

RECONNAISSANCE SURVEY OF
TORKELSEN LAKE
WATERSHED CODE 460 - 0817 - 439 - 616 - 03
SURVEY DATES : 07 - 08 OCTOBER 1995

Prepared for:

MINISTRY OF ENVIRONMENT, LANDS AND PARKS

Fisheries Branch
Skeena Region
3726 Alfred Ave.
Box 5000
Smithers, BC V0J 2N0

By:

Joseph S. DeGisi
Jeffrey A. Burrows
RR#1, Site 27, C2
Smithers, BC V0J 2N0

CONTENTS

LIST OF FIGURES	ii
LIST OF TABLES	iii
LIST OF PHOTOGRAPHS	iii
LIST OF APPENDICES	iii
1. SUMMARY	1
2. DATA ON FILE	2
3. GEOGRAPHIC AND MORPHOLOGIC INFORMATION	2
3.1 Location.....	2
3.2 Physical Data	5
3.3 Benchmark.....	5
3.4 Prior Surveys	5
3.5 Lake Drainage	5
3.6 Terrain and Vegetation.....	6
3.6.1 Immediate Shore	6
3.6.2 Surrounding Country	6
4. ACCESS, DEVELOPMENTS AND LAND USE.....	6
4.1 Access.....	6
4.2 Development and Land Use.....	7
4.2.1 Resorts and Campsites	7
4.2.2 Mining Claims	7
4.2.3 Timber Harvest	7
4.2.4 Waste Permits	7
4.2.5 Water Permits.....	7
4.2.6 Obstructions and Pollutions	7
4.2.7 Recreation Resource Inventory	7
4.2.8 Special Regulations and Restrictions	7
4.2.9 Comments	7

5. FISH POPULATION SAMPLING	7
5.1 Fish Species Composition	8
5.2 Relative Abundance	8
5.3 Size, Age, and Growth.....	8
5.3.1 Non-salmonid Species.....	9
5.3.2 Cutthroat Trout.....	10
5.4 Sexual Maturity and Condition.....	11
5.4.1 Cutthroat Trout.....	11
6. LIMNOLOGICAL SAMPLING	13
6.1 Stratification	13
6.2 Water Chemistry	14
7. OTHER FLORA AND FAUNA.....	16
7.1 Aquatic Plants.....	16
7.2 Zooplankton	16
7.3 Waterfowl and Other Fauna	16
8. MANAGEMENT COMMENTS.....	16
9. PHOTOGRAPHS.....	17

LIST OF FIGURES

Figure 1. Location of Torkelsen Lake.....	3
Figure 2. Torkelsen Lake, enlargement from air photo 30BCB92137 No. 249.....	4
Figure 3. Length frequency histograms for abundant non-salmonid species.....	9
Figure 4. Length frequency histogram for cutthroat trout	10
Figure 5. Age frequency histogram and length-at-age for cutthroat trout.	10
Figure 6. Ford-Walford plot for cutthroat trout	11
Figure 7. Estimated length - weight relationship for Torkelsen Lake cutthroat trout.	12
Figure 8. Temperature and dissolved O ₂ profiles for Torkelsen Lake.	13

LIST OF TABLES

Table 1. Fish sampling effort and catch for all methods.	8
Table 2. Descriptive statistics for length distributions of six fish species.....	9
Table 3. Sexual maturity of Torkelsen Lake cutthroat trout, by age.....	11
Table 4. Water chemistry parameters.....	14
Table 5. Estimated nitrogen : phosphorus ratios.	14
Table 6. Metals concentrations.....	15
Table 7. Zooplankton.	16

LIST OF PHOTOGRAPHS

Photograph 1. Torkelsen Lake, view to SW (Babine Mountains) from E shore of the lake.....	17
Photograph 2. Torkelsen Lake, view to N from E shore of the lake.	17
Photographs 3-5 (cropped). Cutthroat trout, burbot, redbside shiner; gillnet catch, Torkelsen Lake.	18
Photograph 6. Longnose sucker, gillnet catch, Torkelsen Lake.....	19
Photograph 7. White sucker, gillnet catch, Torkelsen Lake.....	19
Photograph 8. Torkelsen Creek, WC 460-0817-439-616, outlet of Torkelsen Lake.	20
Photograph 9. Unnamed stream, WC 460 0817 439 616-700, inlet to the NE corner of Torkelsen Lake.....	20
Photograph 10. Torkelsen Creek, WC 460-0817-439-616, inlet to the N shore of Torkelsen Lake.....	21
Photograph 11. Unnamed stream, WC 460-0817-439-616-646, inlet to the E shore of Torkelsen Lake	21

LIST OF APPENDICES

APPENDIX A. ABBREVIATIONS AND OTHER NOTES	22
APPENDIX B. STREAM SURVEY FORMS.....	23
APPENDIX C. FISH SAMPLING FORMS.....	27
APPENDIX D. LIMNOLOGICAL SAMPLING FORMS.....	38
APPENDIX E. PHOTOGRAPH / NEGATIVE DIRECTORY	40

1. SUMMARY

Torkelsen Lake is located in the Bulkley Forest District, 45 km northeast of the town of Smithers. Reconnaissance inventory of the lake was made 07 - 08 October 1995. Torkelsen Lake covers 133 surface hectares and is oblong in shape. The lake is shallow (mean and maximum depths of 3.3 m and 7.4 m) with gravel and cobble shorelines. It lies 841 m above sea level and drains via Torkelsen Creek to Harold Price Creek, the Suskwa River, Bulkley River and the Skeena system. Access was achieved by 2WD road to a Forest Service campsite at the lake.

Torkelsen Lake was thermally well-mixed at the time of survey. Lake 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 4 minnow traps baited with salmon roe. Six species of fish were captured in Torkelsen Lake: cutthroat trout (*Oncorhynchus clarki*), lake chub (*Couesius plumbeus*), redbelt shiner (*Richardsonius balteatus*), longnose sucker (*Catostomus catostomus*), white sucker (*Catostomus commersoni*) and burbot (*Lota lota*). Gillnet catch per effort for cutthroat trout indicated intermediate population density for the species relative to other small lake populations. Lake chub, white sucker and burbot were captured in low numbers. Cutthroat trout maximum size and population condition factor were low relative to other small lake populations in Skeena region.

The lake outlet stream and three inlet channels were examined for fisheries potential. Torkelsen Creek is blocked at the lake outlet by a beaver dam which is likely a barrier to fish passage except at higher flows. The inlets all contained gravel suitable for salmonid spawning, though only Torkelsen Creek conveyed discernible flow on the survey dates.

Torkelsen Lake provides a pleasant setting for boating and angling. The surroundings are relatively pristine. Mature forests at the lake edge and views of the Babine Mountains contribute to the beauty of the area. A Forest Service primitive campsite is located on the lake, which is already a moderately exploited recreational resource. Protection of the fish populations of Torkelsen Lake is not of special concern at this time. Any timber harvest in the area should be conducted so as to avoid impacting cutthroat spawning and rearing habitat in the lake's inlets, as specified in the Forest Practices Code. Other 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 45 km NE of the town of Smithers
 Drainage Torkelsen C → Harold Price C → Suskwa R → Bulkley R →
 Skeena R → Chatham Sound
 Watershed Code 460-0817-439-616-03
 Latitude / Longitude 55° 05' / 126° 43'
 U.T.M. 09.646146.6106294 (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 - 93M.017 (1:20,000)
 Native Land Claim Sekanni - Carrier, Nattooten

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

Figure 2. Torkelsen Lake, enlargement from air photo 30BCB92137 No. 249.

3.2 Physical Data

Elevation	841 m	Elevation Source.....	Casio ALT6100 altimeter
Water Surface Area.....	1407251 m ²	Volume.....	4540260 m ³
Area Above 6 m Contour....	1338717 m ²	Flushing Rate	NA
Shoreline Perimeter.....	6800 m	Perimeter of Islands.....	NA
Maximum Depth	7.4 m	Mean Depth.....	3.29 m
Sounding Device	Lowrance X-15B	Lake Drainage Area	NA
Filterable Residue (T.S.S.)..	< 4 mg/L	Secchi Disc.....	2.41 m

3.3 Benchmark

The benchmark was established in a 0.50 m (dbh) spruce on the north shore, 30 m WSW of the boat launch at the Forest Service campsite. An iron spike was placed in an orange circle painted on the tree trunk, 0.95 m above the current lake level.

3.4 Prior Surveys

A search of Skeena Region inventory files yielded no records for Torkelsen Lake, Torkelsen Creek or Harold Price Creek.

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.

Four channels were examined.

- S1. Unnamed channel WC 460-0817-439-616-646, inlet to the east shore of Torkelsen Lake and surveyed at UTM 09.647600.6107100 (NAD27). The channel was dry at the time of survey, with only stagnant pools of surface water. The stream may support cutthroat trout spawning during spring and early summer high flows, as suitable gravels were present. An overnight set of a single minnow trap captured no fish.
- S2. Torkelsen Creek, WC 460-0817-439-616, outlet stream of Torkelsen Lake surveyed at UTM 09.646145.6106294 (WCD). A beaver dam at the lake outlet creates an immediate barrier to fish movement between this stream and the lake. At the time of the survey, the channel was watered and at moderate stage. Alder provides a fair degree of crown closure. An overnight set of two minnow traps captured a single juvenile cutthroat trout. Some gravel suitable for salmonid spawning is found below the lake but lakeward migration for young fish would be difficult at late season flows.

- S3. Unnamed channel WC 460-0817-439-616-700, inlet to the northeast corner of Torkelsen Lake and surveyed at UTM 09.647800.6108200 (NAD27). The channel was completely dry at the time of survey, but bears substrate suitable for salmonid spawning. There are no barriers to migration in either direction. The stream is probably used for cutthroat spawning if flow is of sufficient volume.
- S4. Torkelsen Creek, WC 460-0817-439-616, inlet to the north shore of Torkelsen Lake and surveyed at UTM 09.647400.6108200 (NAD27). Flow was low at the time of the survey, but minnow traps captured two juvenile cutthroat and one juvenile longnose sucker. The substrate contained gravels which would be suitable for salmonid spawning, and the channel appears to carry much greater flow seasonally. The culvert at the road crossing would not be a barrier at higher flows. This stream probably supports much of the spawning habitat used by Torkelsen Lake cutthroat trout.

3.6 Terrain and Vegetation

3.6.1 Immediate Shore

Most shoreline substrates are large cobble. Swamp horsetail grows at the immediate shore. Sedges and a mix of alder and willow separate the shore from the surrounding conifer forest. Sedge wetlands are located at the northwest corner and along the southwest shore. Organic fines form the shoreline in these areas.

3.6.2 Surrounding Country

The lake is located within a zone of low swampy terrain, width 4 - 5 km, extending SW from Babine Lake to the Fulton River. Distinctly steeper hills occur on either side of this zone. The area is forested mainly by spruce, lodgepole pine and subalpine fir. The Babine Mountains are visible to the southwest, 10 - 15 km distant.

4. ACCESS, DEVELOPMENTS AND LAND USE

4.1 Access

The lake was accessed by road from the town of Smithers. All road 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 76.4 km. Turn left onto Nilkitkwa - Torkelson Forest Service Road.
4. Proceed NW to odometer 77.7 km. Turn left onto Torkelson Forest Service campsite road.
5. Proceed S to odometer 78.0 km, where the road meets the lakeshore.

The boat launching site is suitable for trailered small craft, though the road end is soft mud so 4WD is advised if a trailered boat is to be launched.

4.2 Development and Land Use

4.2.1 Resorts and Campsites

The BC Forest Service maintains a campsite at “Torkelson Lake” (sic). The site is located 75 m N of the lake. The Ministry of Forests “Bulkley Forest District Recreation Map” describes the site as follows: “Medium size, open site with heavy herbaceous vegetation. Canoeing, small boats, fishing and wildlife viewing. Access road too soft for motor home use.”

4.2.2 Mining Claims

No placer staking is 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

The lake is located within Supply Block B of the Bulkley TSA. The closest existing cutblock to the lake lies 0.4 km to the northeast. The block was logged 1981-83, burned and chemically treated in 1987. Another cutblock located 1 km southeast of the lake was logged in 1988, burned 1989 and replanted 1991. Blocks to the east are visible from some vantage points on the lake surface.

4.2.4 Waste Permits

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

4.2.5 Water Permits

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

4.2.6 Obstructions and Pollutions

A beaver dam at the lake outlet is likely a barrier to fish passage at lower flows. Beavers are currently active at the dam site.

4.2.7 Recreation Resource Inventory

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

A2 E3 --

a c i C1

4

ROS status is thus “Roaded Resource Land”.

4.2.8 Special Regulations and Restrictions

None known.

4.2.9 Comments

Rough trails parallel the shore through dry areas. Open mature forest near the lake edge is quite aesthetic. BC Ecological Reserve No. 73, a bog preserve, is located about 2 km NE of the lake.

5. FISH POPULATION SAMPLING

Details of fish population sampling in Torkelsen Lake and its inlets and outlet are given in Table 1. The raw data were recorded on RIC standard forms “Fish Collection Method Information Form” and “Fish

Collection Data Form” which are reproduced in Appendix C. All landed catch was sampled for appropriate parameters.

Table 1. Fish sampling effort and catch for all methods used at Torkelsen Lake and its inlet-outlet streams, 07 - 08 October 1995. **Loc** gives the location where the gear was fished, where Lake = Torkelsen Lake; S1 = unnamed channel WC 460-0817-439-616-646; S2 = Torkelsen Creek, WC 460-0817-439-616, outlet stream of Torkelsen Lake; S3 = unnamed channel WC 460-0817-439-616-700; S4 = Torkelsen Creek, WC 460-0817-439-616, inlet to the north shore of Torkelsen Lake. **Set** and **Haul** are 24 hour clock times. **Soak** gives the time in minutes for which the gear was deployed. **Depth** unit is metres. 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. The final six columns give the total catch by that gear, by species: **CT** = cutthroat trout, **LKC** = lake chub, **RSC** = reidside shiner, **LSU** = longnose sucker, **WSU** = white sucker, **BB** = burbot. All catch was sampled for length, and other appropriate parameters were recorded for salmonids except those released alive.

Loc	Site	Gear #	Method	Set	Haul	Soak	Depth	CT	LKC	RSC	LSU	WSU	BB
Lake	1	1	MT	1655	1503	1328	2						
Lake	2	1	MT	1715	1547	1352	4						
Lake	3	1	MT	1730	1605	1355	5		1	4			
Lake	4	1	MT	1740	1611	1351	4			3			
Lake	5	1	GN	1840	720	760	0 - 5	31		13	104	1	1
S1	1	1	MT	1415	1512	1497	0.5						
S2	1	1	MT	1615	1435	1340	0.3	1					
S2	2	1	MT	1615	1435	1340	0.3						
S3	1	-	VO	1515	1520	5	-						
S4	1	1	MT	1815	1500	1245	0.5	2			1		
S4	2	1	MT	1900	1430	1170	0.5						

5.1 Fish Species Composition

Six species of fish were captured in Torkelsen Lake and its watershed: cutthroat trout (*Oncorhynchus clarki*), lake chub (*Couesius plumbeus*), reidside shiner (*Richardsonius balteatus*), longnose sucker (*Catostomus catostomus*), white sucker (*Catostomus commersoni*) and burbot (*Lota lota*). Special status in MOE Region 6 is not currently attached to any of these species. The presence of cutthroat trout in Torkelsen 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 2.4 fish per net·hr, indicating intermediate population density for the species relative to other small lake populations. Lake chub, white sucker and burbot were captured in low numbers, relative to the other species (Table 1).

5.3 Size, Age, and Growth

Characteristics of the length distributions of fish captured by gillnet and minnow trap in Torkelsen 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 Torkelsen Lake fish populations. growth in Torkelsen Lake does not conform well to the Von Bertalanffy model (Figure 6). 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. Regardless, cutthroat trout maximum fork length is low relative to other lake populations.

Table 2. Descriptive statistics for length distributions of six fish species captured in Torkelsen Lake and its inlets and outlet stream, 07 - 08 October 1995. Fork lengths are given in mm. **CT (L)** = cutthroat trout captured in Torkelsen Lake, **CT (S)** = cutthroat trout captured in streams adjacent to Torkelsen Lake, **RSC** = redeye shiner, **LKC** = lake chub, **LSU** = longnose sucker, **WSU** = white sucker (includes only lake-captured fish), **BB** = burbot.

Parameter	CT (L)	CT (S)	RSC	LKC	LSU	WSU	BB
Mean	238	98	111	122	226	252	271
Standard Error	3.8	13.0	1.5		3.9		
Median	240	98	111		233		
Mode	244	-	109		165		
Standard Deviation	21.3	22.5	5.4		39.6		
Minimum	195	76	102		133		
Maximum	288	121	120		300		
Sample size	31	3	13	1	104	1	1

5.3.1 Non-salmonid Species

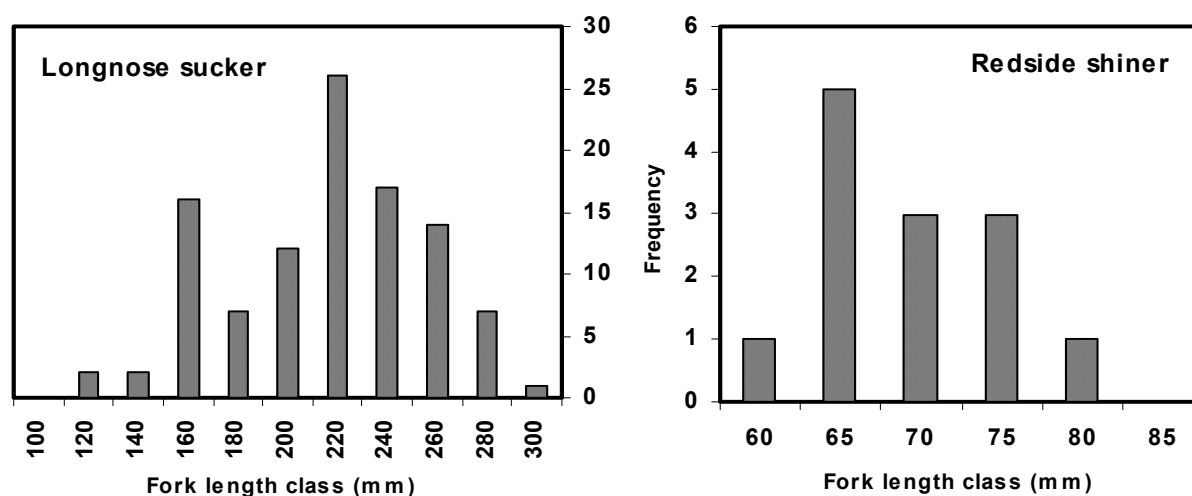


Figure 3. Length-frequency histograms for abundant non-salmonid species captured by gillnet and minnow traps in Torkelsen Lake. Length class width is 20 mm for longnose sucker and 5 mm for redeye shiner. X-axis class labels are the lower bounds for the length classes.

5.3.2 Cutthroat Trout

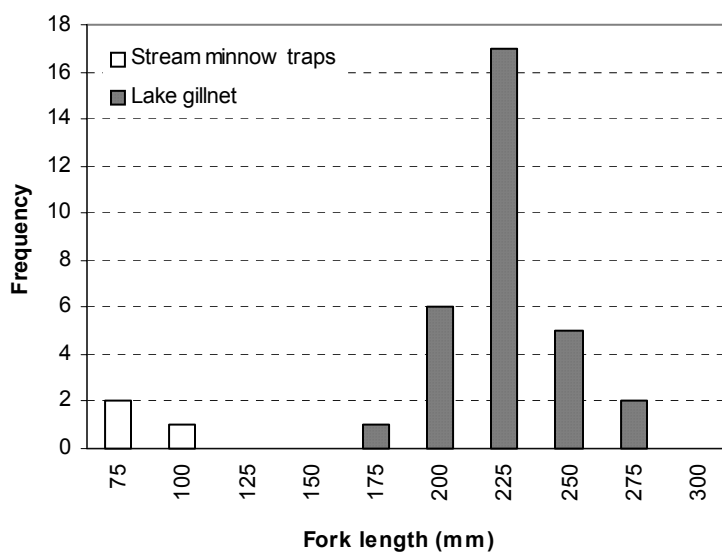


Figure 4. Length frequency distribution of cutthroat trout caught by lake gillnet (shaded bar areas) and stream minnow traps (open bar areas) at Torkelsen Lake, 07 - 08 October 1995. Length class width is 25 mm; x-axis labels are the lower boundaries of length classes.

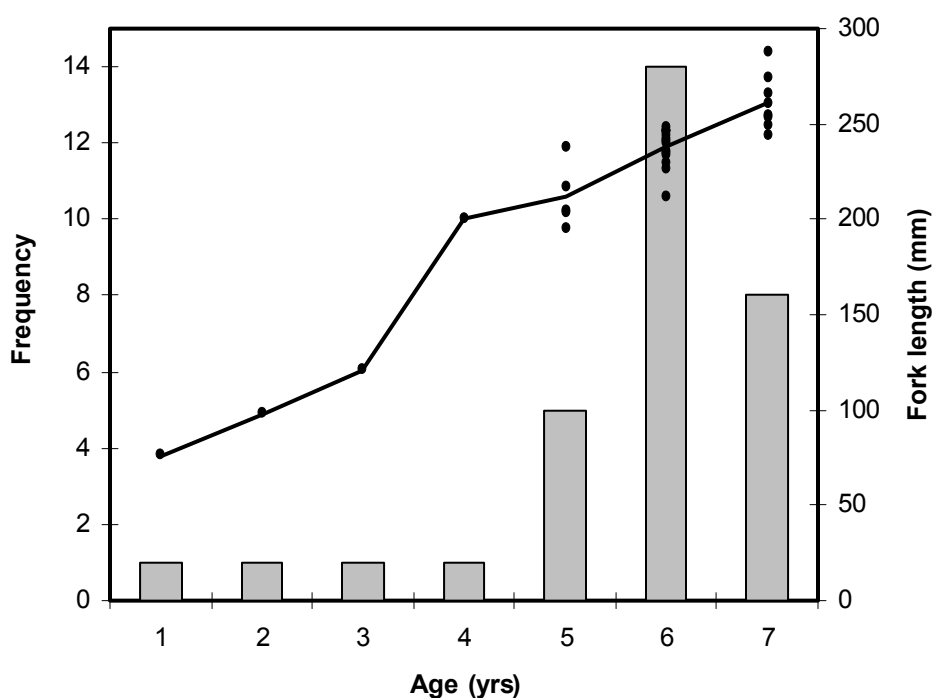


Figure 5. Age frequency histogram and length-at-age for cutthroat trout captured at Torkelsen Lake and its inlets and outlet, 07 - 08 October 1995. The solid line shows mean fork length at age, while the filled circles indicate lengths at age for individual fish.

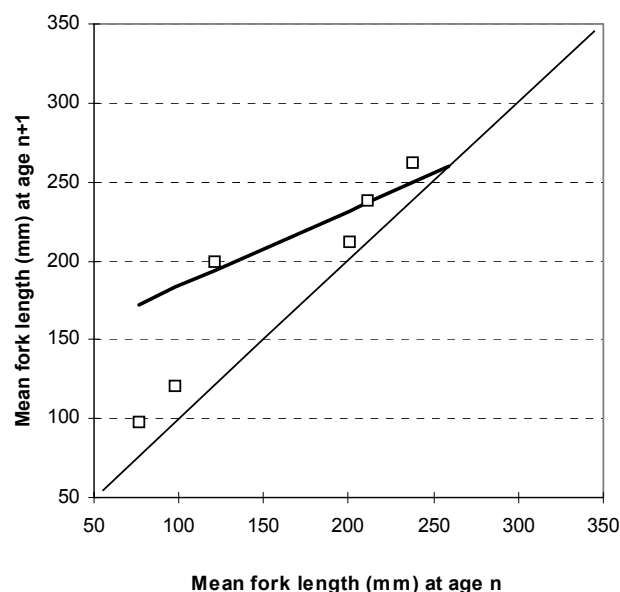


Figure 6. Ford-Walford plot for cutthroat trout captured 07 - 08 October 1995, Torkelsen Lake and inlets / outlet. Lengths-at-age are mean values. The heavy line shows the least-squares regression of {length at age $n+1$ } on {length at age n }. The first two points were excluded from the fit. Estimated terminal length (L_{∞}) occurs at the intersection of the regression line with the diagonal reference line; the parameters from the regression give $k = .473$ and $L_{\infty} = 259$ mm. The fit is generally poor, probably for a combination of the following reasons: early ages occupy a different growth trajectory, sample sizes are small, or the growth model is inappropriate for this population.

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 Torkelsen Lake. The majority of males in each age class below age 7 were immature, while most age 7 males were mature (Table 3). The population condition factor is low, relative to other small lake cutthroat trout populations in Skeena region during late summer (Figure 7).

Table 3. Sexual maturity of Torkelsen Lake cutthroat trout, by age. For the total catch, the ratio of males to females was 1.55 : 1.

Age	Females		Males	
	number	% mature	number	% mature
2	0	-	0	-
3	0	-	0	-
4	0	-	1	0
5	2	0	3	33
6	6	100	8	38
7	3	100	5	80
TOTAL	11	82	17	47

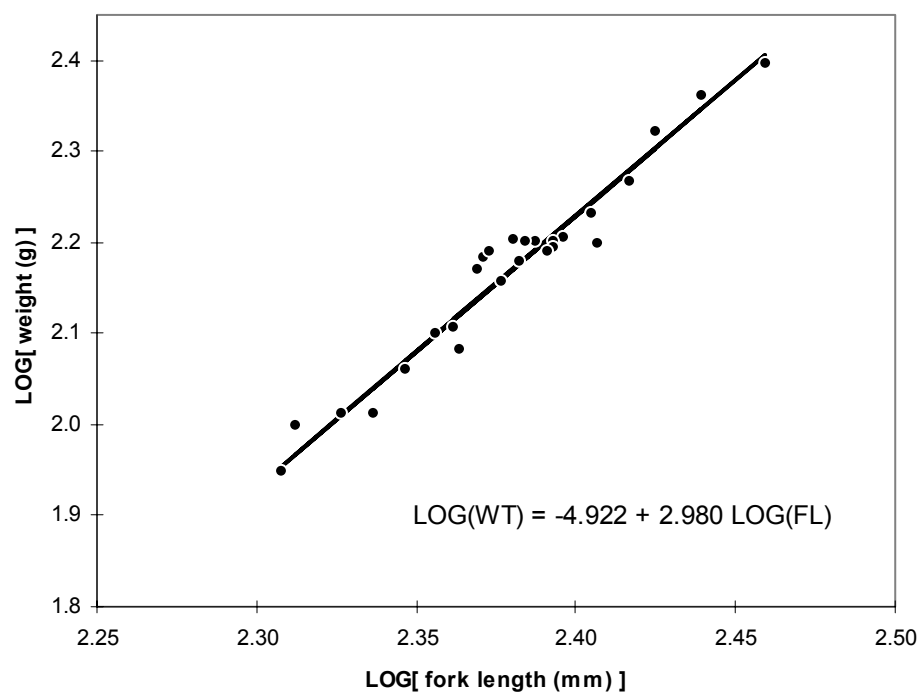


Figure 7. Estimated length - weight relationship for Torkelsen Lake cutthroat trout captured by all methods, 07 - 08 October 1995. Both length and weight are \log_{10} transformed. The GM regression equation is shown; the resulting estimate of Fulton's condition factor is thus $10^{-4.922} \cdot 10^5 = 1.20$.

6. LIMNOLOGICAL SAMPLING

Limnological sampling was conducted at midday 08 October 1995, at the Torkelsen 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 7.0 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 Torkelsen Lake samples were received 10 October 1995, within the 72 hr RIC standard time frame for water sample transport.

6.1 Stratification

The oxygen - temperature profile of Torkelsen Lake on 08 October 1995 is shown in Figure 8. The lake was vertically well mixed.

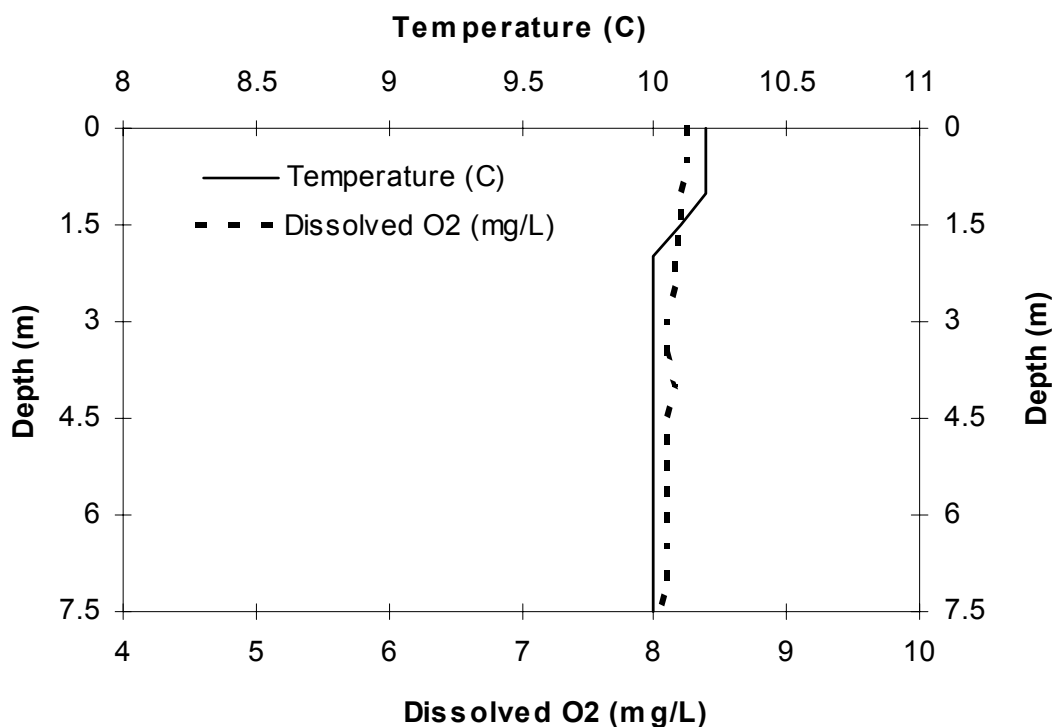


Figure 8. Temperature and dissolved O₂ profiles for Torkelsen Lake, 08 October 1995. The sampling device was a YSI 57 temperature/oxygen meter. Sample interval was 0.5 m.

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 on 08 October 1995, and received by Zenon on 10 October 1995. MDC = minimum detectable concentration for the analytic method.

Parameter	Shallow	Deep	Unit	MDC	Method
Time of Day	13:35	13:20	h	-	-
Depth	0.5	7	m	-	-
pH	6.9	6.9	pH	0.1	Automated pH Meter
Specific Conductance	73	73	uS/cm	1	Cond.Meter Siebold
Residue Nonfilterable (TSS)	< 4	< 4	mg/L	4	Grav, Subsamp Buch 105C
Hardness Total	45	43.9	mg/L		Calculated Result
Alkalinity Phen. 8.3	< 0.5	< 0.5	mg/L	0.5	Automated Electrometer
Alkalinity Total 4.5	36.2	37	mg/L	0.5	Automated Electrometer
Carbonate	< 0.5	< 0.5	mg/L		Calculated Result
Bicarbonate	44.1	45.1	mg/L		Calculated Result
Hydroxide	< 0.5	< 0.5	mg/L		Calculated Result
Total Kjeldahl Nitrogen	0.48	0.46	mg/L	0.04	HgSO ₄ Dig.Auto.Colour.
Total Nitrogen	0.57	0.55	mg/L		Calculated Result
Nitrate+Nitrite (N)	0.09	0.09	mg/L	0.02	Auto. Cadmium Reduction
Nitrate Nitrogen Dissolved	0.09	0.09	mg/L		Calculated Result
Nitrite Nitrogen	< 0.005	< 0.005	mg/L	0.005	Auto. Diazotization
Ortho-Phosphorus (P)	0.003	0.008	mg/L	0.003	Auto.Ascorbic Acid
Phosphorus Total Dissolved	0.009	0.006	mg/L	0.003	Dig.Auto.Ascorbic Acid
Phosphorus - Total	0.011	0.016	mg/L	0.003	Pres.Dig.Auto.Ascorbic A

6.2 Water Chemistry

Results of the general chemistry and metals analyses are given in Table 4 and Table 6. Torkelsen Lake is neutral with 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 phosphorus is limiting algal growth.

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

Parameter	Shallow	Deep	Method
Ortho-Phosphorus	.003	.008	Auto Ascorbic Acid
Phosphorus - Total	.011	.016	Pres. Dig. Auto Ascorbic Acid
Nitrogen - Total Kjeldahl	.48	.46	HgSO ₄ Dig. Auto. Colour.
Nitrogen - Total	.57	.55	Calculated result
N : P RATIO	52 : 1	34 : 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	13:35	13:35	13:20	13:20	h	-	-
Depth	0.5	0.5	7	7	m	-	-
Silver	< 0.03	-	< 0.03	-	mg/L	0.03	-
Aluminum	< 0.06	< 0.02	< 0.06	< 0.02	mg/L	0.06	0.02
Arsenic	< 0.04	< 0.04	< 0.04	< 0.04	mg/L	0.04	0.04
Boron	< 0.04	0.012	< 0.04	0.014	mg/L	0.04	0.008
Barium	0.029	0.028	0.027	0.027	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	10.8	10.9 (1)	10.5	10.6 (1)	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	0.14	0.111	0.13	0.097	mg/L	0.05	0.003
Potassium	0.4	< 0.4	0.6	0.4	mg/L	0.4	0.4
Magnesium	4.38	4.32	4.23	4.24 (1)	mg/L	0.02	0.02
Manganese	0.01	0.007	0.012	0.005	mg/L	0.002	0.002
Molybdenum	< 0.004	< 0.004	< 0.004	< 0.004	mg/L	0.004	0.004
Sodium	2.7	2.35	2.6	2.31	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	1.6	1.62 (1)	1.5	1.60 (1)	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	1.3	1.29	0.9	1.27 (1)	mg/L	0.8	0.03
Tin	< 0.02	< 0.02	< 0.02	< 0.02	mg/L	0.02	0.02
Strontium	0.05	0.051 (1)	0.049	0.049 (1)	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 98 % of lake surface is open water. Swamp horsetail grows at the lake perimeter. Along the west shore and at the south end, mixed macrophyte beds are dominated by *Potamogeton* sp. and *Nuphar* sp.

7.2 Zooplankton

The Torkelsen Lake zooplankton community was numerically dominated by small cyclopoid copepods and their immature stages. Moderate-sized 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 moderate planktivory by the lake's cutthroat trout.

Table 7. Zooplankton collected by horizontal tow of a 118 μ mesh conical plankton net, Torkelsen Lake offshore, 1350 h. on 08 October 1995. Net mouth diameter was 15 cm and net length was 1 m. Tow duration was 4 minutes, at velocity of 0.4 m/sec and depth between 0 and 2 m.

Species	No. / L	Max (mm)	Mode (mm)
<i>Daphnia</i> sp.	5.0	1.7	1.4
<i>Diacyclops bicuspidatus</i>	21.5	1.1	0.7
<i>Bosmina longirostris</i>	0.4	0.7	0.5
Nauplii	9.4	-	-

7.3 Waterfowl and Other Fauna

Beaver and muskrat were active on the lake during the field visit. Loons and mergansers were present.

8. MANAGEMENT COMMENTS

Torkelsen Lake provides a pleasant setting for boating, and angling opportunities for small cutthroat trout. The surroundings are relatively pristine. Mature forests at the lake edge and views of the Babine Mountains contribute to the beauty of the area. A Forest Service primitive campsite is located on the lake, which is already a moderately exploited recreational resource. Protection of the fish populations of Torkelsen Lake is not of special concern at this time. Any timber harvest in the area should be conducted so as to avoid impacting cutthroat spawning and rearing habitat in the lake's inlets, as specified in the Forest Practices Code. Other special regulations or access management status are not recommended.

9. PHOTOGRAPHS

Photograph 1. Torkelsen Lake, view to SW (Babine Mountains) from E shore of the lake.

Photograph 2. Torkelsen Lake, view to N from E shore of the lake.

Photographs 3-5 (cropped). Top to bottom: cutthroat trout, burbot, redbside shiner; from the gillnet catch at Torkelsen Lake.

Photograph 6. Longnose sucker, gillnet catch, Torkelsen Lake.

Photograph 7. White sucker, gillnet catch, Torkelsen Lake.

Photograph 8. Torkelsen Creek, WC 460-0817-439-616, outlet of Torkelsen Lake.

Photograph 9. Unnamed stream, WC 460 0817 439 616-700, inlet to the NE corner of Torkelsen Lake.

Photograph 10. Torkelsen Creek, WC 460-0817-439-616, inlet to the N shore of Torkelsen Lake.

Photograph 11. Unnamed stream, WC 460-0817-439-616-646, inlet to the E shore of Torkelsen Lake

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 obtained 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.

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.

Stream Name		(gaz) Unnamed		(local)		Access				Method							
Watershed Code		460-0817-439-616-646						ReachNo.	1	Lngth(km)							
Location		Inlet to W shore of Torkelsen L				Map#	93M/2		SiteNo.	1	LthSurv(m)	150					
						U.T.M.	09.647600.6107100		FishCard	Y	N	C					
						Field	X	Hist.									
Date	Y.M.D	9	5	1	0	0	7	Time	1415	Agency	C58	Crew					
		JB / JD		Photos		AirPhotos											
C	PARAMETER				VALUE		METH	SPECIFIC DATA					OBSTRUCTIONS				
	Ave. Chan. Width (m)				1.5		T	1.5	2.0	1.0	1.5		C	Ht(m)	Type	Loc	
	Ave. Wet. Width (m)													NA			
	Ave.Max.Riffle Depth (cm)																
	Ave.Max.Pool Depth (cm)																
	Gradient %				< 1		GE	C	BED MATERIAL		%	C	BANKS				
	% Pool		Riffle		Run		Other			Fines	clay,silt,sand (<2mm)	10	Height(m)	%Unstable			
	Side Chan.%		0 X	0-10	10-40	>40			Gravels	small (2-16mm)	0	Texture	F	G	L	R	
		Area%	0	0-5	5-15	>15				large (16-64mm)	40	Confinement	EN	CO	FC	OC	
	Debris	Stable%								sm. cobble (64-128mm)	40	Valley:Channel Ratio	0-2	2-5	5-10	10+	
	COVER: Total%									lge.cobble (128-256mm)	5	Stage	Dry	M	H	Flood	
	Comp.	Dp.Pool	L.O.D.	Boulder	InVeg	OverVeg	Cutbank			boulder (>256mm)	5	Flood Signs Ht(m)		Braided	Y	N	
	sum100%									Bedrock	0	Bars (%)		pH		O2(ppm)	
	Crown Closure %			C	Aspect				D90(cm)	C	Compaction	L	M	H	WaterTemp(C)	6	Turb(cm)
	DISCHARGE												REACH SYMBOL				
	Parameter		Value	Method	Specific Data								(Fish)				
	Wetted Width (m)																
	Mean Depth (m)																
	Mean Velocity (m/s)																
	Discharge (m3/s)		0	GE	trace of flow, not estimable												

[illegible]

DFO / MOE
STREAM SURVEY FORM

Stream Name										(local)										Access				Method													
Watershed Code										460-0817-439-616										ReachNo.		1		Lngth(km)													
Location				Outlet of Torkelsen Lake										Map#		93M/2				SiteNo.		1		LthSurv(m)		200											
										U.T.M.		09.646145.6106294				FishCard		Y N C		Field		X Hist.															
Date		Y.M.D		9		5		1		0		0		7		Time		1600		Agency		C58		Crew		JB / JD		Photos		AirPhotos							
C		PARAMETER										VALUE				METH		SPECIFIC DATA										OBSTRUCTIONS									
		Ave. Chan. Width (m)										5				T		7.0 5.0 3.0										C		Ht(m)		Type		Loc'			
		Ave. Wet. Width (m)										0.89				MS		0.90 0.75 1.00										C1		1.5		BD		0			
		Ave.Max.Riffle Depth (cm)										12				MS		12 11																			
		Ave.Max.Pool Depth (cm)										20				MS		15 25																			
		Gradient %										< 1				GE		C		BED MATERIAL				%		C		BANKS									
		%Pool		0		5		Riffle		5		0		Run		4		5		Other		0		0		GE		Fines		clay,silt,sand (<2mm)		10		Height(m)		%Unstable	
		Side Chan.%						0		X		0-10				10-40				>40				GE		Gravels		small (2-16mm)		5		Texture		F G L R			
				Area%				0				0-5		X		5-15				>15				GE				large (16-64mm)		50		Confinement		EN CO FC OC UC N/A			
		Debris		Stable%										85				GE				Larges		sm. cobble (64-128mm)		20		Valley:Channel Ratio		0-2 2-5 5-10 10+ N/A							
		COVER: Total%										40								Larges		lge.cobble (128-256mm)		10		Stage		Dry		L M H Flood							
		Comp.		Dp.Pool		L.O.D.		Boulder		InVeg		OverVeg		Cutbank												Bedrock		0		Flood Signs Ht(m)		Braided		Y N			
		sum100%				0		20		40		0		40		0												Bars (%)		pH		O2(ppm)					
		Crown Closure %				10		-		100		C		Aspect						D90(cm)				C		Compaction		L M H		WaterTemp(C)		8		Turb(cm)		Cond(25C)	
		DISCHARGE																				REACH SYMBOL															
		Parameter				Value				Method				Specific Data										(Fish)													
		Wetted Width (m)				0.42				MS																											
		Mean Depth (m)				0.1				MS				.07 .12 .12 .10																							
		Mean Velocity (m/s)				0.08				F				.04 .10 .10																							
		Discharge (m3/s)				0.00336				calc														(Width:Valley / Channel,Slope)													
																						BedMaterial															

[illegible]

[illegible]

DFO / MOE
STREAM SURVEY FORM

Stream Name										(local)								Access						Method															
Watershed Code										460-0817-439-616										ReachNo.		1		Lngth(km)															
Location		Inlet to the N shore of Torkelsen L										Map#		93M/2						SiteNo.		1		LthSurv(m)						200									
										U.T.M.		09.647400.6108200						FishCard		N C		Field X Hist.																	
Date	Y.M.D	9	5	1	0	0	8	Time	1430		Agency	C58	Crew	JB/JD		Photos		AirPhotos																					
C	PARAMETER							VALUE			METH	SPECIFIC DATA										OBSTRUCTIONS																	
	Ave. Chan. Width (m)							8.3			MS	12.0 11.0 3.0 7.0										C	Ht(m)	Type	Loc'														
	Ave. Wet. Width (m)							3.4			MS	3.0 1.6 1.8 7.0											N/A																
	Ave.Max.Riffle Depth (cm)							5			MS	5 4 5																											
	Ave.Max.Pool Depth (cm)							27			MS	22 16 26 55																											
	Gradient %							< 1			GE	C	BED MATERIAL				%	C	BANKS																				
	% Pool	5	0	Riffle	3	0	Run	2	0	Other	0	0	GE		Fines	clay,silt,sand (<2mm)		20	Height(m)	%Unstable																			
	Side Chan.%				0X 0-10			10-40			>40		GE		Gravels	small (2-16mm)		20	Texture	F G L R																			
		Area%			0 0-5		X	5-15			>15		GE			large (16-64mm)		20	Confinement		EN CO FC OC UC N/A																		
	Debris		Stable%					75			GE				Larges	sm. cobble (64-128mm)		20	Valley:Channel Ratio		0-2 2-5 5-10 10+ N/A																		
	COVER: Total%							40			GE						lge.cobble (128-256mm)		10	Stage		Dry M H Flood																	
	Comp.	Dp.Pool	L.O.D.		Boulder		InVeg	OverVeg		Cutbank							boulder(>256mm)		10	Flood Signs Ht(m)		Braided		Y															
	sum100%		30		10		30		0	20		10			Bedrock				0	Bars (%)		pH		O2(ppm)															
	Crown Closure %		20 - 100					Aspect						D90(cm)		C	Compaction		L M H		WaterTemp(C)		6 Turb(cm)		Cond(25C)														
	DISCHARGE																				REACH SYMBOL																		
	Parameter				Value			Method			Specific Data										(Fish)																		
	Wetted Width (m)				0.25			MS																															
	Mean Depth (m)				0.007			MS			.01 .0005 .0005																												
	Mean Velocity (m/s)				0.25			F																															
	Discharge (m3/s)				0.00044			calc																															
																				(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)	R
	CT	2	75 - 120	J	R	MT	PLANIMETRIC VIEW	<input type="checkbox"/>
	LSU	1	60	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.								
This channel probably carries much higher flows seasonally and is likely used by lake cutthroat population for spawning; suitable gravel available.								
Good, passable culvert at road crossing.								
							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
 Gazetted Name: Torkelsen
 Lake/Stream/Wetland: Lake
 Sequence No.: 03
 Watershed code: 460-0817-439-616

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

Crew: JB/JD
 UTM: 09.646145.6106294
 (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
5	GN	1	CT	-	200	82	1	M	I	R	age 4+
5	GN	1	CT	-	217	103	2	M	I	R	age 5+
5	GN	1	CT	-	275	230	3	M	M	R	age 7+
5	GN	1	CT	-	255	158	4	M	I	R	age 7+
5	GN	1	CT	-	249	161	5	M	M	R	age 6+
5	GN	1	CT	-	203	89	6	F	I	R	age 5+
5	GN	1	CT	-	244	159	7	F	M	R	age 7+
5	GN	1	CT	-	247	159	8	F	M	R	age 6+
5	GN	1	CT	-	261	185	9	M	M	R	age 7+
5	GN	1	CT	-	235	153	10	F	M	R	regen
5	GN	1	CT	-	234	148	11	F	M	R	age 6+
5	GN	1	CT	-	230	128	12	M	I	R	age 6+
5	GN	1	CT	-	288	250	13	M	M	R	age 7+
5	GN	1	CT	-	236	155	14	F	M	R	age 6+
5	GN	1	CT	-	222	115	15	M	I	R	regen
5	GN	1	CT	-	241	151	16	F	M	R	age 6+
5	GN	1	CT	-	205	100	17	M	I	R	age 5+
5	GN	1	CT	-	212	103	18	M	I	R	age 6+
5	GN	1	CT	-	266	210	19	F	M	R	age 7+
5	GN	1	CT	-	240	160	20	F	M	R	age 6+
5	GN	1	CT	-	247	157	21	M	I	R	age 6+
5	GN	1	CT	-	254	171	22	M	M	R	age 7+
5	GN	1	CT	-	231	121	23	F	M	R	regen
5	GN	1	CT	-	227	126	24	M	I	R	age 6+
5	GN	1	CT	-	242	159	25	M	M	R	age 6+

Card 02 of 02

Crew: JB/JD
UTM: 09.646145.6106294
(source: WCD)

28

Card 01 of 01

Crew: JB/JD
UTM: 09.647400.6108200
(source: NAD27)

30

Card 01 of 01

Crew: JB/JD
UTM: 09.646145.6106294
(source: WCD)

31

Card 01 of 01

Crew: JB/JD
UTM: 09.646145.6106294
(source: WCD)

[illegible]

Comments : _____

Card 01 of 01

Crew: JB/JD
UTM: 09.647600.6107100
(source: NAD27)

Comments : _____

Card 01 of 01

Crew: JB/JD
UTM: 09.646145.6106294
(source: WCD)

Comments : _____

Card 01 of 01

Date (yy/mm/dd):	95/10/07	Agency:	C58	Crew:	JB/JD
Gazetted Name:	Unnamed	Alias:		UTM:	09.647800.6108200
Lake/Stream/Wetland	Stream	Location:			(source: NAD27)
Sequence No.	00	Weather:			
Watershed code:	460-0817-439-616-700	Reach #:	1		

[illegible]

Comments : _____

Card 01 of 01

Date (yy/mm/dd):	95/10/07	Agency:	C58	Crew:	JB/JD
Gazetted Name:	Torkelsen C	Alias:		UTM:	09.647400.6108200
Lake/Stream/Wetland	Stream	Location:			(source: NAD27)
Sequence No.	00	Weather:			
Watershed code:	460-0817-439-616	Reach #:	1		

[illegible]

Comments : _____

APPENDIX D. LIMNOLOGICAL SAMPLING FORMS

Lake Biophysical Data Form

Date (yy/mm/dd): 95/10/08 : 1305 h.

Crew: JB/JD

Site ID

Watershed code: 460-0817-439-616

Sequence No.: 03

Gazetted name: Torkelsen

Alias:

FW Region: 06

UTM (Zone, Easting, Northing): 09.646145.6106294

Management Unit: 08

NTS Map No.: 93 M/02

Biophysical

Biogeo Zone SBSmc

Benchmark (Y/N) Y

Benchmark details: see Comments

Nutrient Status

SEAM No.: -

Secchi depth (m) 2.41

Other samples taken: Y

Limno Station No:

1

H2S (mg/l)

N/A

H2S comments

no odor

TDS method

N/A

DO method

YSI 57

TEMP method

YSI 57

Alkalinity

Field Conditions

wind velocity (km/h) 5

wind direction: SSW

air temp. (c): 8.5

cloud cover (/10 O.C.) 100

surface condition: lt. ripple

water colour: lt. yellow

Development

MOF rec sites (Y/N) N

Resort cmpsts (Y/N) N

Residences (Y/N) N

MOF campsites (Y/N) Y

Resorts (Y/N) N

Co. Rec facilities N

Parks campgrds (Y/N) N

Resort cabins (Y/N) N

Recreation

ROS 4

Biophys features:

Biophys sub-feat.:

Inlets/Outlets

see Stream Survey Card for mandatory fields

Biological

Fish Card attached (Y/N) Y

Fish. Man. Com. see report

Wildlife: see Comments

Reptiles: N/A

Aquatic birds: loons, mergansers

Invertebrates: N/A

Amphibians: N/A

Aquatic Plants: see Comments

Comments:

Beaver lodge, muskrat houses, moose sign

Benchmark (spike in center of orange circle) located .95 m above present lake level on 50 cm dbh spruce, 30 m WSW of boat launch.

Lake Survey Profile Data

Sequence number: 03

Date : 95/10/08 : 1305 h.
(yy/mm/dd)

Limnology station: 1

Depth (m)	D.O. (mg/l)	Temp (c)	TDS (ppm)	Conduct. (umhos/cm)
surface	8.25	10.2		
0.5	8.25	10.2		
1.0	8.20	10.2		
1.5	8.20	10.1		
2.0	8.15	10.0		
2.5	8.15	10.0		
3.0	8.10	10.0		
3.5	8.10	10.0		
4.0	8.15	10.0		
4.5	8.10	10.0		
5.0	8.10	10.0		
5.5	8.10	10.0		
6.0	8.10	10.0		
6.5	8.10	10.0		
7.0	8.10	10.0		
7.5	8.05	10.0		
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
L11 - 1	11	unnamed stream S1, WC 460-0817-439-616-646, inlet to E lakeshore
L11 - 2		beaver dam at lake outlet
L11 - 3		unnamed stream S3, WC 460-0817-439-616-700, inlet to NE corner of the lake
L11 - 4		Torkelsen Creek, stream S4, WC 460-0817-439-616, inlet to the N lakeshore
L11 - 5		Torkelsen Creek, stream S4, WC 460-0817-439-616, inlet to the N lakeshore
L11 - 6		Torkelsen Creek, stream S4, WC 460-0817-439-616, inlet to the N lakeshore
L11 - 7	10	Torkelsen Creek, stream S4, WC 460-0817-439-616, inlet to the N lakeshore
L11 - 8		Torkelsen Creek, stream S4, WC 460-0817-439-616, inlet to the N lakeshore
L11 - 9		unnamed stream S3, WC 460-0817-439-616-700, inlet to NE corner of the lake
L11 - 10		unnamed stream S3, WC 460-0817-439-616-700, inlet to NE corner of the lake
L11 - 11	9	unnamed stream S3, WC 460-0817-439-616-700, inlet to NE corner of the lake
L11 - 12		cutthroat trout juvenile captured in Torkelsen Creek upstream of Torkelsen Lake
L11 - 13		Torkelsen Creek, stream S2, WC 460-0817-439-616, downstream of the lake outlet
L11 - 14	8	Torkelsen Creek, stream S2, WC 460-0817-439-616, downstream of the lake outlet
L11 - 15		beaver dam at lake outlet
L11 - 16		redside shiner, gillnet catch
L11 - 17	5	redside shiner, gillnet catch
L11 - 18	4	burbot, gillnet catch
L11 - 19		burbot, gillnet catch
L11 - 20		cutthroat trout, gillnet catch
L11 - 21	3	cutthroat trout, gillnet catch
L11 - 22	7	white sucker, gillnet catch
L11 - 23	6	longnose sucker, gillnet catch
L11 - 24		longnose sucker, gillnet catch
L11 - 25	1	view to SW (Babine Mountains) from NE corner lakeshore
L11 - 26		start of 180° clockwise panorama taken from limnology station; view to W
L11 - 27		panorama, continued; view to WNW
L11 - 28		panorama, continued; view to NNW
L11 - 29		panorama, continued; view to N
L11 - 30		panorama, continued; view to NNE
L11 - 31		panorama, continued; view to ENE
L11 - 32		panorama, continued; view to E
L11 - 33		start of 180° clockwise panorama, taken from the mouth of stream S1; view to S
L11 - 34		panorama, continued; view to WSW
L11 - 35		panorama, continued; view to WNW
L11 - 36	2	panorama, continued; view to N