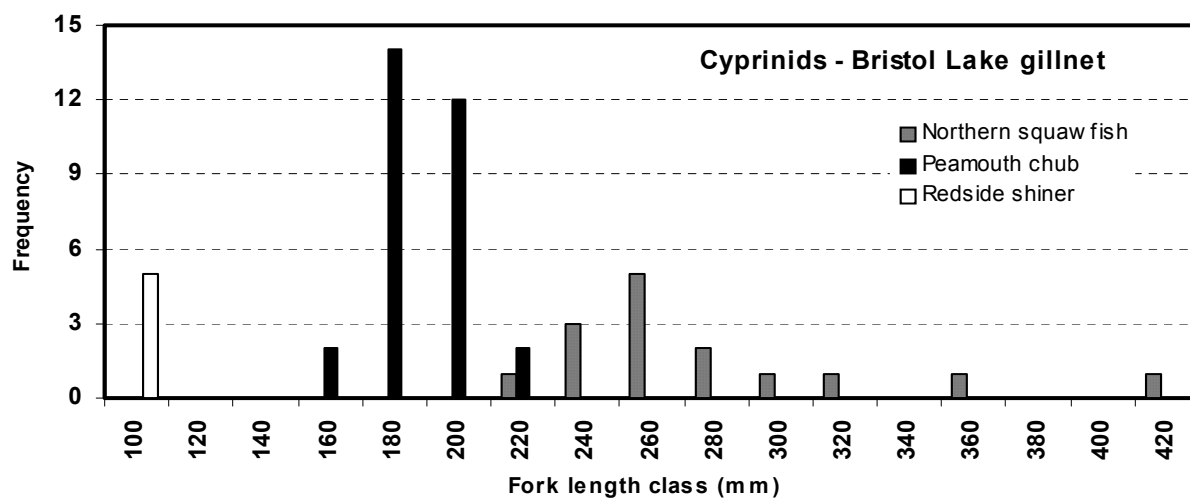


Figure 4. Length-frequency histograms for cyprinid species captured by gillnet in Bristol Lake. Length class width is 20 mm. X-axis class labels are the lower bounds for the length classes.

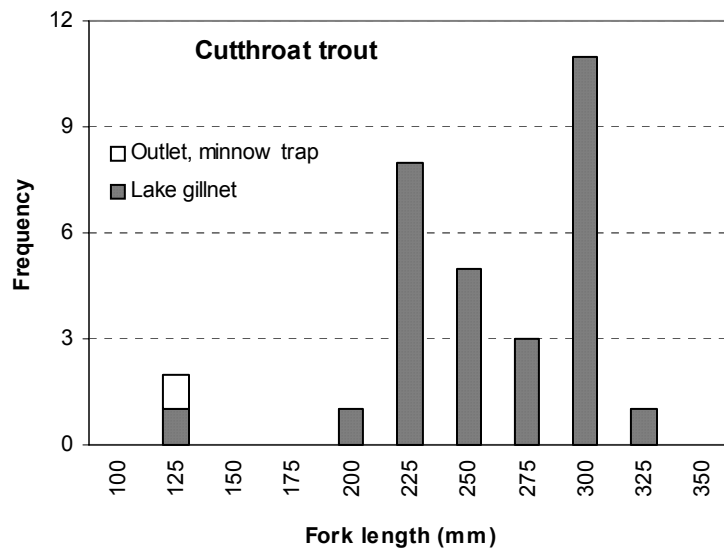
5.3.2 Cutthroat Trout

Figure 5. Length frequency distribution of cutthroat trout caught by lake gillnet (shaded bar areas) and stream minnow traps (open bar areas) at Bristol Lake, 08 - 10 October 1995. Length class width is 25 mm; the x-axis labels are the lower boundaries of length classes.

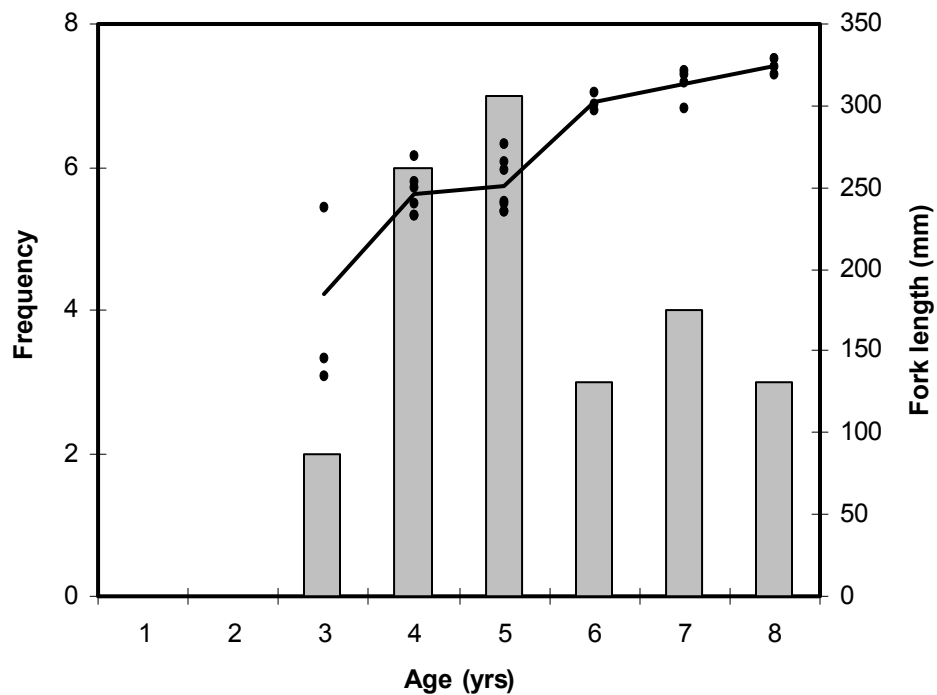


Figure 6. Age frequency histogram and length-at-age for cutthroat trout captured at Bristol Lake and its outlet, 08 - 10 October 1995. The solid line shows mean fork length at age, while the filled circles indicate lengths at age for individual fish.

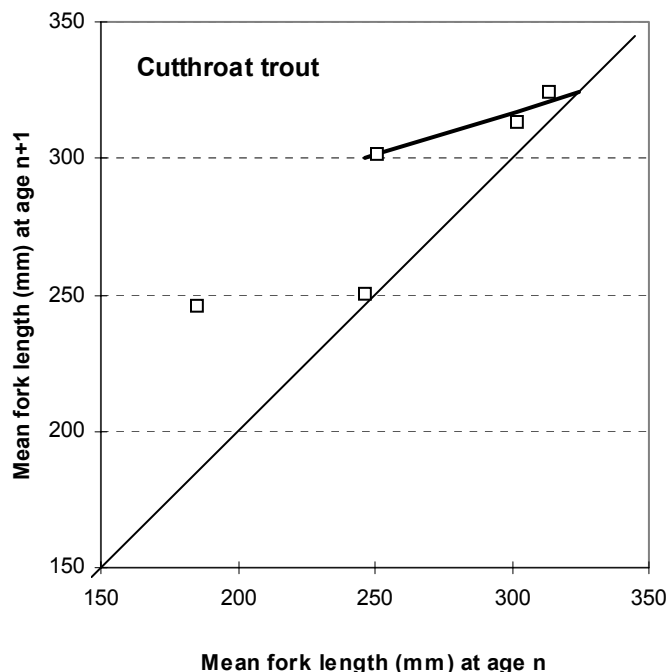


Figure 7. Ford-Walford plot for cutthroat trout captured 08 - 10 October 1995, Bristol Lake and outlet. Lengths-at-age are mean values. The heavy line shows the least-squares regression of {length at age $n+1$ } on {length at age n }. The first two points were excluded from the fit: early age classes appear to follow a different growth trajectory. Estimated terminal length (L_{∞}) occurs at the intersection of the regression line with the diagonal reference line; the parameters from the regression give $k = .310$ and $L_{\infty} = 324$ mm.

5.4 Sexual Maturity and Condition

5.4.1 Cutthroat Trout

Sample sizes are low, but cutthroat trout sexual maturity appears to occur by age 6 for females in Bristol Lake. Males mature between age 5 and 7 (Table 3). The population condition factor is high, relative to other small lake cutthroat trout populations in Skeena region during late summer (Figure 8).

Table 3. Sexual maturity of Bristol Lake cutthroat trout, by age. For the total catch, the ratio of males to females was 0.92 : 1.

Age	Females		Males	
	number	% mature	number	% mature
3	1	0	1	0
4	5	20	1	0
5	5	20	2	50
6	1	100	2	50
7	1	100	3	67
8	0	-	3	100
TOTAL	13	31	12	58

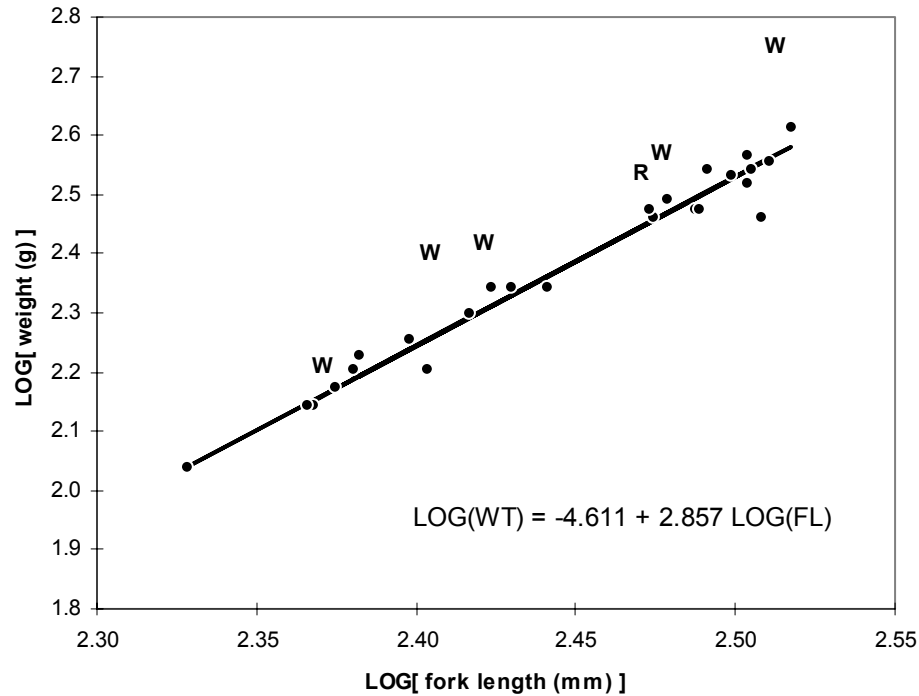


Figure 8. Estimated length - weight relationship for Bristol Lake cutthroat trout captured by all methods, 08 - 10 October 1995. Both length and weight are \log_{10} transformed. The GM regression equation is shown; the resulting estimate of Fulton's condition factor is thus $10^{-4.611} \cdot 10^5 = 2.45$. For comparison, mountain whitefish and rainbow trout captured in Bristol Lake are also shown. Plot symbols are **W** for mountain whitefish, **R** for rainbow trout and filled circles for cutthroat trout.

5.5 Other comments

Many of the peamouth chub captured at Bristol Lake were infected with very large tapeworms. The tapeworms were up to 0.5 cm in width and 20 cm in length, causing visible distension of the gut cavity.

6. LIMNOLOGICAL SAMPLING

Limnological sampling was conducted at midday, 10 October 1995, at the Bristol Lake limnology station labelled on Figure 2. Raw data and associated information were recorded on the RIC standard "Lake Biophysical Data Form" which is reproduced in Appendix D. Water samples were collected at 0.5 m and 5.0 m depths, apportioned into aliquots for general chemistry, metals, and dissolved metals analyses and shipped to Zenon Laboratories for processing. Zenon's records show that the Bristol Lake samples were received on 12 October 1995, within the 72 hr RIC standard time frame for water sample transport.

6.1 Stratification

The oxygen - temperature profile of Bristol Lake on 10 October 1995 is shown in Figure 9. The lake was thermally well mixed, with only slight near-bottom oxygen depletion.

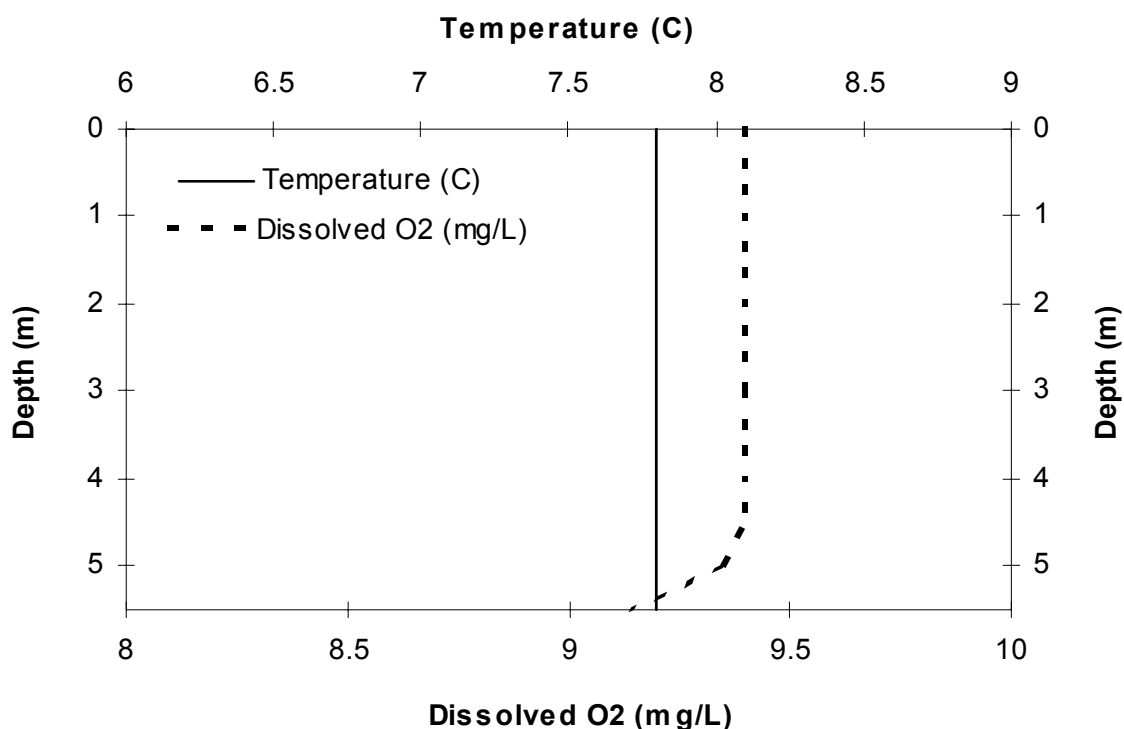


Figure 9. Temperature and dissolved O₂ profiles for Bristol Lake, 10 October 1995. The sampling device was a YSI 57 temperature/oxygen meter. Sample interval was 0.5 m.

Table 4. Water chemistry parameters estimated by Zenon Laboratories. Samples were collected at the limnology station labelled in Figure 2. Each sample was collected by a single cast of a 3.2L non metallic Van Dorn bottle, 10 October 1995, and received by Zenon 12 October 1995. MDC = minimum detectable concentration for the analytic method.

Parameter	Shallow	Deep	Unit	MDC	Method
Time of Day	13:15	13:00	h	-	-
Depth	0.5	5	m	-	-
pH	6.5	6.5	pH	0.1	Automated pH Meter
Specific Conductance	38	37	uS/cm	1	Cond.Meter Siebold
Residue Nonfilterable (TSS)	< 4	< 4	mg/L	4	Grav; Subsamp Buch 105C
Hardness Total	25.3	25.4	mg/L		Calculated Result
Alkalinity Phen. 8.3	< 0.5	< 0.5	mg/L	0.5	Automated Electrometer
Alkalinity Total 4.5	19.8	19.6	mg/L	0.5	Automated Electrometer
Carbonate	< 0.5	< 0.5	mg/L		Calculated Result
Bicarbonate	24.1	23.9	mg/L		Calculated Result
Hydroxide	< 0.5	< 0.5	mg/L		Calculated Result
Total Kjeldahl Nitrogen	0.54	0.57	mg/L	0.04	HgSO ₄ Dig.Auto.Colour.
Total Nitrogen	0.54	0.57	mg/L		Calculated Result
Nitrate+Nitrite (N)	< 0.02	< 0.02	mg/L	0.02	Auto. Cadmium Reduction
Nitrate Nitrogen Dissolved	< 0.02	< 0.02	mg/L		Calculated Result
Nitrite Nitrogen	< 0.005	< 0.005	mg/L	0.005	Auto. Diazotization
Ortho-Phosphorus (P)	< 0.003	< 0.003	mg/L	0.003	Auto.Ascorbic Acid
Phosphorus Total Dissolved	0.007	0.008	mg/L	0.003	Dig.Auto.Ascorbic Acid
Phosphorus - Total	0.007 (1)	0.005 (1)	mg/L	0.003	Pres.Dig.Auto.Ascorbic A

6.2 Water Chemistry

Results of the general ions and metals analyses are given in Table 4 and Table 6. Bristol Lake is neutral with very low specific conductance. Phosphorus and nitrogen concentrations imply oligotrophy and low productivity. Estimated N : P ratios (Table 5) were much greater than 15 : 1, suggesting that phosphorus is limiting phytoplankton growth in Bristol Lake.

Table 5. Estimated nitrogen : phosphorus ratios for shallow (0.5 m) and deep (7.0 m) samples from Bristol Lake. All analyses were performed by Zenon Laboratories, except for calculation of ratios.

Parameter	Shallow	Deep	Method
Ortho-Phosphorus	< .003	< .003	Auto Ascorbic Acid
Phosphorus - Total	.007	.005	Pres. Dig. Auto Ascorbic Acid
Nitrogen - Total Kjehdahl	.54	.57	HgSO ₄ Dig. Auto. Colour.
Nitrogen - Total	.54	.57	Calculated result
N : P RATIO	77 : 1	114 : 1	Calculated result¹

¹ N : P ratio estimated as: TOTAL NITROGEN / TOTAL PHOSPHORUS

Table 6. Metals concentrations estimated by Zenon Laboratories. Sample collection is described in the caption to Table 4. Dissolved metals aliquots were filtered by 0.45µm cellulose acetate membrane syringe. All metals aliquots were fixed immediately after collection with 1 ml HNO₃. Analysis was performed using a Jarrell-Ash Model 61E (inductively coupled argon plasma analysis); “total metals” aliquots were subjected to HNO₃ digestion by Zenon. For values labelled with (1), the dissolved metal concentration was greater than the total concentration. MDC = minimum detectable concentration for the analytic method.

Parameter	Shallow		Deep		Unit	MDC	
	Total	Dissolved	Total	Dissolved		Total	Dissolved
Time of Day	13:15	13:15	13:00	13:00	h	-	-
Depth	0.5	0.5	5	5	m	-	-
Silver	< 0.03	-	< 0.03	-	mg/L	0.03	-
Aluminum	0.1	0.08	0.14	0.08	mg/L	0.06	0.02
Arsenic	< 0.04	< 0.04	< 0.04	< 0.04	mg/L	0.04	0.04
Boron	0.38	< 0.008	0.43	< 0.008	mg/L	0.04	0.008
Barium	0.019 (1)	0.02	0.020 (1)	0.02	mg/L	0.001	0.001
Beryllium	< 0.001	< 0.001	< 0.001	< 0.001	mg/L	0.001	0.001
Bismuth	< 0.02	< 0.02	< 0.02	< 0.02	mg/L	0.02	0.02
Calcium	6.14 (1)	6.55	6.42 (1)	6.58	mg/L	0.05	0.01
Cadmium	< 0.002	< 0.002	< 0.002	< 0.002	mg/L	0.002	0.002
Cobalt	< 0.004	< 0.003	< 0.004	< 0.003	mg/L	0.004	0.003
Chromium	< 0.002	< 0.002	0.002	< 0.002	mg/L	0.002	0.002
Copper	< 0.002	< 0.001	< 0.002	< 0.001	mg/L	0.002	0.001
Iron	0.17	0.16	0.19	0.159	mg/L	0.05	0.003
Potassium	0.4	< 0.4	0.7	< 0.4	mg/L	0.4	0.4
Magnesium	2.10 (1)	2.17	2.10 (1)	2.19	mg/L	0.02	0.02
Manganese	0.007	0.005	0.008	0.005	mg/L	0.002	0.002
Molybdenum	< 0.004	< 0.004	< 0.004	< 0.004	mg/L	0.004	0.004
Sodium	2.5	2.13	2.7	2.14	mg/L	0.4	0.01
Nickel	< 0.01	< 0.008	< 0.01	< 0.008	mg/L	0.01	0.008
Phosphorus	< 0.04	< 0.04	< 0.04	< 0.04	mg/L	0.04	0.04
Lead	< 0.03	< 0.02	< 0.03	< 0.02	mg/L	0.03	0.02
Sulphur	0.5	0.47	0.5	0.45	mg/L	0.1	0.03
Antimony	< 0.02	< 0.015	< 0.02	< 0.015	mg/L	0.02	0.015
Selenium	< 0.03	< 0.03	< 0.03	< 0.03	mg/L	0.03	0.03
Silicon	< 0.8	0.09	< 0.8	0.08	mg/L	0.8	0.03
Tin	< 0.02	< 0.02	< 0.02	< 0.02	mg/L	0.02	0.02
Strontium	0.042 (1)	0.045	0.044 (1)	0.045	mg/L	0.001	0.001
Tellurium	< 0.02	< 0.02	< 0.02	< 0.02	mg/L	0.02	0.02
Titanium	< 0.003	< 0.003	< 0.003	< 0.003	mg/L	0.003	0.003
Thallium	< 0.03	< 0.02	< 0.03	< 0.02	mg/L	0.03	0.02
Vanadium	< 0.003	< 0.003	< 0.003	< 0.003	mg/L	0.003	0.003
Zinc	< 0.01	0.002	0.01	0.002	mg/L	0.01	0.002
Zirconium	< 0.003	< 0.003	< 0.003	< 0.003	mg/L	0.003	0.003

7. OTHER FLORA AND FAUNA

7.1 Aquatic Plants

More than 65 % of lake surface is open water. Swamp horsetail and flooded sedges grow at the lake perimeter. Macrophyte beds visible on the air photo (Figure 2) are dominated by *Nuphar* sp.

7.2 Zooplankton

The Bristol Lake zooplankton community was numerically dominated by very small cyclopoid copepods and their immature stages. Small daphnids were also abundant. Macrozooplankton such as amphipods and chaoborids were not present in the plankton. The zooplankton species composition and size structure was suggestive of intense planktivory by the lake's salmonid and cyprinid populations.

Table 7. Zooplankton collected by horizontal tow of a 118 μ mesh conical plankton net, Bristol Lake offshore, 1230 h. on 10 October 1995. Net mouth diameter was 15 cm and net length was 1 m. Tow duration was 3 minutes, at velocity of 0.35 m/sec and depth between 0 and 2 m.

Species	No. / L	Max (mm)	Med
<i>Daphnia</i> sp.	14.2	1.9	1.2
<i>Holopedium</i> sp.	0.2	1	1
<i>Diaptomus</i> sp.	2.8	1.5	1.2
<i>Diacyclops bicuspidatus</i>	50.4	0.8	0.4
Nauplii	0.9	-	-

7.3 Waterfowl and Other Fauna

Beaver activity was most visible at the lake outlet. Geese were present during the survey.

8. MANAGEMENT COMMENTS

The landscape of the Bristol Lake area is dominated by timber harvest. The lake supports a diverse fish community, probably because of its proximity to the Fulton River and Chapman Lake. Protection of the fish populations of Bristol Lake is not of particular concern at this time. Further industrial activity in the area will probably not occur within the next half-century. Despite its fishery potential, the lake is unlikely to attract significant recreational angling in the near future because of the condition of its surroundings. Special regulations or access management status are not recommended.

9. PHOTOGRAPHS

Photograph 1 (cropped). Bristol Lake, view SW to Babine Mountains from lake center.

Photographs 2-3 (cropped). Bristol Lake, view NE from road access point at mid-W shore.

Photographs 4-7 (cropped). Top to bottom: coarsescale sucker, longnose sucker, redbside shiner, peamouth chub; gillnet catch, Bristol Lake.

Photographs 8-10 (cropped). Rainbow trout, cutthroat trout, mountain whitefish; gillnet catch, Bristol Lake.

Photograph 11. Bristol Creek, WC 480-6972-657, outlet stream of Bristol Lake; beaver dam at the lake outlet.

Photograph 12. Unnamed channel, inlet to the west shore of Bristol Lake at UTM 09.645600.6100800 (NAD27).

Photograph 13. Unnamed channel WC 480-6972-657-237, southern inlet to the east shore of Bristol Lake at UTM 09.646500.6101200 (NAD27).

Photograph 14. Unnamed channel WC 480-6972-657-112, inlet to the south shore of Bristol Lake at UTM 09.646200.6100500 (NAD27).

APPENDIX A. ABBREVIATIONS AND OTHER NOTES

MOE = Ministry of Environment, Lands and Parks

RIC = Resource Inventory Committee

TSA = timber supply area

UTM = Universal Transverse Meracator

WC = Watershed Code

WCD = Watershed Code Dictionary

NTS = National Topographic Survey

NAD27 = North American Datum 1927

UTM values were derived from two sources:

1. For lakes, UTM at the outlet was obtained from the WCD, and this is noted after the UTM.
2. For streams, UTM for the surveyed reach was estimated from NTS 1:50,000 mapsheets, using interpolation. UTM datum year (i.e. NAD27) is recorded after the estimate. The exception is stream reaches at lake outlets. For these, UTM for the lake outlet is used, and referenced as WCD.

Native land claims information was derived from the following sources:

1. Northern Interior Negotiating Region, Statements of Intent, August 31 1995. Ministry of Forests Aboriginal Affairs Branch. Map scale 1 : 3,500,000.
2. "Native Land Claims in Skeena Region", February 1995. Ministry of Environment Lands and Parks. Map scale 1 : 1,500,000.

Fish growth rate and condition factor were estimated by methods detailed in:

Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Canadian Bulletin of Fisheries and Aquatic Sciences No. 191.

APPENDIX B. STREAM SURVEY FORMS

DFO / MOE
STREAM SURVEY FORM

Stream Name		(gaz) Bristol C		(local)		Access	Method																		
Watershed Code		480-6972-657				ReachNo.	1																		
Location		Outlet of Bristol Lake			Map#	93M/2		SiteNo.	1		LthSurv(m)	300													
Date		Y.M.D		9 5 1 0 0 9		Time	1000		Agency	C58		Crew	JB/JD		Photos	AirPhotos									
U.T.M.		09.645803.6100298				FishCard	N		C		Field	X		Hist.											
C	PARAMETER		VALUE		METH		SPECIFIC DATA					OBSTRUCTIONS													
	Ave. Chan. Width (m)		6		T		6.0 6.0					C		Ht(m)		Type		Loc'n							
Ave. Wet. Width (m)		1.1		MS		.25 2.00					C1		0.5		BD		0								
Ave.Max.Riffle Depth (cm)		4		MS		5 6 3 2																			
Ave.Max.Pool Depth (cm)		30		MS		30																			
Gradient %		< 1		GE		C		BED MATERIAL			%		C		BANKS										
% Pool		Riffle		Run		Other		Fines		clay,silt,sand (<2mm)		10		Height(m)		%Unstable									
Side Chan.%		0		0-10		10-40		X		>40		GE		Gravels		small (2-16mm)		20		Texture		F G L R			
Debris		Area%		0		0-5		5-15		X		>15		GE		large (16-64mm)		20		Confinement		EN CO FC OC UC N/A			
Stable%		75		GE		Larges		sm.cobble (64-128mm)		20		Valley:Channel Ratio		0-2 2-5 5-10 10+ N/A		Stage		Dry		L M H Flood					
COVER: Total%		Comp.		Dp.Pool		L.O.D.		Boulder		InVeg		OverVeg		Cutbank		boulder(>256mm)		10		Flood Signs Ht(m)		Braided		Y N	
sum100%																Bedrock		0		Bars (%)		pH		O2(ppm)	
Crown Closure %		0		C		Aspect		D90(cm)		C		Compaction		L M H		WaterTemp(C)		7		Turb(cm)		Cond(25C)			
DISCHARGE										REACH SYMBOL															
Parameter		Value		Method		Specific Data					(Fish)														
Wetted Width (m)		.24000		MS							_____														
Mean Depth (m)		.03667		MS		.03 .02 .06																			
Mean Velocity (m/s)		.15000		F							(Width/Valley/Channel,Slope)														
Discharge (m3/s)		.00132		calc							BedMaterial														

FISH SUMMARY							STREAM/VALLEY CROSS-SECTION						
C	Species	No.	SizeRange(mm)	LifePhase	Use	Method/Ref	L (Looking Downstream) R						
	LSU	1	135	J	R	MT	PLANIMETRIC VIEW						
	CT	1	135	J	R	MT	_____						
COMMENTS													
Channel Stability <input type="checkbox"/> ; Debris <input type="checkbox"/> ; Management Concerns <input type="checkbox"/> ; Obstructions <input type="checkbox"/> ; Riparian Zone <input type="checkbox"/> ; Valley Wall Processes <input type="checkbox"/> ; Etc.													
C1 - Beaver dam at lake outlet forms a barrier at low flows; probably passable at higher flows which are likely substantial seasonally, based on channel width													
At time of survey, flow was subsurface at many points, so many parameters are not estimable													
No barriers between beaver dam and Fulton River													
							Edited by: JD						
							Date YMD 960220						

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz) <u>Unnamed</u> (local)		Access		Method	
Watershed Code <u>480-6972-657-183</u>				ReachNo. <u>1</u>	Lngth(km)
Location <u>Inlet to NW shore of Bristol L</u>			Map# <u>93M/2</u>	SiteNo. <u>1</u>	LthSurv(m) <u>100</u>
			U.T.M. <u>09.645800.6101500</u>	FishCard <input checked="" type="radio"/> N <input type="radio"/> C	Field <input checked="" type="checkbox"/> Hist. <input type="checkbox"/>
Date Y.M.D <u>9 5 1 0 0 9</u>		Time <u>1445</u>	Agency <u>C58</u>	Crew <u>JB/JD</u>	AirPhotos
C	PARAMETER	VALUE	METH	SPECIFIC DATA	
	Ave. Chan. Width (m)	0.8	MS	0.7	0.9
	Ave. Wet. Width (m)	0.8	MS	0.7	0.9
	Ave. Max. Riffle Depth (cm)				
	Ave. Max. Pool Depth (cm)	37	MS	29	45
	Gradient %	< 1	GE	BED MATERIAL	
% Pool	100	Riffle	0	0	Run
0-10	10-40	>40	0	0	0
Other	0	0	0	BANKS	
Side Chan. %	0	0	0	Fines	clay, silt, sand (<2mm)
Area %	0	0-5	5-15	>15	100
Stable %		Gravels			
		small (2-16mm)			
		large (16-64mm)			
		sm. cobble (64-128mm)			
		lge. cobble (128-256mm)			
		boulder (>256mm)			
		Bedrock			
		0			
COVER: Total%	25	Stage			
Comp.	Dp.Pool	L.O.D.	Boulder	InVeg	OverVeg
sum100%	60	0-2			
		2-5			
		5-10			
		10+			
		Flood			
		0			
		Braided			
		Y			
		N			
		Flood Signs Ht (m)			
		Bars (%)			
		pH			
		O2(ppm)			
Crown Closure %		0	C	Aspect	
		D90(cm)		C	Compaction
		L	M	H	
		WaterTemp(C)		6	Turb(cm)
				Cond(25C)	
DISCHARGE					
Parameter		Value	Method	Specific Data	
Wetted Width (m)					
Mean Depth (m)					
Mean Velocity (m/s)					
Discharge (m3/s)				no discernible flow	
REACH SYMBOL					
(Fish)					
				(Width: Valley / Channel, Slope)	
				BedMaterial	

FISH SUMMARY						
C	Species	No.	SizeRange(mm)	LifePhase	Use	Method/Ref
	LKC	1	53	J	R	MT
COMMENTS						
Channel Stability <input type="checkbox"/> ; Debris <input type="checkbox"/> ; Management Concerns <input type="checkbox"/> ; Obstructions <input type="checkbox"/> ; Riparian Zone <input type="checkbox"/> ; Valley Wall Processes <input type="checkbox"/> ; Etc.						
Channel was watered only in the last 75 m adjacent to the lake; dry above that point						
Edited by: JD						
Date YMD 960220						

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz) Unnamed (local)		Access	Method
Watershed Code		ReachNo. 1	Lngh(km)
Location Inlet to W bay of Bristol L		Map# 93M/2	SiteNo. 1 LthSurv(m) 50
U.T.M. 09.645600.6100800		FishCard	Field <input checked="" type="checkbox"/> Hist. <input type="checkbox"/>
Date Y.M.D 9 5 1 0 0 9	Time 1620	Agency C58	Crew JB / JD
PARAMETER		VALUE	METH
Ave. Chan. Width (m)		0.9	MS
Ave. Wet. Width (m)		0.9	MS
Ave.Max.Riffle Depth (cm)			
Ave.Max.Pool Depth (cm)		18	MS
Gradient %		< 1	GE
BED MATERIAL		%	C
% Pool 100	Riffle 0 0	Run 0 0	Other 0 0
Fines clay,silt,sand (<2mm)		100	
Gravels small (2-16mm)		0	
Gravels large (16-64mm)		0	
Larges sm. cobble (64-128mm)		0	
Larges lge.cobble (128-256mm)		0	
Larges boulder(>256mm)		0	
Bedrock		0	
COVER: Total%		40	
Comp.	Dp.Pool	L.O.D.	Boulder
sum100%	25	25	25
Debris Stable%			
Crown Closure %		0 - 100	C
Aspect			
DISCHARGE		REACH SYMBOL	
Parameter	Value	Method	Specific Data
Wetted Width (m)			
Mean Depth (m)			
Mean Velocity (m/s)			
Discharge (m3/s)			no flow
(Width:Valley / Channel,Slope) BedMaterial			

FISH SUMMARY						STREAM/VALLEY CROSS-SECTION <input type="checkbox"/>	
C	Species	No.	SizeRange(mm)	LifePhase	Use	Method/Ref	(Looking Downstream)
		0				VO	R
PLANIMETRIC VIEW <input type="checkbox"/>							
COMMENTS							
Channel Stability <input type="checkbox"/> ; Debris <input type="checkbox"/> ; Management Concerns <input type="checkbox"/> ; Obstructions <input type="checkbox"/> ; Riparian Zone <input type="checkbox"/> ; Valley Wall Processes <input type="checkbox"/> ; Etc.							
Channel is flooded by lake, watered only to 15 m upstream of lakeshore							
Dry above that point							
Edited by: JD						Date YMD 960220	

APPENDIX C. FISH SAMPLING FORMS

FISH COLLECTION DATA FORM

Card 01 of 02

Date (yy/mm/dd): 95/10/08 Agency: C58 Crew: JB/JD
 Gazetted Name: Bristol Alias: _____ UTM: 09.645803.6100298
 Lake/Stream/Wetland: Lake Location: _____ (source: WCD)
 Sequence No.: 01 Weather: _____
 Watershed code: 480-6972-657 Reach #: _____

Area sampled: (m2)		Air tmp: _____ (C)			Wtr tmp : _____ (C)			EC : _____ (ms/cm)			
Site No.	Capture Method	Pass # or trap/net #	Species (code)	Mark or Tag No.	Length FL (mm)	Weight (g)	Scale sample #	Sex (code)	Maturity (code)	Activity (code)	Comments
6	GN	1	CT	-	315	300	2	M	M	R	regen
6	GN	1	CT	-	298	290	3	M	I	R	age 7+
6	GN	1	CT	-	276	220	4	F	M	R	age 5+
6	GN	1	CT	-	237	150	5	M	I	R	age 3+
6	GN	1	CT	-	307	300	6	M	M	R	regen
6	GN	1	CT	-	322	290	7	F	M	R	age 7+
6	GN	1	CT	-	320	350	8	M	M	R	regen
6	GN	1	CT	-	329	410	9	M	M	R	age 8+
6	GN	1	CT	-	240	160	10	M	M	R	age 5+
6	GN	1	CT	-	315	340	11	M	M	R	age 7+
6	GN	1	CT	-	269	220	12	F	M	R	age 4+
6	GN	1	CT	-	297	300	13	M	M	R	age 6+
6	GN	1	CT	-	213	110	14	F	I	R	regen
6	GN	1	CT	-	319	370	15	M	M	R	age 7+
6	GN	1	CT	-	308	300	16	M	I	R	age 6+
6	GN	1	CT	-	233	140	17	F	I	R	age 4+
6	GN	1	CT	-	232	140	18	F	I	R	age 4+
6	GN	1	CT	-	250	180	19	M	I	R	age 4+
6	GN	1	CT	-	253	160	20	F	I	R	age 4+
6	GN	1	CT	-	310	350	21	M	M	R	regen
6	GN	1	CT	-	324	360	22	M	M	R	age 8+
6	GN	1	CT	-	265	220	23	F	I	R	age 5+
6	GN	1	CT	-	261	200	24	F	I	R	age 5+
6	GN	1	CT	-	240	160	25	F	I	R	age 4+
6	GN	1	CT	-	301	310	26	F	M	R	age 6+

FISH COLLECTION DATA FORM

Card 02 of 02

Date (yy/mm/dd): <u>95/10/08</u>	Agency: <u>C58</u>	Crew: <u>JB/JD</u>
Gazetted Name: <u>Bristol</u>	Alias: _____	UTM: <u>09.645803.6100298</u>
Lake/Stream/Wetland: <u>Lake</u>	Location: _____	(source: WCD)
Sequence No.: <u>01</u>	Weather: _____	
Watershed code: <u>480-6972-657</u>	Reach #: _____	

Area sampled: _____		Air tmp: _____		Wtr tmp : _____		EC : _____					
(m2)		(C)		(C)		(ms/cm)					
Site No.	Capture Method	Pass # or trap/net #	Species (code)	Mark or Tag No.	Length FL (mm)	Weight (g)	Scale sample #	Sex (code)	Maturity (code)	Activity (code)	Comments
6	GN	1	CT	-	241	170	27	F	I	R	age 5+
6	GN	1	CT	-	319	330	28	M	M	R	age 8+
6	GN	1	CT	-	235	140	29	F	I	R	age 5+
6	GN	1	CT	-	133	27	30	F	I	R	age 3+
6	GN	1	CT	-	235	150	31	M	I	R	age 5+
6	GN	1	RB	-	296	340	1	F	M	R	age 9+
6	GN	1	MW	-	264	260	1	F	M	R	age 8+
6	GN	1	MW	-	300	370	2	F	M	R	age 11+
6	GN	1	MW	-	326	560	3	F	M	R	age 8+
6	GN	1	MW	-	254	250	4	F	M	R	age 6+
6	GN	1	MW	-	235	160	5	F	I	R	age 7+

FISH COLLECTION DATA FORM

Card 01 of 01

Date (yy/mm/dd): 95/10/08
Gazetted Name: Bristol C
Lake/Stream/Wetland: Stream
Sequence No.: 00
Watershed code: 480-6972-657

Agency: C58
Alias: _____
Location: _____
Weather: _____
Reach #: 1

Crew: JB/JD
UTM: 09.645803.6100298
(source: WCD)

Area sampled: _____ (m2)		Air tmp: _____ (C)		Wtr tmp : _____ (C)		EC : _____ (ms/cm)					
Site No.	Capture Method	Pass # or trap/net #	Species (code)	Mark or Tag No.	Length FL (mm)	Weight (g)	Scale sample #	Sex (code)	Maturity (code)	Activity (code)	Comments
1	MT	2	CT	-	145	-	1	-	-	R	age 3+

**FISH COLLECTION DATA FORM
VERSION : LENGTH-ONLY**

Card 01 of 01

Date (yy/mm/dd): 95/10/08
 Gazetted Name: Bristol
 Lake/Stream/Wetland: Lake
 Sequence No.: 01
 Watershed code: 480-6972-657

Agency: C58
 Alias: _____
 Location: _____
 Weather: _____
 Reach #: _____

Crew: JB/JD
 UTM: 09.645803.6100298
 (source: WCD)

Area sampled: _____ (m2)			Air tmp : _____ (C)		Wtr tmp : _____ (C)				EC : _____ (ms/cm)				
Site No.	Capture Method	Pass # or trap/net #	Species (code)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)
6	GN	1	PMC	207	223	205	202	195	172	181	200	195	212
6	GN	1	PMC	212	202	221	191	192	210	185	192	202	202
6	GN	1	PMC	180	171	197	198	185	201	181	203	192	188
6	GN	1	PMC	na	na	na	na	na	na	na	na	na	na
6	GN	1	PMC	na	na	na	na	na	na	na	na	na	na
6	GN	1	PMC	na	na	na	na	na	na	na	na	na	na
6	GN	1	PMC	na	na	na	na	na	na	na	na	na	na
6	GN	1	PMC	na	na	na	na	na	na	na	na	na	na
6	GN	1	PMC	na	na	na	na	na	na	na	na	na	na
6	GN	1	PMC	na	na	na	na	na	na	na	na	na	na
6	GN	1	PMC	na	na	na	na	na	na	na	na	na	na
6	GN	1	RSC	109	114	105	110	105	107				
6	GN	1	CSU	458	400	336	435	452	415	374	420	408	495
6	GN	1	CSU	408	na								
6	GN	1	NSC	302	243	271	238	289	432	260	327	248	283
6	GN	1	NSC	250	266	273	360	265					
6	GN	1	LSU	284	272	264	292	294	295	278	277	280	221
6	GN	1	LSU	291									
1	MT	1	LKC	65									

**FISH COLLECTION DATA FORM
VERSION : LENGTH-ONLY**

Card 01 of 01

Date (yy/mm/dd): 95/10/08
Gazetted Name: Bristol C
Lake/Stream/Wetland: Stream
Sequence No.: 00
Watershed code: 480-6972-657

Agency: C58
Alias: _____
Location: _____
Weather: _____
Reach #: 1

Crew: JB/JD
UTM: 09.645803.6100298
 (source: WCD)

Area sampled: _____				Air tmp: _____				Wtr tmp: _____				EC: _____			
(m2)				(C)				(C)				(ms/cm)			
Site No.	Capture Method	Pass # or trap/net #	Species (code)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)		
1	MT	1	LSU	135											

FISH COLLECTION DATA FORM VERSION : LENGTH-ONLY

Card 01 of 01

Date (yy/mm/dd): 95/10/08
 Gazetted Name: Unnamed
 Lake/Stream/Wetland: Stream
 Sequence No. 00
 Watershed code: 480-6972-657-237

Agency: C58
 Alias: _____
 Location: _____
 Weather: _____
 Reach #: 1

Crew: JB/JD
 UTM: 09.646500.6101200
(source: NAD27)

Area sampled: _____ (m2)			Air tmp: _____ (C)		Wtr tmp: _____ (C)			EC: _____ (ms/cm)					
Site No.	Capture Method	Pass # or trap/net #	Species (code)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)
1	MT	1	LKC	87									
1	MT	1	LSU	52	64								

FISH COLLECTION DATA FORM VERSION : LENGTH-ONLY

Card 01 of 01

Date (yy/mm/dd): 95/10/08
 Gazetted Name: Unnamed
 Lake/Stream/Wetland: Stream
 Sequence No.: 00
 Watershed code: 480-6972-657-237

Agency: C58
 Alias:
 Location:
 Weather:
 Reach #: 1

Crew: JB/JD
 UTM: 09.646500.6101200
 (source: NAD27)

Area sampled: _____ (m2)				Air tmp: _____ (C)		Wtr tmp: _____ (C)				EC: _____ (ms/cm)			
Site No.	Capture Method	Pass # or trap/net #	Species (code)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)
1	MT	1	LKC	87									
1	MT	1	LSU	52	64								

**FISH COLLECTION DATA FORM
VERSION : LENGTH-ONLY**

Card 01 of 01

Date (yy/mm/dd): 95/10/08
 Gazetted Name: Unnamed
 Lake/Stream/Wetland: Stream
 Sequence No.: 00
 Watershed code: 480-6972-657-183

Agency: C58
 Alias: _____
 Location: _____
 Weather: _____
 Reach #: 1

Crew: JB/JD
 UTM: 09.645800.6101500
 (source: NAD27)

Area sampled: _____ (m2)			Air tmp: _____ (C)		Wtr tmp: _____ (C)			EC: _____ (ms/cm)					
Site No.	Capture Method	Pass # or trap/net #	Species (code)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)	Length FL (mm)
1	MT	1	LKC	53									

FISH COLLECTION METHOD INFORMATION

Card 01 of 01

Date (yy/mm/dd): 95/10/08; 95/10/09
Gazetted Name: Bristol
Lake/Stream/Wetland: Lake
Sequence No.: 01
Watershed code: 480-6972-657

Agency: C58
Alias:
Location:
Weather:
Reach #:

Crew: JB/JD
UTM: 09.645803.6100298
(source: WCD)

Date (yy/mm/dd)	Sample Site No.	Pass # or trap/net #	Capture Method	Time In (24 hr clock)	Time Out (24 hr clock)	Sampling time (min)	Depth (m)
95/10/08	1	1	MT	2000	1335	1055	0.5
95/10/08	1	2	MT	2000	1335	1055	1
95/10/09	2	1	MT	1351	0930	1179	2.5
95/10/09	3	1	MT	1355	0934	1179	2
95/10/09	4	1	MT	1400	1003	1203	2
95/10/09	5	1	GN	1745	0751	846	0 - 2.5

Comments : Minnow traps and gillnet set over one night. Date recorded is date of

FISH COLLECTION METHOD INFORMATION

Card 01 of 01

Date (yy/mm/dd): 95/10/09 **Agency:** C58 **Crew:** JB/JD
Gazetted Name: Bristol C **Alias:** _____ **UTM:** 09.645803.6100298
Lake/Stream/Wetland: Stream **Location:** _____ (source: WCD)
Sequence No.: 00 **Weather:** _____
Watershed code: 480-6972-657 **Reach #:** 1

Date (yy/mm/dd)	Sample Site No.	Pass # or trap/net #	Capture Method	Time In (24 hr clock)	Time Out (24 hr clock)	Sampling time (min)	Depth (m)
95/10/09	1	1	MT	1000	1057	1497	0.5
95/10/09	1	2	MT	1000	1059	1499	0.5

Comments : _____

FISH COLLECTION METHOD INFORMATION

Card 01 of 01

Date (yy/mm/dd):	<u>95/10/09</u>	Agency:	<u>C58</u>	Crew:	<u>JB/JD</u>
Gazetted Name:	<u>Unnamed</u>	Alias:	<u></u>	UTM:	<u>09.646200.6100500</u>
Lake/Stream/Wetland:	<u>Stream</u>	Location:	<u></u>	(source: NAD27)	
Sequence No.:	<u>00</u>	Weather:	<u></u>		
Watershed code:	<u>480-6972-657</u>	Reach #:	<u>1</u>		

Date (yy/mm/dd)	Sample Site No.	Pass # or trap/net #	Capture Method	Time In (24 hr clock)	Time Out (24 hr clock)	Sampling time (min)	Depth (m)
95/10/09	1	1	MT	1045	1043	1438	0.7

Comments : _____

FISH COLLECTION METHOD INFORMATION

Card 01 of 01

Date (yy/mm/dd):	<u>95/10/09</u>	Agency:	<u>C58</u>	Crew:	<u>JB/JD</u>
Gazetted Name:	<u>Unnamed</u>	Alias:	<u></u>	UTM:	<u>09.646500.6101200</u>
Lake/Stream/Wetland	<u>Stream</u>	Location:	<u></u>		(source: NAD27)
Sequence No.	<u>00</u>	Weather:	<u></u>		
Watershed code:	<u>480-6972-657</u>	Reach #:	<u>1</u>		

Date (yy/mm/dd)	Sample Site No.	Pass # or trap/net #	Capture Method	Time In (24 hr clock)	Time Out (24 hr clock)	Sampling time (min)	Depth (m)
95/10/09	1	1	MT	1215	1018	1323	0.7

Comments : _____

FISH COLLECTION METHOD INFORMATION

Card 01 of 01

Date (yy/mm/dd): 95/10/09 Agency: C58 Crew: JB/JD
Gazetted Name: Bristol C Alias: _____ UTM: 09.646500.6101300
Lake/Stream/Wetland: Stream Location: _____ (source: NAD27)
Sequence No. 00 Weather: _____
Watershed code: 480-6972-657 Reach #: 1

Date (yy/mm/dd)	Sample Site No.	Pass # or trap/net #	Capture Method	Time In (24 hr clock)	Time Out (24 hr clock)	Sampling time (min)	Depth (m)
95/10/09	1	1	MT	1225	1012	1307	0.5
95/10/09	2	1	MT	1540	1640	1500	1

Comments : _____

FISH COLLECTION METHOD INFORMATION

Card 01 of 01

Date (yy/mm/dd): 95/10/09 **Agency:** C58 **Crew:** JB/JD
Gazetted Name: Unnamed **Alias:** _____ **UTM:** 09.645800.6101500
Lake/Stream/Wetland: Stream **Location:** _____ (source: NAD27)
Sequence No.: 00 **Weather:** _____
Watershed code: 480-6972-657 **Reach #:** 1

Date (yy/mm/dd)	Sample Site No.	Pass # or trap/net #	Capture Method	Time In (24 hr clock)	Time Out (24 hr clock)	Sampling time (min)	Depth (m)
95/10/09	1	1	MT	1445	0947	1142	0.3

Comments : _____

FISH COLLECTION METHOD INFORMATION

Card 01 of 01

Date (yy/mm/dd): <u>95/10/09</u>	Agency: <u>C58</u>	Crew: <u>JB/JD</u>
Gazetted Name: <u>Unnamed</u>	Alias: _____	UTM: <u>09-645600-6100800</u>
Lake/Stream/Wetland: <u>Stream</u>	Location: _____	(source: NAD27)
Sequence No.: <u>00</u>	Weather: _____	
Watershed code: _____	Reach #: <u>1</u>	

Date (yy/mm/dd)	Sample Site No.	Pass # or trap/net #	Capture Method	Time In (24 hr clock)	Time Out (24 hr clock)	Sampling time (min)	Depth (m)
95/10/09	1	-	VO	1620	1621	1	-

Comments : _____

APPENDIX D. LIMNOLOGICAL SAMPLING FORMS

Lake Biophysical Data Form			
Date (yy/mm/dd):	<u>95/10/10 : 1245h</u>	Crew:	<u>JB/JD</u>
Site ID			
Watershed code:	<u>480-6972-657</u>	Sequence No.:	<u>01</u>
Gazetted name:	<u>Bristol</u>	Alias:	
FW Region:	<u>06</u>	UTM (Zone, Easting, Northing):	<u>09.645803.6100298</u>
Management Unit:	<u>08</u>	NTS Map No.:	<u>93 M/02</u>
Biophysical			
Biogeo Zone	<u>SBSmc</u>		
Benchmark (Y/N)	<u>Y</u>		
Benchmark details:	<u>see Comments</u>		
Nutrient Status			
SEAM No.:	<u>-</u>	Lim no Station No:	<u>1</u>
Secchi depth (m)	<u>1.53</u>	H2S (mg/l)	<u>N/A</u>
Other samples taken:	<u>Y</u>	H2S comments	<u>no odor</u>
		TDS method	<u>N/A</u>
		DO method	<u>YSI 57</u>
		TEMP method	<u>YSI 57</u>
		Alkalinity	
Field Conditions			
wind velocity (km/h)	<u>to 8</u>	wind direction:	<u>S</u>
cloud cover (/10 O.C.)	<u>99%</u>	surface condition:	<u>ripple</u>
		air temp. (c):	<u>7</u>
		water colour:	<u>lt. yellow</u>
Development			
MOF rec sites (Y/N)	<u>N</u>	Resort cmpsts (Y/N)	<u>N</u>
MOF campsites (Y/N)	<u>N</u>	Resorts (Y/N)	<u>N</u>
Parks campgrds (Y/N)	<u>N</u>	Resort cabins (Y/N)	<u>N</u>
Recreation			
ROS	<u>4</u>	Biophys features:	
		Biophys sub-feat.:	
Inlets/Outlets	<u>see Stream Survey Card for mandatory fields</u>		
Biological			
Fish Card attached (Y/N)	<u>Y</u>	Fish. Man. Com.	<u>see Report</u>
Wildlife:	<u>see Comments</u>	Reptiles:	<u>N/A</u>
Aquatic birds:	<u>geese</u>	Invertebrates:	<u>FW clams</u>
Amphibians:	<u>N/A</u>	Aquatic Plants:	<u>see Comments</u>
Comments:			
<u>Observed beaver, raven, moose droppings</u>			
<u>Benchmark (spike in center of orange circle), 0.85 m above present lake level in</u>			
<u>25 cm dbh spruce tree 25 m E of lake outlet.</u>			

Lake Survey Profile Data

Sequence number: 01

Date : 95/10/10 : 1245h
(yy/mm/dd)

Limnology station: 1

Depth (m)	D.O. (mg/l)	Temp (c)	TDS (ppm)	Conduct. (umhos/cm)
surface	9.4	7.8		
0.5	9.4	7.8		
1.0	9.4	7.8		
1.5	9.4	7.8		
2.0	9.4	7.8		
2.5	9.4	7.8		
3.0	9.4	7.8		
3.5	9.4	7.8		
4.0	9.4	7.8		
4.5	9.4	7.8		
5.0	9.35	7.8		
5.5	9.15	7.8		
6.0				
6.5				
7.0				
7.5				
8.0				
8.5				
9.0				
9.5				
10.0				
10.5				
11.0				
11.5				
12.0				
12.5				
13.0				
13.5				
14.0				
14.5				
15.0				
15.5				
16.0				
16.5				
17.0				
17.5				
18.0				
18.5				
19.0				
19.5				
20.0				

Depth (m)	D.O. (mg/l)	Temp (c)	TDS (ppm)	Conduct. (umhos/cm)
20.5				
21.0				
21.5				
22.0				
22.5				
23.0				
23.5				
24.0				
24.5				
25.0				
25.5				
26.0				
26.5				
27.0				
27.5				
28.0				
28.5				
29.0				
29.5				
30.0				
30.5				
31.0				
31.5				
32.0				
32.5				
33.0				
33.5				
34.0				
34.5				
35.0				
35.5				
36.0				
36.5				
37.0				
37.5				
38.0				
38.5				
39.0				
39.5				
40.0				

APPENDIX E. PHOTOGRAPH / NEGATIVE DIRECTORY

Negative #	Photo # (report)	Description
L12 - 1		Bristol Creek, stream S1, downstream of Bristol Lake outlet
L12 - 2	11	Bristol Creek, stream S1, beaver dam at lake outlet
L12 - 3		view from SE lake shore toward NNW
L12 - 4		Babine Mountains from SE corner of Bristol Lake
L12 - 5		Bristol Lake and Babine Mountains from E shore of Bristol Lake
L12 - 6	13	unnamed stream S3, WC 480-6972-657-237, southern inlet to the E shore of Bristol Lake
L12 - 7	15	unnamed stream S5, WC 480-6972-657-183, inlet to the NW shore of Bristol Lake
L12 - 8		unnamed stream S6, inlet to the W shore of Bristol Lake
L12 - 9	12	unnamed stream S6, inlet to the W shore of Bristol Lake
L12 - 10	4	coarsescale (largescale) sucker, gillnet catch
L12 - 11	5	longnose sucker, gillnet catch
L12 - 12		mountain whitefish, gillnet catch
L12 - 13	8	rainbow trout, gillnet catch
L12 - 14		cutthroat trout, gillnet catch
L12 - 15	9	cutthroat trout, gillnet catch
L12 - 16		Bristol Creek, stream S1, downstream of Bristol Lake outlet
L12 - 17	14	unnamed stream S2, WC 480-6972-657-112, inlet to the S shore of Bristol Lake
L12 - 18	16	Bristol Creek, stream S4, northern inlet to the E shore of Bristol Lake
L12 - 19		start of 180° panorama, taken from 100 m offshore of the Bristol Creek (S4) inlet delta; view to SE
L12 - 20		panorama, continued; view to SSE
L12 - 21		panorama, continued; view to S
L12 - 22		panorama, continued; view to SSW
L12 - 23		panorama, continued; view to WSW
L12 - 24	1	panorama, continued; view to W
L12 - 25		panorama, continued; view to WNW
L12 - 26		panorama, continued; view to NW
L12 - 27	7	peamouth chub, gillnet catch
L12 - 28		peamouth chub, gillnet catch
L12 - 29	6	redside shiner, gillnet catch
L12 - 30	10	mountain whitefish, gillnet catch
L12 - 31		start of 90° panorama, taken from access site at middle W shore; view to SE
L12 - 32		panorama, continued; view to ESE
L12 - 33	2	panorama, continued; view to E
L12 - 34	3	panorama, continued; view to ENE
L12 - 35		panorama, continued; view to NE