WATER and AIR MONITORING and REPORTING SECTION

WATER, AIR and CLIMATE CHANGE BRANCH

MINISTRY OF ENVIRONMENT

Water Quality in British Columbia

Objectives Attainment in 2004

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SUMMARY

The setting of water quality objectives in priority basins in British Columbia began in 1982. By the end of 2004, the Ministry of Environment (formerly the Ministry of Water, Land and Air Protection) had set water quality objectives in 51 areas or basins and updated them in two, both fresh and marine, throughout the Province. Annual monitoring to check the attainment of objectives started in 1987. This report presents the results of monitoring done to check the attainment of objectives in 20 basins in 2004.

The results are summarized in a series of tables. For all Ministry Regions the objectives were met 90.8 percent of the time in 2004. The findings in 2004 are slightly lower than the 2003 results (92.7%), and similar to previous years when attainment ranged from 95 percent in 1998 to 77 percent in 1997.

There was not 100 percent attainment because objectives are set in areas where water quality problems may occur. Monitoring results therefore reflect the state of water quality in areas affected by human activity rather than in the Province as a whole.

Variables for which objectives were sometimes not met in three or more basins in the 2004 sampling program included fecal coliforms, turbidity, dissolved oxygen and total copper.

ACKNOWLEDGEMENTS

The regional Environmental Protection staff carried out most of the monitoring, either directly or by using co-op students and contractors. The Environment Canada Pacific Environmental Science Centre and the PSC Analytical Laboratory analyzed the samples for most variables except for microbiological indicators measured by Cantest Labs and JR Labs, organic compounds by Axys Analytical Services, and biological communities measured by Fraser Environmental Services.

Additional data found in this report were also obtained from regional offices of B.C Ministry of Environment, Environment Canada, and the federal Department of Fisheries and Oceans (DFO).

INTRODUCTION

In 1981, the Auditor General recommended that the Ministry develop a method of measuring its performance in safeguarding water quality. To fulfil this recommendation, the Ministry undertook the setting of water quality objectives for fresh and marine surface waters of British Columbia.

Water quality objectives are safe conditions or threshold levels of a substance that will protect the most sensitive water use of a specific body of water. They establish a reference against which the state of water quality at a specific site is checked, as recommended by the Auditor General. They are also used to prepare Waste Management Permits or Plans and to measure their effectiveness. Water quality objectives are thus a basic tool for use in maintaining a healthy aquatic environment.

We began work on water quality objectives in 1982. The Ministry has now published objectives on bodies of water in 51 areas or basins and updated them in two. In addition, objective-setting and updating is proceeding in a number of other basins. In each basin considered, we expected some type of water quality problem due to human activity. We set objectives for lakes, rivers, creeks, and marine areas covering all seven Environment Regions of the Ministry.

This report for 2004 is the sixteenth in a series of reports that began in 1986. Since 1987, the Ministry has been monitoring ambient water specifically to check the attainment of objectives. As a result, we have obtained an annual picture of how well objectives are being met since 1987. Each report is a condensation of monitoring data for use by managers of the water resource. It indicates where conditions are acceptable and provides a warning of where further evaluation may be needed to solve water quality problems. To keep this report to a reasonable length, we assume some reader familiarity with the detailed background reports on water quality objectives for each basin. Copies of these background reports may be obtained from the web site of the Water, Air and Climate Change Branch of the Ministry in Victoria (http://www.env.gov.bc.ca/wat/wq/index.html).

We usually choose the basins for setting water quality objectives on the basis of perceived water quality problems. Thus, results presented here indicate conditions in likely problem areas, but do not reflect the state of water quality in the Province as a whole. There are many bodies of water where water quality is relatively unaffected by humans and likely to remain so for the foreseeable future. Thus, reports in this series are a measure of the state of water quality in areas of British Columbia influenced by human activity.

To help the public and resource managers interpret the large amount of attainment data presented in this type of report, we developed a water quality index in 1995. This is a system of ranking which assigns a number and grade to a body of water to indicate its quality. The B.C. index is based on factors that measure the success of meeting water quality objectives. It thus compresses large quantities of data into a statement on the quality of water and its uses. A brochure describing this index is available from the Ministry, as is a more detailed report explaining how to calculate the index from the monitoring data on objectives attainment.

In 1995 the index was applied in 33 water basins plus five groundwater aquifers in the Province to produce a *B.C. Water Quality Status Report*. This report, the first of its kind, is intended to show the public in non-technical terms how suitable the water is, in specific areas, for a variety of uses. The *Status Report*, which is based on objectives attainment data collected between 1987 and 1993, was released in April 1996, and is available from the Ministry web site.

METHODS OF PRESENTING AND INTERPRETING THE DATA

Reports on Objectives

At the present time, the Ministry of Environment (formerly the Ministry of Water, Land and Air Protection) has completed 51 reports on water quality objectives. The complexity and size of the reports varies considerably, depending upon the body of water considered. These reports are distributed among the Environmental Regions of the Ministry as follows:

Vancouver Island	8
Skeena	5
Omineca-Peace	9
Cariboo	2
Southern Interior	14
Kootenay	5
Lower Mainland	8
Total	51

Work is in progress on a number of other water basins where objectives are either being set or updated.

Tables of Results

Tables 1 to 21 summarize the data collected in 2004, with a separate table for each of the water basins monitored. Due to funding limitations, fewer basins were monitored between 1995 and 2001 than had been previously monitored (see Figure 1 below); however, this trend has since reversed, with a gradual increase in the number of basins monitored province-wide. The level of monitoring effort for 2004 was about the same level as was used in the late 1980's when the program first began. It should be noted that the need for yearly monitoring in all water bodies is not practical or justified. For this reason, the Ministry has adopted a program of monitoring water bodies for three years following adoption of the water quality objectives. Thereafter, monitoring occurs about once in a five-year period except for exceptional water bodies.

In each table we list all the objectives that have been set, as they appear in the summary table of each report on objectives. We have updated a few of the objectives to reflect new water quality guidelines and procedures. For example, we are now using chlorophyll *a* instead of periphyton biomass and total ammonia-N instead of un-ionized ammonia-N. The 90th percentile of 400/100 mL for fecal coliform values is used when high fecal coliform values were recorded at bathing beaches.

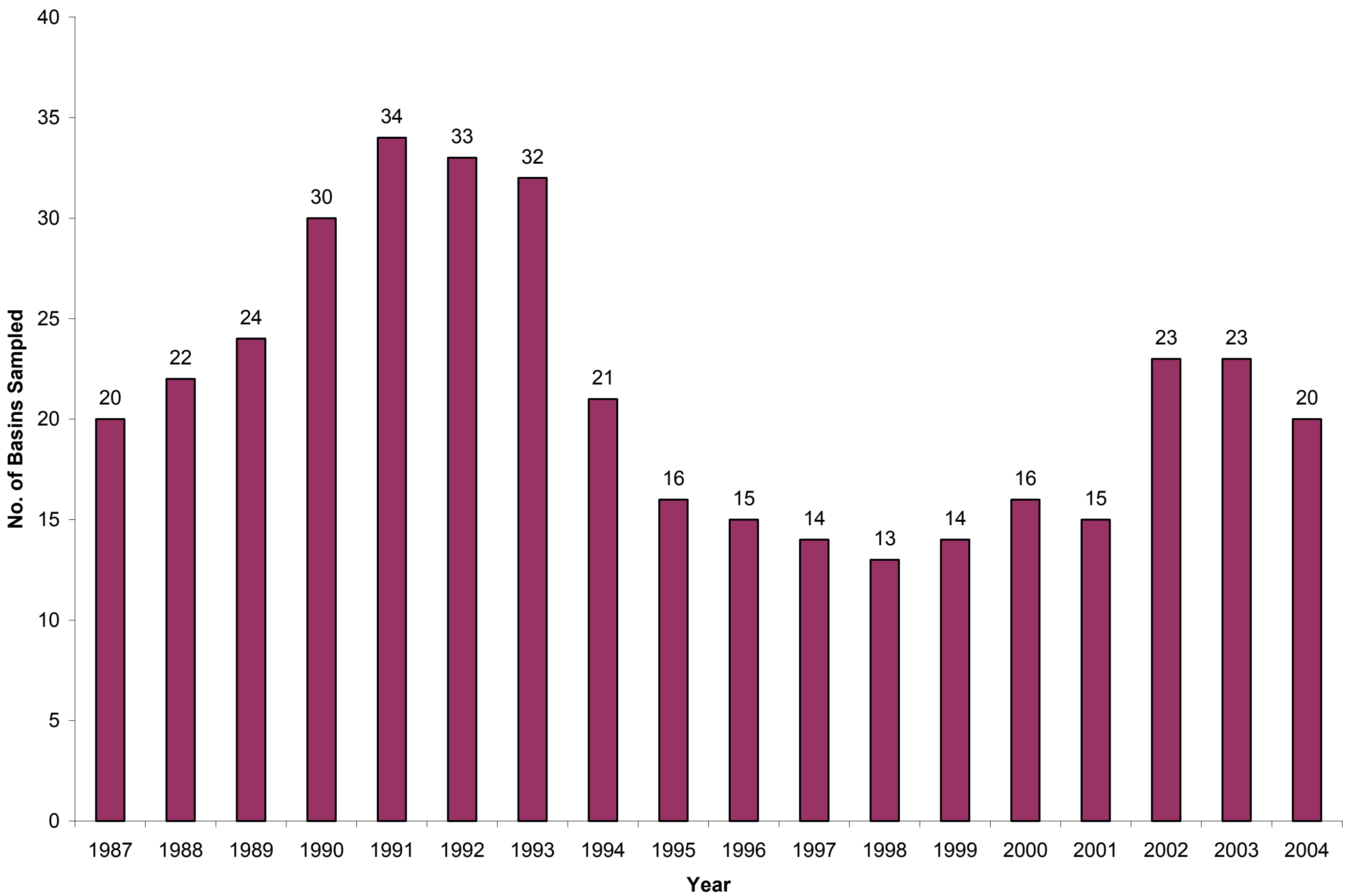


Figure 1. Summary of the number of basins sampled annually between 1987 and 2004.

Four different concluding statements are used in the data assessment: objective met, objective not met, indefinite result, and omitted 2004. We consider the objective to have been met if the monitoring result equaled or was within the objective limit. We report the result as indefinite if there were insufficient data to check the objective (a minimum of five samples collected within a 30-day period are necessary to calculate an average, median, geometric mean or ninetieth percentile value), the data were suspect, or the minimum detectable concentration was too high. We report the objective as omitted if, for some reason, planned data collection did not take place or was excluded because of low priority, taking into account past results. These tables are the most important part of this report since they summarize where, when, and by how much objectives were met or exceeded in 2004.

Text

In the text section, we briefly explain the quality assurance program and its status in the 2004 monitoring year. We then give a provincial overview of the monitoring results. Finally, we describe briefly the tabulated data for each body of water, by Region, mentioning the highlights and sometimes drawing some general conclusions. At this stage, we avoid qualifying statements such as: "...the objectives were nearly met, slightly exceeded or probably met...". We consider these types of statements to be too speculative without the support of further evidence to explain them. Thus objectives not met by a wide margin are categorized equally with apparently borderline cases. Although a more detailed interpretation is desirable, this is not done here because it would require the presentation of much more data, beyond the scope of this attainment report.

For the same reason, we do not attempt to explain what may have caused the results or to comment on the effect of objectives not being met. Such assessments would entail consideration of river flows, effluent discharges, whether objectives are long-term or short-term, the degree to which objectives are exceeded, quality assurance, and other factors.

In addition to a brief description of the tabulated data, we present the 2004 water quality index and rank for the bodies of water in each basin - when there are sufficient data to do so. The calculation of the index and rank for 2004 helps highlight those variables that had a detrimental effect on water quality in a particular water body. The index formulation has been modified from the original index and now follows the index format endorsed by the Canadian Council of Ministers of the Environment (CCME).

The 2004 Attainment Report guides those involved in managing water quality by focusing on areas of concern where further assessment or inspection may be needed. Since monitoring to check water quality objectives covers only a short time span, usually at most 30 days, we believe that any instance when objectives were not met could be significant and is worth a more detailed look. Further study could show whether objectives were not met because of natural phenomena or because there is a human cause to the problem.

Figures

A location map in Figure 2 shows the 51 basins where objectives have been set. Separate maps, Figures 3 to 24, illustrate the 20 water basins monitored in 2004 and show the sampling sites referred to in the tables.

Guide to Ranking Future Monitoring

Due to limited funds, we cannot monitor all basins where objectives have been set each year. We have therefore proposed the following scheme to rank monitoring:

- **1st priority**: any basin with less than three years of complete monitoring or any basin the Ministry considers provincially or internationally significant. Examples of significant basins are the Fraser River due to fisheries, the Okanagan Valley lakes due to recreation, and the lower Columbia River due to trans-boundary effects.

- **2nd priority**: any basin in which, after at least three years monitoring, a number of objectives are not regularly attained and there is either a local expression of concern or a plan for short-term action.

- **3rd priority**: any basin as for the 2nd priority above, but where there is no known concern or plan of action.

- **4th priority**: any basin in which, after at least three years monitoring, most objectives are either being met or the situation is fairly well documented with no change in status expected in the short term.

QUALITY ASSURANCE PROGRAM

Due to fiscal restraints, the Quality Assurance Program was suspended in 1996. Prior to this, the Quality Assurance Program ran over a five-year period from 1991 to 1995. This program described the accuracy and precision of the test results to assess the reliability of the results, and was specific to the variable and levels measured for objectives attainment. In its place the Ministry conducts a more general quality assurance program to ensure that contract laboratories are producing results that meet Ministry data quality standards. As well, regional offices incorporate some collection of replicate samples and submission of blanks as part of their normal sample collection activities.

PROVINCIAL OVERVIEW OF RESULTS

Presentation of Results

In the tables summarizing the monitoring data, there are four kinds of concluding statement. These are: objective met, objective not met, omitted 2004, and indefinite result.

To get an overview of performance for the Province, we totaled the number of occurrences of each conclusion for each water basin from the summary tables. In compiling these totals, we counted each instance of a maximum (or minimum) objective being met or not met plus all average and percentile values being met or not met.

Table 1 (p. 46) shows the results of this compilation in 2004. For each Region we give the sum of occurrences for each kind of conclusion and then total them for the whole Province. We also express the occurrences as a percent of the total of all occurrences, both by Region and for the Province as a whole.

Discussion of Results

Although the results apply to specific occurrences, we assume for this analysis that they are representative of the whole year. This simplification is a conservative approach to describing the state of water quality since we usually attempt to collect data during worst-case conditions.

Table 1 shows that the objectives were met 87% of the time in the Province as a whole in 2004. This result varied according to Region from 64% to 91%. Objectives were not met from between 2% and 14% of the time, with an overall average of 9%.

The occurrence of objectives omitted and indefinite results in 2004 averaged 1% and 3%, respectively. If we subtract these instances from the total, the objectives were met 91% of the time and objectives not met 9% of the time. By subtracting the instances of no results, we speculate that if all objectives had yielded results, then the above trend would continue.

We can therefore generalize that, in the Province as a whole, the objectives were met about 91% of the time in 2004.

Factors which can affect the overall outcome include the frequency at which particular objectives in any region are monitored, the completeness of monitoring in a basin, and the inclusion or omission of water basins with either serious or minor water quality problems.

When comparing the data from past years, the relatively low numbers seen in the mid-1990's have reversed somewhat (as seen in the table below), with the exception of a slight dip in 2000. However, it is speculated that a downward trend could resume, because new basins with known problems will be added and, as monitoring costs increase, there will be a tendency to cease monitoring in areas where objectives are being met to free-up funding for areas that may have persistent water quality concerns.

If we wish to use objectives attainment data to describe the general state of water quality in developed areas, we will need to maintain monitoring in all areas where objectives have been set. If monitoring resources are scarce, we will need to concentrate on areas where the worst water quality problems occur. This will produce an increasingly negative general result, although we would expect the situation to improve in subsequent years as corrective action is taken. The goal, of course, is for water quality objectives to be met 100% of the time in all areas. Monitoring in future years, followed by corrective action where required, will show how close we can get to this ideal situation.

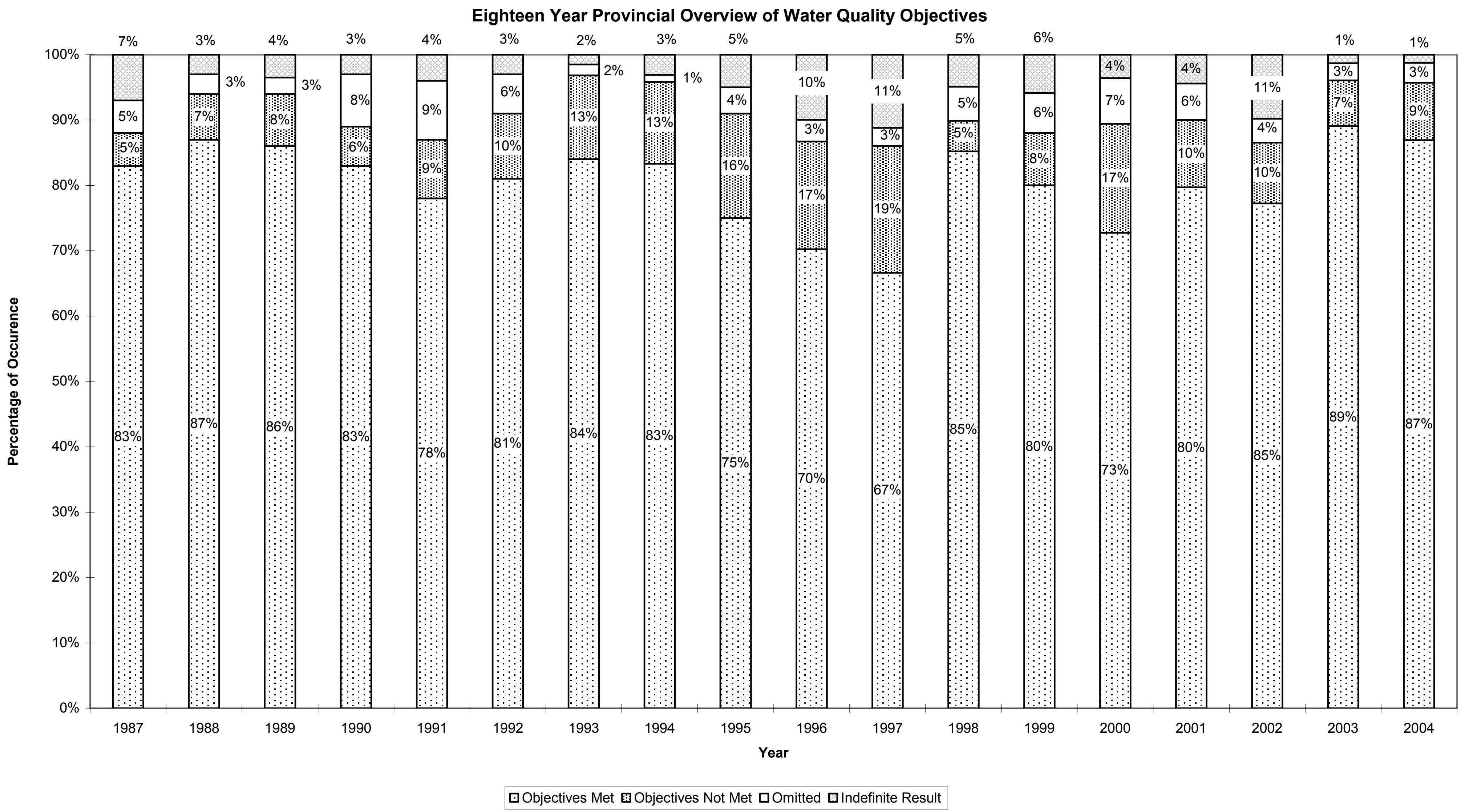
A comparison of objectives attainment (note: only attainment and exceedences were considered in calculations – data that was omitted or indefinite were not included).

	1987	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**
% of the Time Objectives Were Met	94%	93%	91%	93%	90%	89%	87%	87%	82%	81%
Number of Basins Sampled	20	22	24	30	34	33	32	21	16	15

	1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
% of the Time Objectives Were Met	77%	95%	91%	81%	89%	89%	93%	91%
Number of Basins Sampled	14	13	14	16	15	23	23	20

Eighteen-Year Water Quality Attainment Overview

This report marks the eighteenth year of the *Water Quality Objectives Attainment Report* series. Included below is a graph representing the findings from the past seventeen years of attainment reporting: this graph shows trends in each of the four concluding statements (objectives met, objectives not met, omitted, and indefinite results).


Eighteen Year Provincial Overview of Water Quality Objectives
Percentage of Occurence
Year
1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
83% 87% 86% 83% 78% 81% 84% 83% 75% 70% 67% 85% 80% 73% 80% 85% 89% 87%
5% 7% 8% 6% 9% 10% 13% 13% 16% 17% 19% 5% 8% 17% 10% 10% 7% 9%
5% 3% 3% 8% 9% 6% 2% 1% 4% 3% 3% 5% 6% 7% 6% 4% 3% 3%
7% 3% 4% 3% 4% 3% 2% 3% 5% 10% 11% 5% 6% 4% 4% 11% 1% 1%
Objectives Met
Objectives Not Met
Omitted
Indefinite Result

WATER QUALITY INDEX

The CCME (Canadian Council of Ministers of the Environment) water quality index has been calculated for the different water bodies. It should be noted that in prior years, the B.C. water quality index has been reported. We have now conformed our reporting to that developed within the CCME forum. It should be noted that the two can be compared but the CCME index is the reverse of the B.C. index. A B.C. value of 13 is approximately the same as a CCME index value of 87.

VANCOUVER ISLAND REGION

Cowichan-Koksilah Rivers

The Cowichan River is the most important river on Vancouver Island for recreational and commercial fisheries. The Koksilah River is a major tributary of the Cowichan River near its mouth. Possible sources of contamination include treated municipal sewage, agriculture, urban development, and effluents from a fish hatchery and abandoned metal mines.

Objectives were not checked from 1994 to 1997. Monitoring carried out from 1988 to 1993 gave fairly consistent results, with water quality ratings of fair for both rivers (Cowichan River index = 30 or CCME index of about 70; Koksilah River index = 36 or CCME index of about 74). It showed that objectives were not met for microbiological contaminants in both rivers and for algal growth in the lower part of the Cowichan River.

Table 2 (page 47) lists results for 2004, and Figure 3 (page 103) shows site locations. The CCME index values calculated for 2004 were 92 for the Cowichan River and 79 for the Koksilah River, which equate to ranks of Good and Fair, respectively.

In 2004, objectives were met 96% of the time when sufficient data was collected to evaluate compliance. Fecal coliforms, dissolved oxygen and chlorophyll-*a* did not meet objectives on occasion.

Middle Quinsam Lake, and Quinsam River Basin

Middle Quinsam Lake drains via the Quinsam River into the Campbell River just upstream from the Campbell River estuary (Figure 4, Figure 5). The Middle Quinsam Lake sub-basin is a valuable habitat for trout and salmon, but could be impacted by an open-pit coal mine operating in the area. It was noted as having excellent water quality (index = 3 or CCME index of about 97) based on measurements between 1989 and 1993 while the Quinsam River had good water quality (index = 8 or CCME index of about 92). Figure 4 and Figure 5 show site locations.

Table 3 shows results for 2004. The CCME index value calculated for Long Lake, Quinsam River and Middle Quinsam Lake were all equal to 100. This translates to a ranking of Excellent for all three waterbodies for 2004.

All water quality objectives that were monitored in the Quinsam basin in 2004 were met.

Oyster River

The Oyster River flows from the Forbidden Plateau area into the Strait of Georgia, south from Campbell River (Figure 6). The river and its tributaries are important habitat for several species of trout and salmon. The main threats to water quality are logging, agriculture, and mine exploration. We expect the latter to lead to active mining in the future, especially for coal.

Between 1990 and 1993, the objectives were usually always met, with a water quality rating of good (index = 16 or CCME index of about 84). Since the situation is stable, we did not monitor from 1994 to 1997. A few samples were collected between 1998 and 2001. No monitoring took place in 2004.

Elk and Beaver Lakes

Located near Victoria, these are the most important recreational fisheries lakes on southern Vancouver Island. Water-contact recreation is also very important in the lakes. Residential and agricultural development and the release of phosphorus from lake sediments are responsible for the present eutrophic state of the lakes.

Prior to this report, Elk and Beaver Lakes were monitored from 1993 to 1995. During the 1993 to 1995 study period, objectives for dissolved oxygen, chlorophyll-*a*, and the phytoplankton community were consistently not met, reflecting the eutrophic nature of the lakes. The water quality ratings were borderline, (index =54 or CCME index of about 46), for Elk Lake and poor, (index =72 or CCME index of about 28), for Beaver Lake.

Monitoring in the future will be a lower priority until action is taken to improve water quality conditions.

Tsolum River

The Tsolum River flows from Mount Washington to the Puntledge River at Comox on Georgia Strait (Figure 6). Acid-mine drainage from a closed copper mine in the headwaters creates high copper levels which are deleterious to fish. The river has the potential to support significant populations of salmonids.

Table 4 lists results for 2004. The Tsolum River had a CCME index value of 39 for 2004, which equates to a ranking of Poor.

Objectives for the Tsolum River were checked for the first time in 1994 in the river just downstream from the mine site. Since then, the objectives for dissolved copper were often not met.

Dissolved copper concentrations continued to exceed the maximum objective in 2004, and in the one instance where the sampling frequency was sufficient to evaluate the average objective (calculations for mean values require a minimum of five samples collected within a 30-day period), the guideline was not met.

We recommend continued objectives monitoring to track the progress of reclamation work at the mine.

Holland Creek and Stocking Lake

The Holland Creek and Stocking Lake watersheds, located near Ladysmith (Figure 7), are used mainly as a source of drinking water with some use for recreation and fisheries. Water quality objectives were prepared and approved recently as part of a watershed management plan for the area. Logging and road building are the main influences on water quality.

Monitoring to check the attainment of water quality objectives was carried out for the first time in 2002. The CCME WQI value for Stocking Lake was 87, while the value for Holland Creek was 68. These values translate to a ranking of Good and Fair, respectively. Table 5 summarizes water quality data.

Objectives were met 85% of the time in Holland Creek and Stocking Lake. Objectives that were occasionally not met included turbidity in Holland Creek, and average total organic carbon in both Holland Creek and Stocking Lake.

Quatse Lake

Quatse Lake is located on the north-eastern end of Vancouver Island, approximately three kilometres north from Coal Harbour. In addition to a source of drinking water for Coal Harbour, Quatse Lake is also an important aquatic habitat for both fish and wildlife. A substantial portion of the watershed has been logged, which in turn has raised concerns that water quality may be affected.

Monitoring to check the attainment of water quality objectives has not yet been carried out, and is not planned in the immediate future.

SKEENA REGION

Bulkley River

The Bulkley River is a major tributary to the Skeena River. It is an important river for fisheries and has some drinking water use. The main influences on water quality are treated municipal effluent from Houston and Smithers, agriculture, urban runoff, and possible contamination in the headwaters from mining.

We have monitored the attainment of objectives from 1988 to 1992 and obtained consistent data, with a water quality rating of good, (index = 15 or CCME index of about 85). Given these results, we have not monitored the Bulkley River since 1992. We recommend monitoring to validate the rating be carried out in 2005.

Kathlyn, Seymour, Round, and Tyhee Lakes

These four small lakes, in the Smithers area, are used for recreation, domestic water supply, and irrigation (Figure 8). The main influences on water quality are agriculture and residential development around the lakes.

Monitoring between 1987 and 1993 showed objectives for turbidity, colour, and phosphorus not being met due to the eutrophic nature of the lakes. No objectives monitoring took place between 1993 and 2001 Water quality was reported as fair for Kathlyn, (index = 34 or CCME index of about 66), and Tyhee, (index = 21 or CCME index of about 79), lakes in the 1996 water quality status report.

The CCME WQI values calculated for 2004 were 88 for Kathlyn Lake, 64 for Seymour Lake, 54 for Round Lake and 100 for Tyhee Lake. These values translate to rankings of Good, Marginal, Marginal, and Excellent, respectively.

Table 6 summarizes the 2004 water quality data for these four lakes. Objectives as a whole were met 83% of the time in these lakes. Objectives that were not met included turbidity, total phosphorus and colour.

Lower Kitimat River and Arm

The river and arm are an important migration route for salmonids, and the water is also used for recreation and for industrial and municipal supplies. A kraft pulp mill and a municipal treatment plant discharge to the river and an aluminum smelter and methanol plant discharge at the head of the arm.

We recommend continued monitoring as the Ministry works with dischargers to upgrade effluent treatment facilities.

Lakelse Lake

Lakelse Lake drains into the Skeena River (Figure 9) and is important for salmon spawning and rearing and for recreation. It is also used as a domestic water supply. The only threats to water quality are septic tanks around the shoreline, agriculture, and logging in watersheds that drain into the lake.

The objectives were last checked in 1992 and all were met, with a water quality rating of good (index = 9 or CCME index of about 91). No monitoring was conducted between 1992 and 2001.

The CCME WQI for Lakelse Lake was 100 in 2004, which equates to a ranking of Excellent. Table 7 summarizes the 2004 water quality data for Lakelse Lake. Objectives were met 100% of the time when there was suffiencient data to determine attainment.

Yakoun River

The Yakoun River is on Graham Island in the Queen Charlotte Islands. It flows north from the Queen Charlotte Ranges into Masset Inlet. An open pit gold mine within the drainage has been proposed and water quality objectives have been set accordingly. The river has valuable fish resources, contributing all five species of salmon. It is also important for wildlife and recreation.

The development of the gold mine is in abeyance. We recommend monitoring to check the attainment of water quality objectives when the project proceeds.

OMINECA-PEACE REGION

Charlie Lake

Charlie Lake is used as a backup drinking water supply for the city of Fort St. John (the Peace River is the primary source) and for recreation. Agriculture, residential development around the lake, and nutrients from lake sediments are factors affecting water quality.

Monitoring from 1987 to 1993 showed the main problem to be high phosphorus levels causing eutrophic conditions, with a water quality rating of borderline (index = 46 or CCME index of about 64). Studies are underway to determine how to reduce nutrient input. The Charlie Lake Technical Advisory Committee is currently overseeing a watershed land-use/impact source survey to identify potential mitigation sites. Routine monitoring to check objectives should resume when corrective measures are undertaken.

Bullmoose Creek

Bullmoose Creek and its tributaries (West and South Bullmoose creeks) are important recreational fish habitat. The creeks are adjacent to an open pit coal mine.

The attainment of water quality objectives was documented by monitoring between 1987 and 1993 and there were no serious impacts, with a water quality ratings of fair for both Bullmoose Creek (index = 22 or CCME index of about 78), and West Bullmoose Creek (index = 23 or CCME index of about 77), and good for South Bullmoose Creek (index = 10 or CCME index of about 90). Further monitoring is a low priority at this time.

Nechako River

The Nechako River, a major tributary to the Fraser River at Prince George, has its flow controlled by dams for power generation for the Alcan aluminum smelting plant (Figure 10). The river is an important route for migrating salmon. Water quality can be affected by treated municipal sewage and diffuse sources such as forestry and agriculture. Water temperature is influenced by the flow of water released from the dams and by the manner in which it is released.

In past years, the fecal coliform objectives were met in the Nechako River except immediately downstream from Vanderhoof. The temperature objectives immediately downstream from Cheslatta Falls were often not met in the summer. We have obtained similar results since 1987. For the period, 1987 to 1993, water quality was considered as fair (index = 22 or CCME index of about 78). Temperature objectives might be met if a cold-water release structure, proposed for the Kenney Dam upstream from Cheslatta Falls, is installed. The attainment of the temperature objectives further downstream on the Nechako at Vanderhoof and upstream from the Stuart River has improved due to water temperature management by the Nechako Fisheries Conservation Program.

Table 8 shows water quality data for 2004. The Nechako River had a CCME index value of 61 for 2004, which equates to a ranking of Marginal. The Chilako River had a CCME index value of 100, which equates to a ranking of Excellent.

Water quality objectives for the Nechako River were met 80% of the time that an assessment could be made. Objectives that were not met included dissolved oxygen and water temperature.

The Nechako Watershed Council and the Village of Vanderhoof have been advised of concerns associated with exceedence of coliform objectives downstream of Vanderhoof. Potential solutions include further treatment of the discharge or rerouting of the discharge to irrigation or wetlands to reduce nutrient concentrations. Alcan continues to monitor Nechako River water quality. Until action is taken by the Village of Vanderhoof it is not anticipated that water quality will change significantly, and therefore no further monitoring is recommended until that time or until 2007, whichever comes first.

Pine River

The Pine River, a tributary to the Peace River, supplies water to Chetwynd and supports significant sport fish populations. The water quality is considered to be mostly in a natural state with the major influence coming from forestry and from treated sewage from the Village of Chetwynd. On August 1, 2000 an oil pipeline ruptured, spilling almost 1 million litres of B.C. light crude oil to ground adjacent to the upper Pine River. Roughly half of this (or 500,000 litres) was believed to enter the Pine River. After an extensive cleanup, an estimated 80,000 L of in-river oil remained unaccounted for. This oil was likely dissolved in water, trapped in backwaters and deposited into and onto river sediment and river bottom substrates. Monitoring is ongoing, with continued spill response on an as-needed basis. Impact studies to determine potential short and long-term impacts from the spill are being reviewed by the Ministry at this time.

With regard to the other objectives currently in place for the Pine River, we presently consider monitoring to be a low priority for this basin and none was carried out after 1992. Past results show all objectives being met fairly consistently, with a water quality rating of good (index = 5 or CCME index of about 95). We recommend monitoring in 2005.

Pouce Coupe River and Dawson Creek

The Pouce Coupe River enters the Peace River inside the Alberta Border. Dawson Creek is its major tributary. The waters are impacted mainly by municipal discharges and agriculture.

The exact causes for objectives not being met need to be found. Water quality ratings were fair for the Pouce Coupe River (index = 33 or CCME index of about 67; period of record: 1987 to 1990), and borderline for Dawson Creek (index = 56 or CCME index of about 44; period of record: 1987 to 1989). Since objectives were consistently not met up to 1992, we will not resume monitoring to check their attainment until measures are taken to correct the problem. We recommend monitoring in 2005.

The City of Dawson Creek is monitoring both Dawson Creek and the Pouce Coupe River during spring freshet, as well as summer and winter low flows. We recommend that this work continue, and that data collected in the future be analyzed with respect to the existing water quality objectives for these water bodies.

Peace River

We have set objectives for the Peace River between the Bennett Dam and the B.C.-Alberta Border. The water is important for aquatic life and irrigation and can be affected by municipal discharges, forestry, agriculture, a gas plant, and a pulp mill built in 1988 after the objectives were set. We first checked the objectives in 1988. Water quality for the Peace River was judged as fair (index = 22 or CCME index of about 78), for the period of record from 1988 to 1993.

Objectives not met at times in 1994 included those for turbidity, suspended solids, temperature, and chromium. A limited amount of monitoring was conducted in 2004 at the joint Federal-Provincial monitoring site near Alces. The CCME WQI for the Peace River was 83 in 2004, which equates to a ranking of Good. Table 9 summarizes the 2004 water quality data for the Peace River, and Figure 11 shows site locations. Objectives that were not met 100% of the time when there was sufficient data to make a determination were total copper and total zinc.

Considering Alberta's interest in the quality of the water crossing the provincial border, we recommend that objectives monitoring of the Peace River continue.

Upper Finlay River Sub-Basin

The Finlay River, located in the north east part of the Province, drains into the north end of Williston Lake. This river is broken into two sub-basins, the upper and the lower Finlay.

The drainage area of the upper Finlay sub-basin includes portions of the Skeena Mountains, Spatsizi Plateau, Omineca Mountains, and the Rocky Mountains. The upper Finlay was the site of a gold and silver mine and mill (the Baker Mine), now closed. The upper Finlay system is an important aquatic habitat for sports fishery species such as Dolly Varden (*Salvelinus malma*), and Rainbow Trout (*Oncorhynchus mykiss*). In addition, other water uses include recreational uses and as a source of drinking water for the community of Ware. Objectives apply to Jock and Galen creeks, which eventually flow into the upper Finlay River.

The objectives were checked in 1987. The potential acid rock drainage situation at the Baker Mine is monitored annually in the spring and indicates that water quality in Galen Creek is acceptable. The Ministry will be negotiating a spring sampling program with the Baker Mine site owner. The large Kemess Mine, located in the Attichika Creek drainage above Thutade Lake, could potentially impact water quality, and monitoring of that site by the mining company is extensive. These data need to be added to the Ministry EMS database so that they can be used for reporting as appropriate. The need for monitoring in 2005 should reflect the data collected by the mines.

Lower Finlay River Sub-Basin

The lower Finlay sub-basin drains a portion of the Rocky Mountains, and the Finlay Range about 8000 km^2 in size. Even though the lower Finlay is an important fish habitat, other water use is minimal due to low development and population in the area. Water quality concerns stem from logging and potential mineral extraction in the region.

We recommend water quality monitoring in 2005 for one year. As development increases an assessment may show that monitoring is needed in the future.

Fraser River from the Source to Hope

This is the most important river in the Province in terms of fisheries values. Most of the contamination to the river between Moose Lake (the source of the river) and Hope is from pulp and paper mills and municipal treatment plants at Prince George and places downstream. Water quality objectives have been prepared to protect aquatic life, wildlife, irrigation, livestock watering, and drinking water supplies.

Table 10 lists 2004 water quality data, and Figure 12 shows site locations. A CCME index value was calculated for four sites on the Upper Fraser River in 2004: the Fraser River near Red Pass, the Fraser River near Hansard, the Fraser River near Quesnel and the Fraser River at Hope. Index values were 90 near Hope (a ranking of Good), 69 near Quesnel (a ranking of Fair), 100 near Hansard (a ranking of Excellent) and 88 near Red Pass (a ranking of Good).

Objectives were met in 94% of instances for the upper Fraser River. Parameters that did not consistently meet their objectives include fecal coliforms, dissolved oxygen and colour.

We recommend continued monitoring to check objectives in this section of the Fraser River, as well as increasing the sampling frequency for fecal coliforms and *E. coli* sufficiently to be able to evaluate objective compliance.

CARIBOO REGION

Williams Lake

Williams Lake drains to the Fraser River and is important for drinking water, recreation, and aquatic life (Figure 13). The water quality is affected by phosphorus that comes from lake sediments and traditional farming practices in the San Jose River drainage, the main inlet to the lake, and to a lesser extent from residential septic systems around the lake. For the period from 1987 to 1993, the water quality was rated as borderline (index = 55 or CCME index of about 45). However, cores of the lake bottom have recently been sampled, and preliminary findings indicate that Williams Lake has historically been more eutrophic (productive) than originally thought. Therefore, the algal blooms and other indicators of high phosphorus concentrations may be endemic rather than linked to anthropogenic activities. Pending the final results of this investigation, the water quality objectives for Williams Lake may be changed to reflect this new information.

Total dissolved phosphorus concentrations measured between 1987 and the present show annual fluctuations that reflect changes in the amount of annual runoff each year, with no clear increasing or decreasing trend. However, water clarity appears to be steadily improving, with increasing mean Secchi disk depths from 1977 to the present.

Table 11 lists water quality results and Figure 13 shows site locations. The CCME index value for Williams Lake in 2004 was 59, which equates to a ranking of Marginal.

Objectives were met 88% of the time when sufficient sampling was conducted to determine objectives compliance. Maximum turbidity objectives and minimum Secchi depths were consistenly met, while average turbidity objectives and objectives for spring overturn phosphorus concentrations were not met.

There are continued concerns with land use in the Williams Lake basin, and ranchers have made numerous changes to reduce their impact. As such, they are generally in compliance with the Code of Agricultural Practice for Waste Management as specified in the Agricultural Waste Control Regulation. The South Lakeside area is now connected to the

Williams Lake sewer system, which should help maintain water quality. Further potential impacts from upstream land uses have to be minimized to maintain and improve water quality. We recommend continued monitoring of objectives to track the progress of corrective measures being undertaken in the watershed, and for the water quality objectives for Williams Lake to be updated to reflect new knowledge.

San Jose River

The San Jose River originates at Lac La Hache and is the main inlet to Williams Lake. It is used mainly for irrigation, livestock watering, and water storage. Ranching is the activity with the most influence on water quality.

The Ministry set only one objective for the San Jose River, namely the total annual loading of dissolved phosphorus entering Williams Lake. The region began measuring annual loading in the 1970's. Sampling was suspended in 1997, and is not expected to continue until the objectives for Williams Lake have been updated.

The annual load was based on a calendar year. It was derived by adding daily stream flows in Borland Creek and the San Jose River just upstream, multiplying the total daily flow by the dissolved phosphorus daily concentrations measured in the San Jose downstream from Borland, plotting these daily loads against time, and measuring the area under the curve to obtain annual load. Sampling was suspended in 1997, and is not expected to continue until the objectives for Williams Lake have been updated.

SOUTHERN INTERIOR REGION

Bonaparte River

The Bonaparte River is a tributary to the Thompson River. It is an important trout habitat and is affected by agricultural operations and municipal discharges. Its main tributaries are Clinton Creek and Loon Creek.

The water quality objectives were last checked in 1994. Objectives not met at times included those for fecal coliforms, suspended solids, turbidity, chlorophyll-*a*, and the objective for dissolved oxygen in Loon Lake. The water quality rating for the time period 1987 to 1993 was Fair.

There are plans to improve water quality and correct problems. Routine monitoring to check attainment of objectives should resume in 2004 and after improvements are made.

Okanagan Valley Lakes

To date, objectives have only been set in the five main lakes for phosphorus, which is the major factor controlling the trophic state of the lakes (Figure 14). The lakes are highly valued for recreation, fisheries, and as a source of drinking and irrigation water. The major anthropogenic inputs of phosphorus are from treated municipal sewage and from diffuse sources that include septic tanks, agriculture, and forestry. However, the vast majority of phosphorus loading to the lakes is due to natural sources within the watershed (*e.g.* erosion). Phosphorus release from sediments also occurs in Wood Lake and Osoyoos Lake.

Table 12 lists results for 2004. CCME index rankings for Osoyoos and Wood lakes in 2004 were in the Poor range, with index values ranging from 18 in Wood Lake and 35 in Osoyoos Lake. Skaha, Kalamalka and Okanagan lakes were all rated as Excellent, with index values of 100. It should be noted that the rankings for any one year vary widely from year-to-year due to the influence of measuring only one variable.

Average spring turnover phosphorus objectives for the Okanagan Valley Lakes were met in 77% of instances where an assessment of data could be made. Objectives were consistently met in Okanagan, Kalamalka and Skaha lakes, consistently not met in Wood Lake, and occasionally met Osoyoos Lake.

Because there is only the single water quality objective for each lake (*i.e.*, spring overturn phosphorus), the index gives only a rough idea of the state of water quality. Better estimates will be provided when a few more pertinent objectives have been established and monitored.

Given the environmental and recreational importance of these lakes, we recommend continued monitoring of phosphorus at spring overturn, and the preparation of a more complete set of water quality objectives.

Tributaries to Okanagan Lake near Westbank

We set objectives for Peachland, Trepanier, and Westbank creeks, which flow into Okanagan Lake in the Peachland-Westbank area. Peachland and Trepanier creeks support spawning populations of kokanee or trout, and all three creeks are used for irrigation and domestic water supplies. Effluent from a molybdenum mine (which closed in the early 1990's) had the potential to impact Peachland and Trepanier creeks, but seepage from this site is now captured and treated in order to meet the water quality objectives in Trepanier Creek. Westbank Creek is influenced by urban runoff and agricultural activities.

The objectives have been checked for three years with results showing generally good water quality, with water quality rating of Fair to Good. Further monitoring was considered a low priority and was discontinued in 1994.

Since that time, concerns have been raised about possible discharges from the closed Brenda Mines Operations. Hearings of the Environmental Appeal Board have resulted in the region re-assessing current objectives for Trepanier Creek. Monitoring should resume in 2005.

Tributaries to Okanagan Lake near Kelowna

Mission, Kelowna, and Brandt's creeks are tributaries to Okanagan Lake on its east shore near Kelowna (Figure 15). Mission and Kelowna creeks support salmonids and the water is also used for irrigation and domestic supply. Brandt's Creek is used mainly for irrigation. The creeks can be affected by urban storm-water runoff in their lower reaches and by logging or agriculture further upstream. Treated wastewater is discharged to Brandt's Creek.

Objectives were checked on a few occasions in 2004 in both Mission and Kelowna creeks, and results are summarized in Table 13. CCME index rankings calculated for Mission Creek and Kelowna Creek for 2004 were both 100, which equates to a ranking of Excellent.

Objectives were met in 100% of all instances where there were sufficient data to determine compliance.

Tributaries to Okanagan Lake near Vernon

Lower Vernon Creek and Deep Creek are tributaries to Okanagan Lake at its north end. The water is used for domestic and irrigation purposes and has some fisheries values, especially in lower Vernon Creek. Potential sources of contamination are urban storm-water runoff, a municipal sewage discharge, agricultural operations, and groundwater affected by spray irrigation of treated sewage.

Objectives were last checked in 1996, when objectives for suspended solids were not met in both creeks, and those for fecal coliforms and *E. coli* were not met on the Lower Vernon Creek. Monitoring should resume in 2005.

Similkameen River

The Similkameen River flows from Manning Park, east through the south Okanagan, then south across the U.S. border (Figure 16). It is important for fisheries, drinking water, and irrigation. Water quality could potentially be affected by mining and municipal discharges to ground and surface waters. We updated the water quality objectives in 1990 because of an increase in mining activity in the Hedley Creek area.

Monitoring between 1987 and 1993 has given consistent results with water quality ranked as good (index = 14 or CCME index of about 86), and was suspended in 1994 as low priority. The main problem has been with fecal coliforms, possibly from agricultural operations, which did not always meet the drinking water objective required for water that is treated by disinfection only. Limited data was collected in 1996 and 1997. All objectives were met in 1996, and all objectives except for total lead in Hedley Creek were met in 1997.

Table 14 lists results in 2004. CCME index rankings calculated for Hedley Creek and the Similkameen River for 2004 were 78 and 76, respectively. Both of these values equate to ratings of Fair.

Objectives were met in 90% of all instances where there were sufficient data to determine compliance. Objectives that were not met consistently included fecal coliforms in the Similkameen River, turbidity in both the Similkameen River and Hedley Creek, and strong acid dissociable cyanide (SAD-CN) + thiocyanate and total copper in Hedley Creek.

Cahill Creek

Cahill Creek, its tributaries (Nickel Plate Mine Creek and Sunset Creek), and a parallel stream (Red Top Gulch Creek) enter the Similkameen River near Hedley (Figure 17). Fish from the Similkameen River use the creek near its mouth and the water is also used for irrigation. This watershed is the site of a gold mine and mill that began operating in 1987, and closed in 1996. Monitoring to check objectives began in 1987, with water quality for 1987 to 1993 being rated as good (index =13 or CCME index of about 87). Objectives not met in 2000 and 2001 included turbidity, sulphate and total arsenic. In 2004, water quality data collected by the permittee was analyzed for objectives attainment, resulting in almost daily measurements for some parameters. This gives a much clearer picture of what is happening in Cahill Creek and its tributaries over the entire year than we have been able to ascertain in the past.

Table 15 provides a summary of the 2004 data. CCME index ratings for each of the creeks in 2004 (and their respective rankings) are as follows: Cahill Creek: 90 (Good); Nickel Plate Mine Creek: 53 (Marginal); Red Top Gulch Creek: 63 (Marginal); Sunset Creek: 100 (Excellent). Objectives that were not met consistently included average and maximum sulphate concentrations, as well as strong acid dissociable cyanide (SAD-CN) + thiocyanate.

Monitoring by the permittee will continue in order to document improving trends in nitrate, cyanide and sulphate in various surface waters draining the mine site.

Bessette Creek

Bessette Creek, which flows into the Shuswap River, is formed by the confluence of Harris and Duteau creeks near the town of Lumby. Lawson Creek, and its tributary Spider Creek, flow into Duteau Creek. These creeks provide spawning habitat for trout and four species of salmon. Activities that can affect water quality include a telephone pole treatment plant near Harris Creek, a wood-waste landfill along Lawson Creek, seasonal discharge of municipal sewage effluent to Bessette Creek, and agricultural operations in the area generally. Based on data from1990 to 1993, water quality was rated as fair for Bessette Creek (index = 33), Lawson Creek (index = 40 or CCME index of about 60), and Spider Creek (index = 40 or CCME index of about 60), but good in Harris Creek (index = 17 or CCME index of about 83).

Monitoring was suspended for 2003 but should resume in 2005.

Hydraulic Creek

Hydraulic Creek flows into Okanagan Lake via Mission Creek about 10 km upstream from the lake. Hydraulic Creek is an important source of drinking water relying on disinfection only. The creek also supports a recreational fishery and is used for irrigation. Commercial logging in the watershed can affect these water uses.

Monitoring between 1991 and 1993 to check objectives showed that fecal coliform contamination was the main problem, with a water quality rating of fair (index =35 or CCME index of about 65). Monitoring was discontinued in 1994, as results were fairly predictable. Monitoring should resume in 2005.

Christina Lake

Christina Lake, located in south central B.C., drains into the Kettle River which joins the Columbia River in Washington State (Figure 18). The lake is important for recreation, domestic water supply and sport fish. The potential sources of contamination are residential development, agriculture, and logging.

Objectives were checked for the first time in 1994 and those not met included objectives for phytoplankton distribution, periphyton distribution, dissolved oxygen, and periphyton chlorophyll-*a*.

Table 16 shows 2004 attainment. The CCME index value for Christina Lake was 100 in 2004, which equates to a ranking of Excellent.

Objectives were met 100% of the time that attainment could be determined.

We recommend resuming sampling until objectives have been checked for at least one more year to obtain a reasonable database.

Thompson River

We set objectives in 1992 for the South Thompson which drains Little Shuswap Lake, the North Thompson which joins the South Thompson at Kamloops, Kamloops Lake, and the lower Thompson which is a major tributary to the Fraser River (Figure 19). This river system is very important for fish, especially salmon and trout. It is used extensively for recreation and is also a source of water for drinking, irrigation, and industrial use.

Between the North Thompson River and Kamloops Lake, the river receives treated effluents from a bleached kraft pulp mill and from the City of Kamloops. There are also diffuse discharges from agriculture and forestry. All these discharges can affect Kamloops Lake and the Thompson River downstream.

Table 17 lists results in 2004 and Figure 19 shows site locations. The CCME index value for both the Lower Thompson and Kamloops Lake was 100, equivalent to a ranking of Excellent.

Objectives were met 100% of the time in the Thompson River system when sampling frequencies were sufficient to determine objectives compliance.

We recommend continued monitoring to check Thompson River objectives.

Keremeos Creek

Water quality objectives were set for Keremeos Creek and its main tributaries (South Keremeos Creek, Cedar Creek and Olalla Creek) in 2000. Keremeos Creek provides important fish-rearing habitat, and is a source of water for domestic and irrigation use. A ski resort in the headwaters of Keremeos Creek, as well as agriculture, forestry and road maintenance operations, all influence the water quality of these creeks to varying degrees.

Monitoring was not conducted in 2004. In 2003 objectives that were occasionally not met include fecal coliforms, turbidity and suspended solids.

We recommend continued monitoring to check Keremeos Creek objectives.

KOOTENAY REGION

Columbia and Windermere Lakes

These two lakes are important for fisheries, recreation, and as a source of drinking water. Residential development around the lakes is the main potential influence on water quality.

Attainment monitoring for water quality objectives was conducted in Columbia and Windermere lakes between 1987 and 1992. Since the objectives were met fairly consistently over this time period, with a water quality rating of good (index = 5 or CCME index of about 95 for Columbia Lake and 4 or CCME index of about 96 for Windermere Lake), attainment monitoring was discontinued in 1993.

A limited monitoring program was undertaken for Windermere Lake in 2002 and 2003 to determine if shoreline development was impacting water quality. There are presently eighteen water intakes drawing water from Windermere Lake. Three of these intakes were incorporated in the program. The study was designed to determine if the combination of heavy development on silt soils and the increased reliance on septic systems for domestic waste water disposal was affecting the productivity of the lake. Objectives were not monitored in 2004.

We recommend that monitoring resume in Windermere Lake in 2005.

Toby Creek and Upper Columbia River

Toby Creek enters the Upper Columbia River just downstream from Windermere Lake (Figure 20). Both watercourses are important for aquatic life and recreation. Potential sources of contamination in Toby Creek include indirect discharges of domestic sewage and by drainage from an abandoned mine. The Upper Columbia River receives an indirect discharge of treated sewage from Fairmont and Radium Hot Springs. In addition, Edgewater directly discharges treated sewage effluent into the Upper Columbia twice a year.

All objectives were generally met except occasional exceedences for fecal coliforms. We did not monitor after 1989 in Toby Creek and 1992 in the Upper Columbia River, as monitoring was considered a low priority at this time.

Limited monitoring was conducted in 2004 in both Toby Creek and the Upper Columbia River. The impact from the abandoned mine site on Toby Creek water quality was assessed to determine if the existing mine tailings were entering the creek and impacting water quality. Monitoring was also conducted in the Upper Columbia River in 2004 to assess whether treated sewage effluent was impacting water quality. Table 18 shows the results of the 2004 monitoring program, and Figure 20 shows site locations.

The CCME index value for Toby Creek was 68, equivalent to a ranking of Fair, while the index value for the Upper Columbia River was 100, equivalent to a ranking of Excellent. Objectives that were occasionally not met in Toby Creek included total ammonia and total nitrite.

Objectives were met 79% of the time in the Toby Creek and the Upper Columbia River when sampling frequencies were sufficient to determine objectives compliance.

Columbia River from Keenleyside to Birchbank

The Columbia River is one of the major rivers in B.C. and Washington State. In B.C., this section of the river is important for aquatic life, sport fishing, recreation and, to a lesser extent, as a drinking water supply. In the U.S., it supports a food fishery, major salmon runs, and irrigation and drinking water supplies. Between the Hugh Keenleyside Dam and Birchbank, the main influence is a kraft pulp mill that expanded production and upgraded its effluent treatment to secondary between 1991 and 1993. There are also small discharges of secondary-treated municipal effluent and urban runoff.

An objectives report for this section of the Columbia River was completed in 1992. Objectives were monitored over a period of three years. However, the monitoring program was significantly reduced in 1997 and was discontinued in 1998. Limited attainment monitoring was reintroduced in this section of the Columbia River in 2003. These results will be used to determine the frequency of further objectives monitoring in this area.

Water quality was rated as fair in the 1996 status report (index = 35 or CCME index of about 65), but appears to be improving based on data review from 1991 to 1993. Objectives not met in 2002 included dissolved oxygen and dioxins and furans in sediments. No samples were collected in 2004.

Columbia River from Birchbank to the International Border

The Columbia River is one of the major rivers in both B.C. and Washington State. In B.C., this section of the river is important for aquatic life, sport fishing, recreation and, to a lesser extent, as a drinking water supply. In the U.S., the Columbia River supports a food fishery, major salmon runs, and irrigation and drinking water supplies. Between Birchbank and the international border, the main influence is a metal smelter and refinery at Trail. There are also small discharges of secondary-treated municipal effluent and urban runoff.

A draft objectives report for this section of the Columbia River was completed in 1997 (MacDonald Environmental, 1997), and updated objectives were formalized in 2000; (MWLAP 2000). Attainment monitoring has been conducted annually in this section of the river since 1998. In 2004, attainment monitoring included water, sediment and fish tissue sampling at several sites between Birchbank and the international border and water sampling bi-weekly at Birchbank and weekly at Waneta.

Table 19 lists results for 2004, and Figure 21 shows site locations. The CCME index value for the lower Columbia River was 68 in 2004, which equates to a ranking of Fair. The lower Columbia River was rated as Fair for the three years between 2000 and 2002, and was ranked Good in 2003.

Objectives were met 88% of the time in the lower Columbia River when there were sufficient data to assess attainment. Objectives that were occasionally not met included fecal coliforms, dissolved oxygen, total cadmium, total chromium, total zinc, total arsenic in fish tissue, total lead in fish tissue, total mercury in fish tissue, dioxins and furans in fish tissue, total arsenic in sediments, total cadmium in sediments, total chromium in sediments, total copper in sediments, total lead in sediments, and total zinc in sediments.

Considering the international significance of the river and its importance to aquatic life, continued monitoring to check the attainment of objectives is recommended.

Elk River

The Elk River and its main tributaries, the Fording River, Line Creek and Michel Creek, are located in the south-eastern part of the province. The Elk River is a tributary to Lake Koocanusa on the east side. We have set provisional objectives for suspended solids and substrate sedimentation to protect aquatic life against the potential effects of coal mining operations in the basin.

The objectives for suspended solids apply to base flow, or the non-freshet period, in the Elk River basin. They were generally met at all sites in 1993. Limited monitoring was conducted in 2004. The CCME WQI for the Elk River was 100 in 2004, which equates to a ranking of Excellent. This compares well with the 2003 ranking of 41 (Poor). Table 20 summarizes the 2004 water quality data for the Elk River.

Objectives were met on 100% of occasions when there was suffiencient data to determine guideline compliance.

We recommend continued monitoring in 2005.

LOWER MAINLAND REGION

Fraser River from Hope to Kanaka Creek

We have set objectives for the Fraser River between Hope and Kanaka Creek, for tributaries entering from the south, and for all major water courses between the Fraser River and the International Border. The Fraser River is a major salmon migration route and the tributaries are important spawning areas. The major discharges to the Fraser River in this section are of treated municipal sewage.

Monitoring to check objectives was carried out in 1987, 1988, 1990, 1992, and 1993. The objectives were updated in 1998 and we recommend checking the revised objectives when they are finalized. Overall water quality was rated as good (index = 7 or CCME index of 93). We recommend monitoring in 2005.

Fraser River from Kanaka Creek to the Mouth

The river downstream from Kanaka Creek and the outer estuary (Figure 22) are very important for salmon migration and rearing. The water is used for irrigation and certain beaches are heavily used for recreation. Water quality can be affected by industry, treated sewage, and agriculture.

Water quality was rated as Good (index = 4 or CCME index of 96), in the Main Stem, Fair (index = 28 or CCME index of 72), in the Main Arm, and Fair (index = 18 or CCME index of 82), in the North Arm.

We have monitored to check objectives annually since 1987. Due to the provincial importance of this river and the threats to water quality that exist in this section, we recommend that such monitoring be continued annually. Updated objectives were released in 2000. A CCME WQI value was calculated for five portions of the Fraser River between Kanaka Creek and the mouth: the Main Arm (index value of 91, equivalent to Good); Main Stem (index value of 100, equivalent to Excellent); Middle Arm (index ranking of 71, equivalent to Fair); North Arm (index ranking of 91, equivalent to Good); and Sturgeon

Banks (ranking of 100, equivalent to Excellent). A minimal amount of data was collected in 2004, and it is summarized in Table 21. Objectives were met 74% of the time, with objectives total copper occasionally not met. We recommend increased monitoring in 2005.

Boundary Bay

Boundary Bay sustains a crab and herring fishery and is important for recreation. The Little Campbell River, the Serpentine River, and the Nicomekl River are tributaries to Boundary Bay on the east side. They provide important habitat for trout and salmon and are used for irrigation. The main influences on water quality are from sewage pumping stations, storm-water, and septic tanks in Boundary Bay and from agriculture in the tributaries.

Objectives were checked from 1988 to 1993 giving consistent results, with a water quality rating of fair (index = 40 or CCME index of 60). Since the situation is stable and fairly well documented, further monitoring was considered a low priority except where required at bathing beaches for human health reasons. Sampling resumed in 1999, when four samples were collected at various sites and analyzed for a number of parameters. Three samples were also collected in 2000, and six samples were collected in 2002. No monitoring was conducted in 2003 or 2004. Parameters which occasionally failed to meet their objectives in 2002 included dissolved oxygen and maximum and average nitrite levels.

Burrard Inlet

Burrard Inlet includes Port Moody Arm, Indian Arm, Vancouver Harbour, False Creek, and English Bay. The water is designated for aquatic life and wildlife in all areas and for primary-contact recreation in most areas, except in False Creek. There are several municipal and industrial discharges to Burrard Inlet that can affect water quality. These include primary-treated sewage, combined sewer overflows, storm-water, bulk-loading terminals, a sugar refinery, a sodium chlorate plant, a chlor-alkali plant, and oil depots. Water quality for the 1995 report was ranked as Fair in Port Moody Arm (index = 40 or CCME index of 60), Indian Arm (index = 18 or CCME index of 82), Second Narrows to Roche Point (index = 31 or CCME index of 69), First to Second Narrows (index = 42 or

CCME index of 58), and outer Burrard Inlet (index = 20 or CCME index of 80), but Borderline in False Creek (index = 44 or CCME index of 56). Samples were last collected in 1996 and 1997, but analyzed only for fecal coliforms. Objectives for fecal coliforms were occasionally not met at Deep Cover, Cates Park and Brockton Point.

In the past, objectives have not been met for a number of other variables, including metals in sediments, phenol in water, and PCBs and PAHs in sediments. No water samples were collected in 2004.

We recommend monitoring resume in Burrard Inlet in 2005, with an increased number of parameters measured so that a greater percentage of objectives are being assessed.

Burrard Inlet Tributaries

We have set objectives for the following three tributaries to Burrard Inlet: School House Brook (which discharges to Port Moody Arm and could be influenced by a chemical polymer plant); Lynn Creek (which discharges to Vancouver Harbour and could be affected by a municipal landfill); and the Capilano River (which discharges to outer Burrard Inlet and may also be affected by a municipal landfill). The main uses of these tributaries are recreation, aquatic life, and wildlife.

The water quality objectives were last checked in 1994. At that time, objectives were not met at times for phenols, water temperature, chromium, iron, zinc, and chlorophenols in water. Water quality was ranked as fair in School House Brook (index = 38 or CCME index of 62), good in Lynn Creek (index = 12 or CCME index of 88), and good in the Capilano River (index = 16 or CCME index of 84).

Although we have data for four years, we recommend resuming monitoring in 2005 because the past record is rather incomplete.

North Shore Lower Fraser Tributaries

Objectives have been set for the following four tributaries to the north shore of the lower Fraser River in the Lower Mainland: Kanaka Creek, the Pitt River, the Coquitlam River, and the Brunette River. All these streams, and their tributary streams and lakes, support salmon and trout fisheries to varying degrees. Most are important for recreation and some are sources of drinking water requiring treatment. Discharges that can affect water quality include storm-water, agricultural runoff, treated sewage, landfill leachates, wastewaters from gravel operations, and a wood preservation plant.

Monitoring from 1990 to 1993 gave fairly consistent results, and we consider future monitoring to be a relatively low priority until some of the water quality problems, caused mainly by non-point sources, are addressed. Water quality was ranked as fair in Kanaka Creek (index = 41 or CCME index of 59), good in the Pitt River (index = 16 or CCME index of 84), and Pitt Lake (index = 4 or CCME index of 96), fair in the Alouette (index = 24 or CCME index of 76) and North Alouette (index = 22 or CCME index of 78) rivers, and excellent (index = 3 or CCME index of 97) in Alouette Lake. Coquitlam River water quality was ranked as fair (index = 34 or CCME index of 66), while the Brunette River was good (index = 14 or CCME index of 86). We recommend monitoring resume in 2005.

Pender Harbour

Pender Harbour, a small coastal inlet on the Sechelt Peninsula, is important for recreational boating and fishing. It also supports commercial fishing and some commercial shellfish harvesting. The main influences on water quality are from diffuse sources such as septic tanks, some agriculture, and sewage discharges from boats.

In 1994, the third year of monitoring, objectives were often not met for copper, lead, and zinc in both water and sediments and for iron in water. Objectives for tri-butyl tin in water and PAHs in sediments were also not met. These results were similar to those of past years. Since the situation is stable and reasonably well defined, monitoring is a lower priority in the immediate future. We recommend monitoring in 2005.

Sechelt Inlet

Sechelt Inlet is located on the mainland coast about 80 km northwest of Vancouver. It is important for fisheries, especially fish farming, and recreation and has potential for shellfish harvesting. Potential sources of contamination include residential development, marinas, logging and minor discharges from gravel washing, a fish hatchery, and mariculture.

Monitoring for the second time in 1994 showed that objectives for suspended solids, copper, lead, and zinc were not met at times, mostly near a dock in Porpoise Bay at the south end of the inlet.

We recommend continuing the program for at least one more year to obtain a reasonable database.

Table 1. Provincial Overview of Water Quality Objectives – 2004

	Number of Occurrences				
Region	**Objectives Met**	**Objectives Not Met**	**Indefinite Results**	**Omitted 2002**	**Totals**
Vancouver Island	542	14	20	17	593
	91.4%	2.4%	3.4%	2.9%	100.0%
Lower Mainland	17	6	0	30	53
	32.1%	11.3%	0.0%	56.6%	100.0%
Southern Interior	8368	801	85	56	9310
	89.9%	8.6%	0.9%	0.6%	100.0%
Kootenays	891	135	2	9	1037
	85.9%	13.0%	0.2%	0.9%	100.0%
Cariboo	73	10	1	4	88
	83.0%	11.4%	1.1%	4.5%	100.0%
Omineca - Peace	678	97	256	34	1065
	63.7%	9.1%	24.0%	3.2%	100.0%
Skeena	78	14	6	4	102
	76.5%	13.7%	5.9%	3.9%	100.0%
All Regions	**10647**	**1077**	**370**	**154**	**12248**
	86.9%	**8.8%**	**3.0%**	**1.3%**	**100.0%**
All Regions less occurrences with no result	**10647**	**1077**			**11724**
	90.8%	**9.2%**			**100.0%**

Table 2. Cowichan - Koksilah Rivers Water Quality Objectives – 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliforms < 10 /100 mL 90th percentile (np)	Cowichan River: 0120808 300m u/s L. Cowichan STP	Aug 10 - Sep 7	3	22 - 25 CFU/100 mL	
			1	np. = 24.6 CFU/100 mL	Indef. Result (no 5-in-30)
	E206107 400m d/s L. Cowichan STP	Aug 18 - Sep 7	2	25 - 29 CFU/100 mL	
			1	np. = 28.6 CFU/100 mL	Indef. Result (no 5-in-30)
	Koksilah River: 0123981 at Highway 1	Jan 15 - Dec 16	26	< 1 - 205 CFU/100 mL	
		Oct 26 - Nov 25	1	np. = 137.8 CFU/100 mL	Objective not met
		Jan 15 - Dec 16	1	np. = 63 CFU/100 mL	Indef. Result (no 5-in-30)
E. coli < 10 /100 mL 90th percentile (np)	Cowichan River: 0120808 300m u/s L. Cowichan STP	Aug 10 - Sep 7	3	18 - 21 CFU/100 mL	
			1	np. = 20.8 CFU/100 mL	Indef. Result (no 5-in-30)
	E206107 400m d/s L. Cowichan STP	Aug 18 - Sep 7	2	16 - 23 CFU/100 mL	
			1	np. = 22.3 CFU/100 mL	Indef. Result (no 5-in-30)
	Koksilah River:	2004	0	no data collected	Omitted 2004
E. coli < 385 /100 mL 90th percentile (np)	Cowichan River: D/S from highway	2004	0	no data collected	Omitted 2004
Enterococci < 3 /100 mL 90th percentile (np)	Cowichan River Koksilah River	2004	0	no data collected	Omitted 2004
Turbidity max increase: 5 NTU or 10%	Cowichan River: E206106 1 km d/s Duncan STP	Feb 25 - Nov 25	19	0.68 - 3.91 NTU	Objective met
		Jan 15 - Dec 16	5	5.59 - 34.1 NTU	Indef. result (no control)
	Koksilah River: 0123981 at Highway 1	Feb 25 - Nov 25	23	0.49 - 3.53 NTU	Objective met
		Jan 15 - Nov 18	2	5.16 - 6.1 NTU	Indef. result (no control)
Suspended Solids max. increase 10 mg/L or 10%	Cowichan River Koksilah River	2004	0	no data collected	Omitted 2004
Ammonia-N < 1.30 mg/L av 6.75 mg/L max at pH = 7.9 temp = 15 C	Cowichan River: E206108 d/s Cowichan Lake	Aug 10 - Sep 7	3	0.006 - 0.012 mg/L	Max obj. met
			1	av. = 0.009 mg/L	Indef. Result (no 5-in-30)
	0120808 300m u/s L. Cowichan STP	Aug 10 - Sep 7	3	0.003 - 0.011 mg/L	Max obj. met
			1	av. = 0.0067 mg/L	Indef. Result (no 5-in-30)

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Chlorophyll-a 50 mg/m2 max	Cowichan River: 0120808 300m u/s L. Cowichan STP	Aug 18 - Sep 7 Sep 7	5 1	4.1 - 30.3 mg/m2 83.9 mg/m2	Max obj. met Max obj. not met
	E206107 400m d/s L. Cowichan STP	Aug 10 - Sep 7	9	0.8 - 12.6 mg/m2	Max obj. met
Total Cl2 Res. 0.002 mg/L max	Cowichan River	2004	0	no data collected	Omitted 2004
Dissolved Oxygen 8.0 mg/L min Jun - Sep 11.2 mg/L min Oct - May	Cowichan River: E206106 1 km d/s Duncan STP	Jun 22 - Sep 23 Nov 18	7 1	8.6 - 10 mg/L 4 mg/L	Objective met Objective not met
Dissolved Cu <0.002 mg/L av 0.004 mg/L max or 20% increase	Cowichan River Koksilah River	2004	0	no data collected	Omitted 2004
Dissolved Pb <0.003 mg/L av 0.008 mg/L max or 20% increase	Cowichan River Koksilah River	2004	0	no data collected	Omitted 2004
Dissolved Zn <0.030 mg/L av 0.180 mg/L max or 20% increase	Cowichan River Koksilah River	2004	0	no data collected	Omitted 2004
Cu-8 Quinolinolate 0.0005 mg/L max	Cowichan River	2004	0	no data collected	Omitted 2004

Table 3. Middle Quinsam Lake Water Quality Objectives – 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total-P < 0.007 mg/L av. (May - Sept.)	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	< 0.002 - 0.006 mg/L	
		Aug 8 - Sep 6	1	av. = 0.004 mg/L	Objective met
Total-P < 0.006 mg/L av. (May - Sept.)	Middle Quinsam Lake: 0900504 at outlet	Aug 8 - Nov 14	10	< 0.002 - 0.003 mg/L	
		Aug 8 - Sep 6	1	av. = 0.0022 mg/L	Objective met
Chlorophyll-a < 50 mg/m2	Quinsam River	2004	0	no data collected	Omitted 2004
Dissolved Oxygen 3 mg/L min. 1m above seds. (May - Sept.)	Long Lake Quinsam Lake	2004	0	no data collected	Omitted 2004
Turbidity < 1.0 NTU av. 5.0 NTU max.	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	0.23 - 1 NTU	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = 0.35 - 0.59 NTU	Av. obj. met
Nitrate-N < 40 mg/L av. 200 mg/L max.	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	< 0.002 - < 0.058 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = < 0.019 - < 0.031 mg/L	Av. obj. met
	Middle Quinsam Lake: 0900504 at outlet	Aug 8 - Nov 14	10	< 0.002 - < 0.045 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = < 0.008 - < 0.017 mg/L	Av. obj. met
	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	10	< 0.002 - < 0.075 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = < 0.022 - < 0.024 mg/L	Av. obj. met
Total Cobalt 0.05 mg/L max	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	< 0.000005 - 0.000005 mg/L	Objective met
	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	< 0.000005 - 0.000005 mg/L	Objective met
	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	10	< 0.000005 - 0.000005 mg/L	Objective met
Total Manganese 0.05 mg/L max	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	0.0056 - 0.0126 mg/L	Objective met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Suspended Solids < 5 mg/L av. 25 mg/L max. or 10 mg/L max. inc.	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	< 1 - < 4 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = 1 - < 1.6 mg/L	Av. obj. met
	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	< 1 - 1 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = < 1 - 1 mg/L	Av. obj. met
	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	10	< 1 - 1 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = < 1 - 1 mg/L	Av. obj. met
Ammonia-N < 1.82 mg/L av. 12.5 mg/L max. at pH = 7.5 temp. = 12 oC	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	< 0.005 - 0.01 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = 0.006 mg/L	Av. obj. met
	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	< 0.005 - 0.022 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = 0.007 - 0.011 mg/L	Av. obj. met
	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	10	< 0.005 - 0.053 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = 0.012 - 0.015 mg/L	Av. obj. met
Nitrite-N < 0.02 mg/L av. 0.06 mg/L max.	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	< 0.002 - < 0.058 mg/L	Max. obj. met
		Aug 8 - Sep 6	1	av. = < 0.031 mg/L	Indefinite result
		Oct 17 - Nov 14	1	av. = < 0.019 mg/L	Av. obj. met
	Middle Quinsam Lake: 0900504 at outlet	Aug 8 - Nov 14	10	< 0.002 - < 0.045 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = < 0.008 - < 0.017 mg/L	Av. obj. met
	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	9	< 0.002 - < 0.032 mg/L	Max. obj. met
		Nov 7	1	< 0.075 mg/L	Indefinite result
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = < 0.022 - < 0.024 mg/L	Indefinite result
pH > 6.5 90th percentile (np) > 6.9 median (med.)	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	7.3 - 7.8	
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	med = 7.3 - 7.8	Objective met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	np = 7.4 - 7.8	Objective met
	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	7.3 - 7.9	
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	med = 7.4 - 7.8	Objective met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	np = 7.4 - 7.9	Objective met
	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	9	7.1 - 7.8	
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	med = 7.3 - 7.6	Objective met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	np = 7.7	Objective met
Dissolved Aluminum < 0.05 mg/L av 0.1 mg/L max.	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	0.0019 - 0.0309 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = 0.00236 - 0.01394 mg/L	Av. obj. met
	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	0.0053 - 0.0217 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = 0.01092 - 0.0117 mg/L	Av. obj. met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Dissolved Aluminum (continued)	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	10	0.0113 - 0.0855 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = 0.01456 - 0.03026 mg/L	Av. obj. met
Total Arsenic < 0.05 mg/L max.	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	0.0005 - 0.0008 mg/L	Objective met
	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	0.0002 - 0.0004 mg/L	Objective met
	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	10	< 0.0001 - 0.0003 mg/L	Objective met
Total Cadmium < 0.0002 mg/L av. 0.0003 mg/L max.	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	all < 0.00001 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = < 0.00001 mg/L	Av. obj. met
	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	all < 0.00001 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = < 0.00001 mg/L	Av. obj. met
	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	10	all < 0.00001 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = < 0.00001 mg/L	Av. obj. met
Total Copper < 0.002 mg/L av.	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	0.0001 - 0.0005 mg/L	
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = 0.00034 - 0.00036 mg/L	Av. obj. met
	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	0.0004 - 0.0006 mg/L	
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = 0.00046 - 0.00048 mg/L	Av. obj. met
	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	10	0.0005 - 0.0009 mg/L	
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = 0.00054 - 0.00062 mg/L	Av. obj. met
Total Iron < 0.3 mg/L av.	Long Lake Middle Quinsam Lake Quinsam River	2004	0	no data collected	Omitted 2004
Total Lead <0.003 mg/L av. 0.005 mg/L max.	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	< 0.00001 - 0.00001 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = < 0.00001 - 0.00001 mg/L	Av. obj. met
	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	< 0.00001 - 0.00001 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = < 0.00001 - 0.00001 mg/L	Av. obj. met
	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	10	< 0.00001 - 0.00001 mg/L	Max. obj. met
		Aug 8 - Sep 6, Oct 17 - Nov 14	2	av. = < 0.00001 - 0.00001 mg/L	Av. obj. met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total Mercury 0.1 ug/L max.	Long Lake Middle Quinsam Lake Quinsam River	2004	0	no data collected	Omitted 2004
Total Nickel 0.025 mg/L max.	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	< 0.0001 - 0.0003 mg/L	Objective met
	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	< 0.0001 - 0.0004 mg/L	Objective met
	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	10	0.0001 - 0.0002 mg/L	Objective met
Total Silver 0.0001 mg/L max.	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	all < 0.00002 mg/L	Objective met
	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	all < 0.00002 mg/L	Objective met
	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	10	all < 0.00002 mg/L	Objective met
Total Zinc 0.03 mg/L max.	Long Lake: E219412 at outlet	Aug 8 - Nov 14	10	< 0.0001 - 0.0006 mg/L	Objective met
	0900504 Middle Quinsam Lake Outlet	Aug 8 - Nov 14	10	< 0.0001 - 0.0003 mg/L	Objective met
	Upper Quinsam River: 0126402 at Argonaut Road	Aug 8 - Nov 14	10	< 0.0001 - 0.0003 mg/L	Objective met

Table 4. Tsolum River Water Quality Objectives – 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Dissolved Copper < 0.007 mg/L av. 0.011 mg/L max.	E207826 Tsolum River 500m d/s Murex Creek	Jan 26 - Nov 30 Apr 28 - Jun 8	16 7	0.0029 - 0.0068 mg/L 0.0119 - 0.0162 mg/L	Objective met Objective not met
		May 11 - Jun 8	1	av. = 0.01416 mg/L	Av. obj. not met
% steelhead egg survival no difference between test & control (at 95% confidence)	Tsolum River	2004	0	no in situ bioassay data collected	Omitted 2004

Table 5. Holland Creek and Stocking Lake Water Quality Objectives - 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliform	Holland Creek: E216974 at Chicken Ladder Dam	Jan 14 - Mar 3	3	< 1 - 1 CFU/100 mL	
			1	np. = 1 CFU/100 mL	Indef. Result (no 5-in-30)
< 10 CFU/100 mL 90th percentile. (np)	Stocking Lake: E206290 at Centre	Jan 14 - Mar 3	3	< 1 - 3 CFU/100 mL	
			1	np. = 2.6 CFU/100 mL	Indef. Result (no 5-in-30)
Turbidity 1 NTU max	Holland Creek: E216974 at Chicken Ladder Dam	Feb 11 - Mar 3	2	0.16 - 0.26 NTU	Objective met
		Jan 14	1	7 NTU	Objective not met
	Stocking Lake: E206290 at Centre	Jan 14 - Mar 3	3	0.29 - 0.34 NTU	Objective met
Colour 15 TCU max. or	Holland Creek: E216974 at Chicken Ladder Dam	Jan 14 - Mar 3	3	< 5 - 10 TCU	Objective met
no increase if background > 15 TCU	Stocking Lake: E206290 at Centre	Jan 14 - Mar 3	3	all < 5 TCU	Objective met
Total Organic Carbon ≤ 2 mg/L annual average	Holland Creek: E216974 at Chicken Ladder Dam	Jan 14 - Mar 3	3	2.1 - 3.2 mg/L	
			1	av. = 2.8 mg/L	Objective not met
	Stocking Lake: E206290 at Centre	Jan 14 - Mar 3	3	2.3 - 2.9 mg/L	
			1	av. = 2.5 mg/L	Objective not met
pH 6.5 - 8.5	Holland Creek: E216974 at Chicken Ladder Dam	Jan 14 - Mar 3	3	6.7 - 6.9	Objective met
	Stocking Lake: E206290 at Centre	Jan 14 - Mar 3	3	all 7	Objective met
Total Iron 0.3 mg/L max.	Stocking Lake	2004	0	no data collected	Omitted 2004
Chlorophyll a 0.0025 mg/L summer av.	Stocking Lake	2004	0	no data collected	Omitted 2004
Total Phosphorus 0.001 mg/L av. at spring overturn	Stocking Lake	2004	0	no data collected	Omitted 2004

Table 6. Kathlyn, Seymour, Round and Tyhee Lakes Objectives – 2004

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliforms Intakes: ≤ 10 /100 mL 90th percentile (np) Beaches: ≤ 200 /100 mL geometric mean (gm) ≤ 400 /100 mL 90th percentile (np)	Kathlyn Lake Seymour Lake Round Lake Tyhee Lake	2004	0	no data collected	Omitted 2004
Turbidity	Kathlyn Lake: 1131007	Apr 19 - Apr 26 Apr 19	5 1	1.99 - 3.04 NTU 5.17 NTU	Max. obj. met Max. obj. not met
≤ 5 NTU max	Deep Station		1	av = 2.9 NTU	Indefinite result: No 5-in-30
≤ 1 NTU av	Seymour Lake: 1131010	Apr 19 - Apr 26 Apr 19	5 1	2.25 - 3.57 NTU 6.13 NTU	Max. obj. met Max. obj. not met
	Deep Station		1	av = 3.4 NTU	Indefinite result: No 5-in-30
	Round Lake: 1131008	Jan 29 - Aug 18 Jun 22	17 2	0.26 - 4.3 NTU 5.09 - 15.1 NTU	Max. obj. met Max. obj. not met
	Deep Station		1	av = 2.76 NTU	Indefinite result: No 5-in-30
	Tyhee Lake: E216924	Apr 22 - Apr 26	8	1.28 - 3.95 NTU	Max. obj. met
	Deep Station		1	av = 1.8 NTU	Indefinite result: No 5-in-30
Total Phosphorus	Kathlyn Lake: 1131007	Apr 19 - Apr 26	6	0.002 - 0.006 mg/L	
≤ 0.029 mg/L av.	Deep Station		1	av = 0.004 mg/L	Av. obj met
Spring turnover	Seymour Lake: 1131010	Apr 19 - Apr 26	6	0.007 - 0.021 mg/L	
	Deep Station		1	av = 0.011 mg/L	Av. obj met
	Round Lake: 1131008	Apr 22 - Apr 26	7	0.014 - 0.075 mg/L	
	Deep Station		1	av = 0.037 mg/L	Av. obj not met
	Tyhee Lake: E216924	Apr 22 - Apr 26	8	0.002 - 0.007 mg/L	
	Deep Station		1	av = 0.004 mg/L	Av. obj met
Colour ≤ 15 TCU max	Kathlyn Lake: 1131007 Deep Station	Apr 19 - Apr 26	6	5 - 15 TCU	Max. obj. met
	Seymour Lake: 1131010 Deep Station	Apr 19 - Apr 26	6	30 - 50 TCU	Max. obj. not met
	Round Lake: 1131008	Jan 29 - Jul 20 Aug 18	16 3	< 5 - 10 TCU 20 - 40 TCU	Max. obj. met Max. obj. not met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
	Deep Station				
Colour (continued) ≤ 15 TCU max	Tyhee Lake: E216924 Deep Station	Apr 22 - Apr 26	8	< 5 - 10 TCU	Max. obj. met

Table 7. Lakelse Lake Water Quality Objectives – 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliforms Intakes: ≤ 10 /100 mL 90th percentile (np) Beaches: ≤ 200 /100 mL geometric mean (gm) ≤ 400 /100 mL 90th percentile (np)	Lakelse Lake	2004	0	no data collected	Omitted 2004
Turbidity	Lakelse Lake: E206616	May 31 - Sep 8	10	0.5 - 2.94 NTU	Max. objective met
≤ 5 NTU max ≤ 1 NTU av	Deep Station		1	av = 1.5 NTU	Indefinite result No 5-in-30 day samples
Total Phosphorus	E206616	May 31 - Sep 8	10	0.002 - 0.012 mg/L	
≤ 0.01 mg/L av.	Deep Station		1	av = 1.5 NTU	Indefinite result No 5-in-30 day samples
Chlorophyll a ≤ 0.003 mg/L av.	Lakelse Lake	2004	0	no data collected	Omitted 2004
Dissolved Oxygen ≥ 6 mg/L @ 5m above sediments	Lakelse Lake	2004	0	no data collected	Omitted 2004

Table 8. Nechako River Water Quality Objectives – 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliform <100/100ml 90th perc. (np)	Federal/Provincial Site E206583 at Prince George	Jan 7 - Dec 20	25	< 1 - 32 CFU/100 mL	No 5-in-30
			1	np = 13.6 CFU/100 mL	Indefinite result
	Chilako River: E249807 100m U/S Hwy 16	Apr 6 - Sep 30	2	16 - 18 CFU/100 mL	No 5-in-30
			1	np = 17.8 CFU/100 mL	Indefinite result
Fecal Coliforms <10/100ml 90th perc (np)	Stuart River:	2004	0	no data collected	Omitted 2004
Fecal Coliforms <200/100ml geometric mean (gm) <400/100ml 90 perc. (np)	Necoslie River:	2004	0	no data collected	Omitted 2004
Total Cl2 Res. 0.002 mg/L max	Nechako & Stuart Rivers	2004	0	no data collected	Omitted 2004
Ammonia-N <2.05 mg/L av 14.1 mg/L max at pH = 7.5 temp = 1 °C	Chilako River	Apr 6 - Nov 23	3	< 0.005 - 0.013 mg/L	Max obj. met
			1	av = 0.009 mg/L	Indefinite result No 5-in-30
Ammonia-N <1.24 mg/L av 6.46 mg/L max at pH = 8.0 temp = 1 °C	Stuart River	2004	0	no data collected	Omitted 2004
Nitrite-N < 0.02 mg/L av 0.06 mg/l max	Chilako River	Apr 6 - Nov 23	3	< 0.002 - 0.008 mg/L	Max obj. met
			1	av = 0.004 mg/L	Indefinite result
Chlorophyll - a < 50 mg/L av	Nechako River Stuart River	2004	0	no data collected	Omitted 2004
Chlorophyll - a < 100 mg/L av	Chilako River	2004	0	no data collected	Omitted 2004
Dissolved Oxygen 7.75 - 11.2 mg/L min depending on fish egg stage (11.2 mg/L from Oct to Dec and May to Jun 15)	Nechako River E206583 at Prince George	Jan 7 - Apr 26, Jun 21 - Sep 29	16	8.4 - 13.8 mg/L	Objective met
		Oct 26 - Dec 20	5	12.0 - 15.0 mg/L	Objective met
		May 10 - Jun 7, Oct 12	4	9.5 - 11.0 mg/L	Objective not met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
pH 6.5 - 8.5	Nechako River E206583 at Prince George	Jan 7 - Dec 20	25	6.8 - 8	Objective met
Temperature < 15 °C av ~ 100 m d/s Cheslatta Falls	Nechako River: immediately d/s Cheslatta Falls* (DFO's Cheslatta Falls site)	Jan 1 - Dec 31 Jun 7 - Sep 8 Jan 1 - Dec 31	342 76 266	-2.6° - 20.6°C 15.1 - 20.6°C minus 2.6 - 15.0°C	 Objective not met Objective met
Temperature < 20 °C Jul - Aug. < 18 °C Sep - Jun. ~ 100 m u/s Stuart River	Nechako River: at Vanderhoof ~40 km u/s Stuart R. confl. (DFO's Vanderhoof site)	Jan 1 - Dec 31 Jul 1 - Aug 31 Jul 1 - Aug 19 Jan 1 - Dec 31 Jun 8 - Jun 30	366 56.8 5.3 291.3 12.7	0.7° - 23.9°C 14.5° - 20°C 20.1° - 22.5°C 0.7° - 18°C 18.1° - 23.9°C	 Objective met Objective not met Objective met Objective not met
Total Gas Pressure 109 % max	Nechako River	2004	0	no data collected	Omitted 2004

Table 9. Peace River Water Quality Objectives - 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliforms <100 /100 mL 90th percentile (np)	Peace River E206585 at Alces	Jan 13 - Dec 20	23	< 1 - 330 CFU/100 mL	No 5-in-30 day samples
			1	np. = 15.0 CFU/100 mL	Indefinite result
Turbidity 5 NTU or 10% max increase	Peace River E206585 at Alces	Jan 13 - Dec 20	24	0.64 - 746 NTU	Indefinite result No control
Suspended solids 10 mg/L or 10% max increase	Peace River	2004	0	no data collected	Omitted 2004
Total chlorine residual 0.002 mg/L max	Peace River	2004	0	no data collected	Omitted 2004
Dissolved fluoride 1.0 mg/L max	Peace River	2004	0	no data collected	Omitted 2004
Chlorophyll-a 50 mg/m2 max	Peace River	2004	0	no data collected	Omitted 2004
Ammonia-N < 1.78 mg/L av 9.26 mg/L max at pH = 7.8 temp = 0 °C	Peace River	2004	0	no data collected	Omitted 2004
Nitrite - N < 0.04 mg/L av. 0.12 mg/L max. at chloride 2-4 mg/L	Peace River	2004	0	no data collected	Omitted 2004
Dissolved Oxygen 7.25 mg/L min	Peace River	2004	0	no data collected	Omitted 2004
pH 6.5 - 9.0 max change 0.5 pH units	Peace River E206585 at Alces	Jan 13 - Dec 20	23	7.2 - 8.2	Objective met
Total dissolved gas 110% saturation max	Peace River	2004	0	no data collected	Omitted 2004
Temperature max increase 1°C	Peace River E206585 at Alces	Jan 13 - Dec 20	24	0 - 14.5 °C	Indefinite result No control

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total copper 4 µg/L av. 11 µg/L max. at hardness 100 mg/L	Peace River E206585 at Alces	Jan 13 - Dec 20 Jul 6	22 1 1	0.32 - 7.49 µg/L 30.8 µg/L av. = 3.27 µg/L	Max obj. met Max obj. not met Indefinite result No 5-in-30 day samples
Total lead 6 µg/L av. 82 µg/L max. at hardness 100 mg/L	Peace River E206585 at Alces	Jan 13 - Dec 20	23 1	0.024 - 15.2 µg/L av. = 1.3 µg/L	Max obj. met Indefinite result No 5-in-30 day samples
Total nickel 65 µg/L max. at hardness 60 - 120 mg/L	Peace River E206585 at Alces	Jan 13 - Dec 20	23	0.07 - 42.2 µg/L	Max obj. met
Total zinc 30 µg/L max or 20% increase	Peace River E206585 at Alces	Jan 13 - Dec 20 Jul 6	22 1 1	0.13 - 26.9 µg/L 139 µg/L av. = 12.4 µg/L	Objective met Objective not met Indefinite result No control
Chlorinated phenols sum of tri, tetra and penta 0.2 µg/L	Peace River	2004	0	no data collected	Omitted 2004
Phenol 0.002 mg/L av.	Peace River	2004	0	no data collected	Omitted 2004
Un-ionized H2S 0.002 mg/L max	Peace River	2004	0	no data collected	Omitted 2004
2,4-D Ester 0.004 mg/L	Peace River	2004	0	no data collected	Omitted 2004

Table 10. Fraser River (From the Source to Hope) Water Quality Objectives – 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliforms <100 /100 mL 90th percentile (np)	Fraser River Fed/Prov Site at Red Pass	Jan 13 - Dec 20	25	< 1 - 3 CFU/100 mL	No 5-in-30 samples:
			1	np = 1.0 CFU/100 mL	Indefinite result
	Fed/Prov Site at Hansard	Apr 12 - Nov 22	15	< 1 - 47 CFU/100 mL	No 5-in-30 samples:
			1	np = 35.6 CFU/100 mL	Indefinite result
	E206182 at Stoner (d/s Pr. Ge. mills)	Apr 5 - Oct 20	14	< 1 - 4500 CFU/100 mL	No 5-in-30 samples:
			1	np = 287 CFU/100 mL	Indefinite result
	0600011 at Marguerite (d/s Quesnel)	Jan 21 - Dec 16	19	< 1 - 320 CFU/100 mL	No 5-in-30 samples:
			1	np = 168 CFU/100 mL	Indefinite result
	E206581 at Hope	Jan 20 - Dec 15	21	2 - 76 CFU/100 mL	No 5-in-30 samples:
			1	np = 56 CFU/100 mL	Indefinite result
E. coli <100/100 mL 90th percentile (np)	E206182 at Stoner (d/s Pr. Ge. mills)	Apr 5 - Oct 20	14	< 1 - 920 CFU/100 mL	No 5-in-30 samples:
			1	np = 44.2 CFU/100 mL	Indefinite result
Chlorine Residual < 2 ug/L av.	Fraser River	2004	0	no data collected	Omitted 2004
Suspended Solids 10 mg/L or 10% max increase	Fraser River	2004	0	no data collected	Omitted 2004
Turbidity 1 - 5 NTU max increase (control: 5 - 50 NTU)	Fraser River Fed/Prov Site at Red Pass	Jan 13 - Dec 20 Aug 24	26 1	0.23 - 4.41 NTU 6.39 NTU	Objective met Objective not met
	Fed/Prov Site at Hansard	Apr 12 - Nov 22	16	7.51 - 58.4 NTU	Indefinite result (no control)
	0600011 at Marguerite (d/s Quesnel)	Oct 11 Jan 21 - Dec 20	1 23	3.48 NTU 6.44 - 223 NTU	Objective met Indefinite result (no control)
	E206581 at Hope	Jan 6 - Feb 17 Jan 20 - Dec 15	3 19	2.26 - 3.2 NTU 6.59 - 390 NTU	Objective met Indefinite result (no control)
Colour 15 TCU max Jun - Sep 75 TCU max Oct - May	Fraser River Fed/Prov Site at Red Pass	Feb 18 - May 11, Oct 10 - Dec 20 Jun 1 - Sep 28	14 10	< 5 - 5 TCU all <5 TCU	Objective met Objective met
	Fed/Prov Site at Hansard	Apr 12 - May 25, Oct 12 - Nov 22 Jun 7 - Sep 27	8 8	< 5 - 40 TCU < 5 - 10 TCU	Objective met Objective met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Colour (continued) 15 TCU max Jun - Sep	0600011 at Marguerite (d/s Quesnel)	Jan 21 - May 25, Oct 11 - Dec 20	14	< 5 - 60 TCU	Objective met
		Mar 31	1	100 TCU	Objective not met
		Jun 22 - Sep 27	7	< 5 - 15 TCU	Objective met
		Jun 9	1	20 TCU	Objective not met
75 TCU max Oct - May	E206581 at Hope	Feb 17 - May 18, Oct 6 - Dec 15	11	< 5 - 40 TCU	Objective met
		Jun 8 - Aug 31	7	< 5 - 10 TCU	Objective met
		Sep 15	1	20 TCU	Objective not met
Temperature 1 °C max increase	Fraser River Fed/Prov Site at Red Pass	Jan 13 - Dec 20	26	0 - 14.5 °C	Indefinite result No control
	Fed/Prov Site at Hansard	Apr 12 - Nov 22	16	2 - 18 °C	Indefinite result No control
	0600011 at Marguerite (d/s Quesnel)	Jan 21 - Dec 20	24	-1 - 20 °C	Indefinite result No control
	E206581 at Hope	Jan 6 - Dec 15	22	0 - 22 °C	Indefinite result No control
Ammonia-N < 1.78 mg/L av 9.26 mg/L max at pH = 7.8 temp = 0 °C	Fraser River	2004	0	no data collected	Omitted 2004
Nitrite - N < 0.04 mg/L av. 0.12 mg/L max. at chloride 2-4 mg/L	Fraser River	2004	0	no data collected	Omitted 2004
Nitrate+Nitrite-N 10 mg/L max	Fraser River	2004	0	no data collected	Omitted 2004
Chlorophyll-a 50 mg/m2 max	Fraser River	2004	0	no data collected	Omitted 2004
pH 6.5 - 8.5	Fraser River Fed/Prov Site at Red Pass	Jan 13 - Dec 20	26	6.6 - 8.0	Objective met
	Fed/Prov Site at Hansard	Apr 12 - Nov 22	16	6.6 - 8.3	Objective met
	0600011 at Marguerite (d/s Quesnel)	Jan 21 - Dec 20	24	6.6 - 8.1	Objective met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
pH (continued) 6.5 - 8.5	E206581 at Hope	Jan 6 - Dec 15	22	6.8 - 8.1	Objective met
Dissolved Oxygen	Fed/Prov Site at Hansard	Apr 12 - 26, Nov 8 - 22 May 10 - Oct 25	4 12	11.0 - 12.5 mg/L 8.0 - 12.0 mg/L	Objective met Objective met
8.0 mg/L min May to Oct	0600011 at Marguerite (d/s Quesnel)	Jan 21 - Apr 27, Nov 11 - Dec 20 May 12 - Oct 28	11 13	9.5 - 10.3 mg/L 8.3 - 10.2 mg/L	Objective not met Objective met
11.0 mg/L min Nov to Apr	E206581 at Hope	Jan 6 - Apr 13, Nov 3 - Dec 15 May 18 - Oct 25	11 10	12.0 - 15.0 mg/L 8.8 - 12.0 mg/L	Objective met Objective met
Total Lead 0.8 ug/g max in fish muscle	Fraser River	2004	0	no data collected	Omitted 2004
Total PCBs 2.0 ug/g max in fish muscle 0.1 ug/g max in whole fish	Fraser River	2004	0	no data collected	Omitted 2004
Chlorophenols max. TCP's pH 7.8 2,3,4-: 0.1 ug/L 2,3,5-: 0.08 ug/L 2,3,6-: 0.32 ug/L 2,4,5-: 0.08 ug/L 2,4,6-: 0.5 ug/L 3,4,5-: 0.06 ug/L tot: 1.14 ug/L	Fraser River	2004	0	no data collected	Omitted 2004
max TTCPs pH 7.8: 2,3,4,5-: 0.2 ug/L 2,3,4,6-: 0.3 ug/L tot: 0.6 ug/L	Fraser River	2004	0	no data collected	Omitted 2004
max PCP pH 7.8: 0.1 ug/L	Fraser River	2004	0	no data collected	Omitted 2004
AOX	Fed/Prov Site at Hansard	Apr 12 - May 10	3	all < 0.1 mg/L	Indefinite result No control
no increase over control at 95% confidence	0600011 at Marguerite (d/s Quesnel)	Jan 21 - Dec 20	24	0.028 - < 0.1 mg/L	Indefinite result No control

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
AOX (continued)	E206581 at Hope	Jan 6 - Dec 15	21	0.021 - < 0.1 mg/L	Indefinite result No control
Resin Acids 12 ug/L max DHA 45 ug/L max total at pH 7.5	Fraser River	2004	0	no data collected	Omitted 2004
Dioxins and Furans in water 0.06 pg/L max TCDD-TEQ	Fraser River	2004	0	no data collected	Omitted 2004
Dioxins and Furans in sediments 0.25 pg/g max TCDD-TEQ	Fraser River	2004	0	no data collected	Omitted 2004
Dioxins and Furans in fish lipids 50 pg/g TCDD-TEQ	Fraser River	2004	0	no data collected	Omitted 2004

Table 11. Williams Lake Water Quality Objectives – 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliform < 200 /100 mL geometric mean (gm) < 400 /100 mL 90th percentile (np) at beaches	Williams Lake	2004	0	no data collected	Omitted 2004
Fecal Coliform < 10/100 mL 90th percentile at water intakes	Williams Lake	2004	0	no data collected	Omitted 2004
Turbidity < 1 NTU av 5 NTU max.	0603019 Williams Lake: at lake centre	Apr 7 - Nov 9	41	0.97 - 4.98 NTU	Max obj. met
			8	av. = 1.28 - 3.67 NTU	Objective not met
	0603022 Williams Lake: at deepest point	Apr 7 - Nov 9	8	1.61 - 4.93 mg/L	Max obj. met
			1	av. = 3.02 NTU	Indefinite result - no 5-in-30
Total P < 0.020 mg/L av at spring overturn	0603019 Williams Lake: at lake centre	Apr 7	6	0.03 - 0.048 mg/L	
			1	av. = 0.037 mg/L	Objective not met
	0603022 Williams Lake: at deepest point	Apr 7	1	0.061 mg/L	
			1	av. = 0.061 mg/L	Objective not met
Chlorophyll-a < 5 ug/L av (May to Aug)	Williams Lake	2004	0	no data collected	Omitted 2004
Dissolved Oxygen 4.0 mg/L min 5 m above sed.	Williams Lake	2004	0	no data collected	Omitted 2004
Water Clarity 1.2 m min Secchi reading (May to August)	0603019 Williams Lake: at lake centre	Apr 7 - Nov 9	24	daily av. = 1.2 - 3.71 m	Objective met

Table 12. Okanagan Valley Lakes Water Quality Objectives – 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total - P < 0.040 mg/L av. at spring overturn (short-term)	Wood Lake: 0500450 West of Vernon Creek	Mar 17	2	0.041 - 0.042 mg/L	
			1	0.0415 mg/L	Objective not met
	0500848 Wood Lake Deep Basin	Mar 17	3	all 0.041 mg/L	
			1	av. = 0.041 mg/L	Objective not met
Total - P < 0.008 mg/L av. at spring overturn	Kalamalka Lake: 0500246 at south end	Feb 25	3	< 0.002 - < 0.004 mg/L	
			1	av. = < 0.003 mg/L	Objective met
	0500461 Kalamalka Lake South of Coldstream Creek	Feb 25	3	< 0.003 - < 0.005 mg/L	
			1	av. = < 0.0037 mg/L	Objective met
	0500847 Kalamalka Lake South of Coldstream Creek	Feb 25	2	< 0.003 - < 0.004 mg/L	
			1	av. = < 0.0035 mg/L	Objective met
Total - P < 0.010 mg/L av at spring overturn	Okanagan Lake: 0500239 at Armstrong Arm	Apr 19	3	0.007 - 0.015 mg/L	
			1	av. = 0.010 mg/L	Objective met
	0500730 Okanagan Lake at north basin	Feb 18	3	0.004 - 0.005 mg/L	
			1	av. = 0.004 mg/L	Objective met
	0500236 Okanagan Lake at central basin	Feb 18	3	0.004 - 0.007 mg/L	
			1	av. = 0.005 mg/L	Objective met
	0500454 Okanagan Lake U/S Kelowna STP	Feb 23	3	0.002 - 0.003 mg/L	
			1	av. = 0.003 mg/L	Objective met
Total - P < 0.015 mg/L av at spring overturn	Skaha Lake: 0500615 Skaha Lake at centre	Feb 24	3	< 0.005 - < 0.009 mg/L	
			1	av. = < 0.0067 mg/L	Objective met
	0500453 Skaha Lake W.Okanagan L. river mouth	Feb 24	2	< 0.005 - < 0.006 mg/L	
			1	av. = < 0.0055 mg/L	Objective met
	0500846 Skaha Lake south basin	Feb 24	2	< 0.004 - < 0.039 mg/L	
			1	av. = < 0.0215 mg/L	Indefinite result
	Osoyoos Lake: 0500249 at north basin	Apr 5	2	all 0.019 mg/L	
			1	av. = 0.019 mg/L	Objective not met
	0500728 Osoyoos Lake opp. Monashee Co-op	Apr 5	3	0.01 - 0.014 mg/L	
			1	av. = 0.012 mg/L	Objective met

Table 13. Okanagan Tributaries near Kelowna Water Quality Objectives - 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliform ≤ 100/100mL 90th percentile (np)	0500046 Mission Creek at Lakeshore Road	Sep 30	1	59 CFU/100mL	
			1	np = 59 CFU/100mL	Indefinite result
E. coli ≤ 100/100 mL 90th percentile (np)	0500039 Kelowna Creek at Abbott Street 0500046	Sep 30	1	30 CFU/100mL	
			1	np = 30 CFU/100mL	Indefinite result
Enterococci ≤ 25/100 mL 90th percentile (np)	Kelowna Creek Mission Creek	2004	0	no data collected	Omitted 2004
Ammonia-N < 0.762 mg/L av. 5.60 mg/L max. at pH = 8 temp = 20 oC	0500046 Mission Creek at Lakeshore Road	Jun 16 - Dec 2	8	< 0.005 - 0.042 mg/L	Objective met
			1	av. = 0.014 mg/L	Indefinite result
Nitrite-N < 0.06 mg/L av. 0.18 mg/L max	0500046 Mission Creek at Lakeshore Road	Jun 16 - Dec 2	8	< 0.002 - 0.006 mg/L	Objective met
			1	av. = 0.004 mg/L	Indefinite result
Nitrate + Nitrite - N 10 mg/L max.	0500046 Mission Creek at Lakeshore Road	Jun 16 - Dec 2	8	0.012 - 0.119 mg/L	Objective met
			1	av. = 0.067 mg/L	
Chlorophyll-a < 100 mg/m2 av. (average based on six reps)	Kelowna Creek Mission Creek	2004	0	no data collected	Omitted 2004
Dissolved Oxygen 8.0 mg/L min. (May - Oct.) 11.0 mg/L (Nov. - Apr.)	0500046 Mission Creek at Lakeshore Road	Aug 31	1	12.4 mg/L	Objective met
pH 6.5 - 9.0	Kelowna Creek Mission Creek	2004	0	no data collected	Omitted 2004
Dissolved Aluminum 0.1 mg/L or 10% max. increase	Kelowna Creek Mission Creek	2004	0	no data collected	Omitted 2004

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total Copper 0.004 mg/L max 0.0008 mg/L av at hardness = 20 mg/L	0500039 Kelowna Creek at Abbott Street	Oct 8	1 1	< 0.005 mg/L av = < 0.005 mg/L	Indefinite result Indefinite result
Total Zinc 0.03 mg/L or 20% max. increase	0500039 Kelowna Creek at Abbott Street	Oct 8	1	0.013 mg/L	Objective met
Total Lead 0.01 mg/L max 0.004 mg/L av at hardness = 20 mg/L	0500039 Kelowna Creek at Abbott Street	Oct 8	1 1	< 0.03 mg/L av = < 0.03 mg/L	Indefinite result Indefinite result

Table 14. Similkameen River and Hedley Creek Water Quality Objectives – 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliforms < 10 /100 mL 90th percentile (np)	0500629 Similkameen River @ Princeton Hwy 3 Bridge	Jan 7 - Dec 20	27	< 1 - 74 CFU/100 mL	
		Sep 14 - Oct 12	1	np. = 13.2 CFU/100 mL	Objective not met
	0500073 Similkameen River @ Chopka Rd. Bridge	Jan 13 - Dec 20	28	< 1 - 65 CFU/100 mL	
		Sep 21 - Oct 26	1	np. = 9 CFU/100 mL	Objective met
E. coli < 10 /100 mL 90th percentile (np)	Similkameen River	2004	0	no data collected	Omitted 2004
Enterococci < 3 /100 mL 90th percentile	Similkameen River	2004	0	no data collected	Omitted 2004
Suspended Solids max. increase: 10 mg/L or 10%	E223873 Hedley Creek U/S Nickel Plate Diffuser	Jan 5 - Dec 27	56	< 0.1 - 6.8 mg/L	Control Site
	E223874 Hedley Creek 100 m D/S Nickel Plate Diffuser	Jan 5 - Dec 27	56	0.3 - 7.7 mg/L	
		Jan 5 - Dec 27	56	increase = 0 - 2.6 mg/L	Objective met
Substrate Sedimentation: no increase in weight of particles < 3 mm dia.	Similkameen River	2004	0	no data collected	Omitted 2004
Turbidity 1 NTU max increase (U/S < 5 NTU) 5 NTU or 10% max increase (U/S > 5 NTU)	0500629 Similkameen River @ Princeton Hwy 3 Bridge	Jan 7 - Dec 20	27	0.21 - 33.1 NTU	Control Site
	0500073 Similkameen River @ Chopka Rd. Bridge	Jan 13 - Dec 20	25	0.26 - 32.3 NTU	
		Jan 13 - Dec 20	18	increase = 0 - 0.86 NTU	Objective met
		May 11 - Dec 20	5	increase = 1.87 - 3.35 NTU	Objective not met
	E223873 Hedley Creek U/S Nickel Plate Diffuser	Jan 5 - Dec 27	56	0.35 - 5.67 NTU	Control Site
	E223874 Hedley Creek 100 m D/S Nickel Plate Diffuser	Jan 5 - Dec 27	56	0.23 - 6.04 NTU	
		Jan 5 - Dec 27	53	increase = 0 - 0.95 NTU	Objective met
		Feb 2 - Dec 6	3	increase = 2.03 - 2.66 NTU	Objective not met
Total Cl2 Residue 0.002 mg/L max.	Similkameen River	2004	0	no data collected	Omitted 2004

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
WAD-CN < 0.005 mg/L av 0.010 mg/L max.	0500629 Similkameen River @ Princeton Hwy 3 Bridge	Jan 7 - Dec 20 Sep 14 - Oct 12	27 1	< 0.005 - 0.006 mg/L av. = 0.005 mg/L	Max obj met Av obj met
	0500073 Similkameen River @ Chopka Rd. Bridge	Jan 13 - Dec 20 Sep 14 - Oct 12	28 1	all < 0.005 mg/L av. = < 0.005 mg/L	Max obj met Av obj met
	E223873 Hedley Creek U/S Nickel Plate Diffuser	Jan 5 - Dec 27	55 11	all < 0.005 mg/L av. = < 0.005 mg/L	Max obj met Av obj met
	E223874 Hedley Creek 100 m D/S Nickel Plate Diffuser	Jan 5 - Dec 27	55 11	< 0.005 - 0.005 mg/L av. = < 0.005 - 0.005 mg/L	Max obj met Av obj met
SAD-CN + SCN 0.020 mg/L	E223873 Hedley Creek U/S Nickel Plate Diffuser	Jan 5 - Dec 27 Feb 3 Feb 2 - Aug 2	31 22 2	0.0174 - 0.0194 mg/L 0.0204 - 0.294 mg/L < 0.229 mg/L	Objective met Objective not met Indefinite result
	E223874 Hedley Creek 100 m D/S Nickel Plate Diffuser	Jun 21 - Dec 27 Jan 5 - Dec 6	11 44	0.0184 - 0.0194 mg/L 0.0204 - 0.2681 mg/L	Objective met Objective not met
Cyanate as CN 0.45 mg/L max.	Similkameen River	2004	0	no data collected	Omitted 2004
Total Arsenic 0.005 mg/L max. or 20% increase	E223873 Hedley Creek U/S Nickel Plate Diffuser	Jan 6 - Mar 31	15	0.0003 - < 0.0005 mg/L	Objective met
	E223874 Hedley Creek 100 m D/S Nickel Plate Diffuser	Jan 6 - Mar 31	15	0.0004 - 0.001 mg/L	Objective met
Chlorophyll-a < 50 mg/m2 av.	Similkameen River	2004	0	no data collected	Omitted 2004
Chlorophyll-a < 100 mg/m2 av.	Hedley Creek	2004	0	no data collected	Omitted 2004
Dissolved Oxygen 8 mg/L min. (July - March) 11 mg/L min. (April - June)	Similkameen River	2004	0	no data collected	Omitted 2004
pH 6.5 - 8.5	0500629 Similkameen River @ Princeton Hwy 3 Bridge	Jan 21 - Dec 16	19	7.7 - 8.1	Objective met
	0500073 Similkameen River @ Chopka Rd. Bridge	Feb 4 - Dec 16	21	7.6 - 8.1	Objective met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
pH (continued) 6.5 - 8.5	E223873 Hedley Creek U/S Nickel Plate Diffuser	Jan 5 - Dec 27	56	7.0 - 8.27	Objective met
	E223874 Hedley Creek 100 m D/S Nickel Plate Diffuser	Jan 5 - Dec 27	56	6.98 - 8.05	Objective met
Dissolved Aluminum < 0.05 mg/L av. 0.10 mg/L max. or 20% increase	Similkameen River	2004	0	no data collected	Omitted 2004
Total Chromium < 0.002 mg/L av. 0.02 mg/L max. or 20% increase	Similkameen River	2004	0	no data collected	Omitted 2004
Total Copper < 0.002 mg/L av. 0.003 mg/L max. or 20% inc. at hardness = 14	E223873 Hedley Creek U/S Nickel Plate Diffuser	Jan 5 - Dec 27 May 3	55 1 11	0.0003 - 0.0022 mg/L 0.0031 mg/L av. = 0.0012 mg/L	Max obj met Max obj not met Av obj met
	E223874 Hedley Creek 100 m D/S Nickel Plate Diffuser	Jan 5 - Dec 27	56 11	0.0007 - 0.003 mg/L av. = 0.0013 mg/L	Max obj met Av obj met
Total Iron 0.3 mg/L max. or 20% increase	Similkameen River Hedley Creek	2004	0	no data collected	Omitted 2004
Total Manganese 0.05 mg/L max. or 20% increase	Similkameen River Hedley Creek	2004	0	no data collected	Omitted 2004
Total Lead 0.004 mg/L av. 0.030 mg/L max. or 20% inc. at hardness = 46	Similkameen River Hedley Creek	2004	0	no data collected	Omitted 2004
Total Mercury < 0.02 ug/L av. 0.1 ug/L max.	Similkameen River Hedley Creek	2004	0	no data collected	Omitted 2004
Total Molybdinum < 0.01 mg/L av. 0.05 mg/L max. (May - Sept.)	Similkameen River Hedley Creek	2004	0	no data collected	Omitted 2004
Total Nickel 0.025 mg/L max. or 20% increase at hardness < 65	Similkameen River Hedley Creek	2004	0	no data collected	Omitted 2004

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total Uranium < 0.01 mg/L av. 0.10 mg/L max. or 20% increase	Similkameen River Hedley Creek	2004	0	no data collected	Omitted 2004
Total Zinc < 0.01 mg/L av. 0.03 mg/L max. or 20% increase	Similkameen River Hedley Creek	2004	0	no data collected	Omitted 2004

Table 15. Cahill Creek Water Quality Objectives – 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Suspended Solids 10 mg/L or 10% max. increase	E206637 at highway (Cahill #3)	2004	0	no data collected	Omitted 2004
Suspended Solids 20 mg/L or 10% max. increase	Cahill Creek (Headwaters to Hwy) Nickel Plate Mine Creek Sunset Creek	2004	0	no data collected	Omitted 2004
Turbidity 5 NTU or 10% max. increase	Cahill Creek: E206635 U/S Sunset / Nickle Plate Mine Cks	Mar 1 - Dec 6	10	0.36 - 5.66 NTU	Control Site
	E206823 D/S confluence (Cahill #4)	Mar 1 - Dec 6	10	0.37 - 6.5 NTU	
			10	increase = 0 - 1.33 NTU	Objective met
	E249949 Cahill #4A	Mar 1 - Dec 6	10	0.62 - 4.49 NTU	
			10	increase = 0 - 0.93 NTU	Objective met
	E249950 Cahill #4B	Mar 1 - Dec 6	10	0.71 - 4.14 NTU	
			10	increase = 0 - 0.91 NTU	Objective met
	E250424 Cahill #4C	Mar 1 - Dec 6	10	0.14 - 3.99 NTU	
			10	increase = 0 - 0.16 NTU	Objective met
	E206824 D/S Tailings Ponds (Cahill #2)	Mar 1 - Dec 6	10	0.42 - 3.7 NTU	
			10	increase = 0 - 0.21 NTU	Objective met
	E206636 D/S Tailings Ponds (Cahill #2A)	Mar 1 - Dec 6	10	0.38 - 3.48 NTU	
			10	increase = 0 - 0.14 NTU	Objective met
	E206637 at highway (Cahill #3)	Mar 1 - Dec 6	10	0.47 - 3.08 NTU	
			10	increase = 0 - 0.48 NTU	Objective met
	Red Top Gulch Creek: E206638 Below Tailings Pond	Jan 12 - Dec 6	12	0.56 - 16.8 NTU	Control Site
	E215957 East Fork	May 3 - Jun 7	2	3.58 - 6.84 NTU	
			2	Increase = 0 NTU	Objective met
	E215956 West Fork	Jun 7	1	3.47 NTU	
			1	Increase = 0 NTU	Objective met
Turbidity 10 NTU or 20% max. increase	Sunset Creek: E215954 U/S Canty Pit	Jan 12 - Dec 6	12	0.12 - 1.29 NTU	Control Site
	E250751 Lower SS	Jan 12 - Dec 6	12	0.32 - 2.26 NTU	
			12	increase = 0 - 1.66 NTU	Objective met
	E206634 U/S Cahill Creek	Jan 12 - Dec 6	12	0.33 - 2.94 NTU	
			12	increase = 0 - 2.21 NTU	Objective met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Turbidity (continued)	Nickel Plate Mine Creek: E206633 U/S Sunset Creek	Jan 12 - Dec 6	12	0.15 - 1.35 TCU	Objective met
Dissolved Solids 500 mg/L max.	Cahill Creek Red Top Gulch Nickel Plate Mine Creek Sunset Creek	2004	0	no data collected	Omitted 2004
Sulphate < 50 mg/L av. 150 mg/L max.	Cahill Creek: E206635 U/S Sunset / Nickle Plate Mine Cks	Mar 1 - Dec 6	7	5.88 - 13.58 mg/L	Max obj. met
			1	av = 7.6 mg/L	Indef.result (no 5-in-30)
	E206823 D/S confluence (Cahill #4)	Jan 1 - Dec 31	262	11.9 - 94.7 mg/L	Max obj. met
		Jan 1 - Dec 31	47	av. = 13.0 - 40.1 mg/L	Av. obj. met
		Jun 3 - Jul 7	5	av. = 58.0 - 89.3 mg/L	Av. obj. not met
	E249949 Cahill #4A	Jan 1 - Dec 31	259	22.9 - 149.7 mg/L	Max obj. met
		Jul 28 - Aug 2	2	157.0 - 167.7 mg/L	Max obj. not met
		Jan 15 - May 26	15	av. = 24.2 - 50.0 mg/L	Av. obj. met
		Jan 1 - Dec 30	37	av. = 51.7 - 146.4 mg/L	Av. obj. not met
	E249950 Cahill #4B	Jan 1 - Dec 31	256	22.1 - 148.9 mg/L	Max obj. met
		Jul 23 - Aug 3	7	150.7 - 170.3 mg/L	Max obj. not met
		Mar 10 - May 26	9	av. = 23.0 - 49.8 mg/L	Av. obj. met
		Jan 1 - Dec 30	43	av. = 51.1 - 163.5 mg/L	Av. obj. not met
	E250424 Cahill #4C	Jan 1 - Dec 31	258	22.1 - 141.6 mg/L	Max obj. met
		Jul 28 - Aug 3	4	153.3 - 159.5 mg/L	Max obj. not met
		Mar 10 - Sep 22	10	av. = 22.7 - 50.0 mg/L	Av. obj. met
		Jan 1 - Dec 30	42	av. = 51.0 - 147.8 mg/L	Av. obj. not met
	E206824 D/S Tailings Ponds (Cahill #2)	Jan 1 - Dec 31	361	22.5 - 149.0 mg/L	Max obj. met
		Jul 29 - Aug 3	4	150.9 - 161.6 mg/L	Max obj. not met
		Mar 15 - Sep 21	12	av. = 23.1 - 49.8 mg/L	Av. obj. met
		Jan 1 - Dec 31	61	av. = 52.1 - 153.1 mg/L	Av. obj. not met
	E206636 D/S Tailings Ponds (Cahill #2A)	Jan 1 - Dec 31	254	30.3 - 144.3 mg/L	Max obj. met
		Jul 29 - Aug 4	5	151.0 - 159.1 mg/L	Max obj. not met
		Apr 12 - May 31	4	av. = 35.2 - 50.0 mg/L	Av. obj. met
		Jan 1 - Dec 27	47	av. = 53.8 - 150.4 mg/L	Av. obj. not met
	E206637 at highway (Cahill #3)	Jan 1 - Dec 31	253	32.6 - 149.9 mg/L	Max obj. met
		Jul 20 - Aug 4	7	150.9 - 269.8 mg/L	Max obj. not met
		Apr 9 - May 28	3	av. = 38.1 - 43.8 mg/L	Av. obj. met
		Jan 1 - Dec 31	49	av. = 53.6 - 149.1 mg/L	Av. obj. not met
	Red Top Gulch Creek: E206638 Below Tailings Pond	Jan 2 - Dec 31	48	186.9 - 447.8 mg/L	Max obj. not met
		Jan 2 - Dec 6	8	av. = 198.6 - 331.0 mg/L	Av. obj. not met
	E215957 East Fork	Jun 7	1	173 mg/L	Max obj. not met
			1	av = 173 mg/L	Indefinite result
	E215956 West Fork	Jun 7	1	897.5 mg/L	Max obj. not met
		Jun 7	1	av = 897.5 mg/L	Indefinite result
	Nickel Plate Mine Creek: E206633 U/S Sunset Creek	Jan 1 - Dec 31	263	472.6 - 662.3 mg/L	Max obj. not met
		Jan 1 - Dec 31	52	av. = 476.7 - 643.4 mg/L	Av. obj. not met
WAD-CN < 0.005 mg/L av. 0.010 mg/L max.	Cahill Creek: E206637 at highway	Jan 12 - Dec 28	45	0.003 - 0.0054 mg/L	Max obj. met
		Mar 9 - Dec 28	8	av = 0.004 - < 0.005 mg/L	Av. obj. met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
SAD - CN + Thiocyanate as CN 0.20 mg/L max.	Cahill Creek: E206635 U/S Sunset / Nickle Plate Mine Cks	Mar 1 - Dec 6 May 3 - Nov 1	7 3	0.021 - 0.115 mg/L 0.229 - 0.335 mg/L	Objective met Objective not met
	E206823 D/S confluence (Cahill #4)	Jan 5 - Dec 27 May 3 - Nov 1 Feb 2 - Aug 2	48 2 2	0.017 - 0.036 mg/L 0.236 - 0.246 mg/L < 0.229 mg/L	Objective met Objective not met Indefinite result
	E249949 Cahill #4A	Jan 12 - Dec 28 Feb 2 - Nov 1 Aug 2	44 4 1	0.017 - 0.026 mg/L 0.227 - 0.534 mg/L < 0.229 mg/L	Objective met Objective not met Indefinite result
	E249950 Cahill #4B	Jan 12 - Dec 28 May 3 - Nov 1 Feb 2	44 4 1	0.017 - 0.029 mg/L 0.231 - 0.291 mg/L < 0.225 mg/L	Objective met Objective not met Indefinite result
	E250424 Cahill #4C	Jan 12 - Dec 28 Feb 2 - Nov 1 Aug 2	43 4 1	< 0.018 - 0.027 mg/L 0.226 - 0.301 mg/L < 0.229 mg/L	Objective met Objective not met Indefinite result
	E206824 D/S Tailings Ponds (Cahill #2)	Jan 12 - Dec 28 Feb 2 - Nov 1	42 5	0.017 - 0.026 mg/L 0.227 - 0.292 mg/L	Objective met Objective not met
SAD - CN + Thiocyanate as CN 0.20 mg/L max.	E206636 D/S Tailings Ponds (Cahill #2A)	Jan 12 - Dec 28 Feb 2 - Nov 1	43 4	< 0.018 - 0.039 mg/L 0.231 - 0.265 mg/L	Objective met Objective not met
	E206637 at highway (Cahill #3)	Jan 12 - Dec 28 Feb 2 - Nov 1	43 4	< 0.018 - 0.034 mg/L 0.231 - 0.240 mg/L	Objective met Objective not met
	Red Top Gulch Creek: E206638 Below Tailings Pond	Jan 12 - Dec 6 Feb 2 - Nov 1	8 4	< 0.018 - 0.019 mg/L 0.229 - 0.233 mg/L	Objective met Objective not met
	E215957 East Fork	Jun 7 May 3	1 1	0.038 mg/L 0.274 mg/L	Objective met Objective not met
	E215956 West Fork	Jun 7	1	13.892 mg/L	Objective not met
Cyanates as CN 0.45 mg/L max.	Cahill Creek	2004	0	no data collected	Omitted 2004
Total Arsenic 0.05 mg/L max.	Cahill Creek: E206635 U/S Sunset / Nickle Plate Mine Cks	Mar 1 - Dec 6	7	0.0009 - 0.0018 mg/L	Objective met
	E206823 D/S confluence (Cahill #4)	Jan 12 - Dec 6	12	0.0072 - 0.0282 mg/L	Objective met
	E249949 Cahill #4A	Jan 6 - Dec 28	54	0.0107 - 0.0250 mg/L	Objective met
	E249950 Cahill #4B	Jan 6 - Dec 28	59	0.0093 - 0.0235 mg/L	Objective met
	E250424 Cahill #4C	Jan 6 - Dec 28	61	0.0094 - 0.0215 mg/L	Objective met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total Arsenic (continued) 0.05 mg/L max.	E206824 D/S Tailings Ponds (Cahill #2)	Jan 6 - Dec 28	58	0.0094 - 0.0212 mg/L	Objective met
	E206636 D/S Tailings Ponds (Cahill #2A)	Jan 12 - Dec 28	52	0.0100 - 0.0174 mg/L	Objective met
	E206637 at highway (Cahill #3)	Jan 6 - Dec 28	57	0.0100 - 0.0197 mg/L	Objective met
	Red Top Gulch Creek: E206638 Below Tailings Pond	Jan 12 - Dec 6	12	0.0078 - 0.0169 mg/L	Objective met
Total Arsenic 0.5 mg/L max.	Nickel Plate Mine Creek	2004	0	no data collected	Omitted 2004
Ammonia-N < 1.11 mg/L av. 5.78 mg/L max. at pH = 8.0 temp. = 12 °C	Cahill Creek: E206637 at highway (Cahill #3)	Jan 6 - Dec 28	60	0.005 - 0.02 mg/L	Max obj. met
		Jan 06 - Dec 28	12	0.008 - 0.014 mg/L	Av obj met
Nitrite-N < 0.02 mg/L av. 0.06 mg/L max.	Cahill Creek: E206637 at highway	Jan 1 - Dec 31	261	all < 0.03 mg/L	Max obj. met
		Jan 1 - Dec 31	52	av. = < 0.03 mg/L	Indefinite result
Nitrite-N < 1 mg/L max	Cahill Creek: E206635 U/S Sunset / Nickle Plate Mine Cks	Mar 1 - Dec 6	7	all < 0.03 mg/L	Objective met
	E206823 D/S confluence (Cahill #4)	Jan 1 - Dec 31	262	all < 0.03 mg/L	Objective met
	E249949 Cahill #4A	Jan 1 - Dec 31	262	< 0.001 - < 0.03 mg/L	Objective met
	E249950 Cahill #4B	Jan 1 - Dec 31	268	< 0.001 - < 0.03 mg/L	Objective met
	E250424 Cahill #4C	Jan 1 - Dec 31	267	< 0.001 - < 0.03 mg/L	Objective met
	E206824 D/S Tailings Ponds (Cahill #2)	Jan 1 - Dec 31	370	< 0.001 - < 0.03 mg/L	Objective met
	E206636 D/S Tailings Ponds (Cahill #2A)	Jan 1 - Dec 31	259	all < 0.03 mg/L	Objective met
	Red Top Gulch Creek: E206638 Below Tailings Pond	Jan 2 - Dec 31	48	< 0.03 - < 0.06 mg/L	Objective met
	E215957 East Fork	May 3 - Jun 7	2	all < 0.03 mg/L	Objective met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Nitrite-N (continued) < 1 mg/L max	E215956 West Fork	Jun 7	1	< 0.3 mg/L	Objective met
Nitrite-N < 10 mg/L max	Nickel Plate Mine Creek: E206633 U/S Sunset Creek	Jan 1 - Dec 31	263	all < 0.3 mg/L	Objective met
Nitrate-N < 10 mg/L max.	Cahill Creek: E206635 U/S Sunset / Nickle Plate Mine Cks	Mar 1 - Dec 6	10	< 0.005 - 0.19 mg/L	Objective met
	E206823 D/S confluence (Cahill #4)	Jan 1 - Dec 31	266	0.08 - 2.96 mg/L	Objective met
	E249949 Cahill #4A	Jan 1 - Dec 31	266	0.4 - 5.04 mg/L	Objective met
	E249950 Cahill #4B	Jan 1 - Dec 31	268	0.483 - 5.33 mg/L	Objective met
	E250424 Cahill #4C	Jan 1 - Dec 31	267	0.472 - 4.90 mg/L	Objective met
	E206824 D/S Tailings Ponds (Cahill #2)	Jan 1 - Dec 31	370	0.471 - 4.68 mg/L	Objective met
	E206636 D/S Tailings Ponds (Cahill #2A)	Jan 1 - Dec 31	263	0.555 - 7.17 mg/L	Objective met
	E206637 at highway (Cahill #3)	Jan 1 - Dec 31	264	0.513 - 3.92 mg/L	Objective met
	Red Top Gulch Creek: E206638 Below Tailings Pond	Jan 2 - Dec 31	52	1.2 - 8.67 mg/L	Objective met
Nitrate-N < 10 mg/L max.	E215957 East Fork	May 3 - Jun 7	2	1.17 - 2.08 mg/L	Objective met
	E215956 West Fork	Jun 7	1	1.6621 mg/L	Objective met
Nitrate-N < 100 mg/L max	Nickel Plate Mine Creek: E206633 U/S Sunset Creek	Jan 1 - Dec 31	267	16.099 - 38.20 mg/L	Objective met
Total Aluminum 0.30 mg/L max. or 20% increase at pH > 7	Cahill Creek	2004	0	no data collected	Omitted 2004
Total Cadmium 0.0002 mg/L	Cahill Creek Highway Crossing to Similkameen	2004	0	no data collected	Omitted 2004

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total Cadmium 0.005 mg/L	Cahill Creek: Headwaters to Highway crossing Red Top Gulch Creek: Headwaters to Highway crossing	2004	0	no data collected	Omitted 2004
Total Cadmium 0.02 mg/L	Nickel Plate Mine Creek	2004	0	no data collected	Omitted 2004
Total Copper < 0.005 mg/L av. 0.007 mg/L max. or 20% max. increase	Cahill Creek: E206637 at highway (Cahill #3)	Jan 12 - Dec 6	12	0.001 - 0.0031 mg/L	Max obj met
		Jan 12 - Dec 6	1	av. = 0.002 mg/L	Indefinite result
Total Copper < 0.2 mg/L max	Cahill Creek: E206635 U/S Sunset / Nickle Plate Mine Cks	Mar 1 - Dec 6	6	0.0027 - 0.0112 mg/L	Objective met
	E206823 D/S confluence (Cahill #4)	Jan 12 - Dec 6	11	0.0005 - 0.0084 mg/L	Objective met
	E249949 Cahill #4A	Jan 12 - Dec 6	11	0.0008 - 0.15 mg/L	Objective met
	E249950 Cahill #4B	Jan 12 - Dec 6	11	< 0.001 - 0.14 mg/L	Objective met
	E250424 Cahill #4C	Jan 12 - Dec 6	11	< 0.001 - 0.13 mg/L	Objective met
	E206824 D/S Tailings Ponds (Cahill #2)	Jan 12 - Dec 6	11	< 0.001 - 0.1 mg/L	Objective met
	E206636 D/S Tailings Ponds (Cahill #2A)	Jan 12 - Dec 6	8	0.0016 - 0.03 mg/L	Objective met
	Red Top Gulch Creek: E206638 Below Tailings Pond	Feb 2 - Nov 1	4	< 0.001 - < 0.01 mg/L	Objective met
Total Copper < 0.2 mg/L max	Nickel Plate Mine Creek	2004	0	no data collected	Omitted 2004
Dissolved Iron 0.3 mg/L max.	Cahill Creek	2004	0	no data collected	Omitted 2004
Total Lead < 0.005 mg/L av. 0.015 mg/L max. at 20% increase	Cahill Creek Red Top Gulch Nickel Plate Mine Creek Sunset Creek	2004	0	no data collected	Omitted 2004
Total Lead < 0.05 mg/L max	Cahill Creek: Headwaters to Highway crossing Red Top Gulch Creek: Headwaters to Highway crossing	2004	0	no data collected	Omitted 2004

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total Lead < 0.1 mg/L max	Nickel Plate Mine Creek:	2004	0	no data collected	Omitted 2004
Total Mercury 0.1 ug/L max.	Cahill Creek: Highway Crossing to Similkameen Red Top Gulch Creek: Highway Crossing to Similkameen	2004	0	no data collected	Omitted 2004
Total Mercury 1 ug/L max.	Cahill Creek: Headwaters to Highway crossing Red Top Gulch Creek: Headwaters to Highway crossing	2004	0	no data collected	Omitted 2004
Total Mercury 3 ug/L max.	Nickel Plate Mine Creek	2004	0	no data collected	Omitted 2004
Total Mercury 0.5 ug/g max. wet weight in fish	Cahill Creek: Highway Crossing to Similkameen Red Top Gulch Creek: Highway Crossing to Similkameen	2004	0	no data collected	Omitted 2004
Total Molybdenum 0.01 mg/L av. (May - Sept.) 0.05 mg/L max.	Cahill Creek: E206637 at highway (Cahill #3)	2004	0	no data collected	Omitted 2004
Total Molybdenum 0.01 mg/L av. 0.05 mg/L max.	Nickel Plate Mine Creek	2004	0	no data collected	Omitted 2004
Total Selenium 0.001 mg/L max. or 20% max. increase	Cahill Creek: E206637 at highway (Cahill #3)	2004	0	no data collected	Omitted 2004
Total Selenium 0.01 mg/L max.	Cahill Creek: Highway Crossing to Similkameen Red Top Gulch Creek: Highway Crossing to Similkameen	2004	0	no data collected	Omitted 2004
Total Selenium 0.05 mg/L max.	Nickel Plate Mine Creek	2004	0	no data collected	Omitted 2004
Total Silver 0.0001 mg/L max. or 20% max. increase	Cahill Creek: E206637 at highway (Cahill #3)	2004	0	no data collected	Omitted 2004
Total Silver 0.05 mg/L max.	Cahill Creek: Highway Crossing to Similkameen Red Top Gulch Creek: Highway Crossing to Similkameen Nickel Plate Mine Creek	2004	0	no data collected	Omitted 2004
Total Zinc 0.05 mg/L max.	Cahill Creek: E206637 at highway (Cahill #3)	2004	0	no data collected	Omitted 2004

Table 16. Christina Lake Water Quality Objectives – 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Zooplankton > 10% for any of the rotifers (ro objective) *Kellicottia* *Conochilus* > 10% for any of the crustaceans (cr objective) *Bosmina* *Epishura* *Diacyclops*	Christina Lake	2004	0	no data collected	Omitted 2004
Dissolved Oxygen 8 mg/L at any depth	Christina Lake: 0200078 Christina Lake at Christina	Sep 28	12	9.4 - 15.3 mg/L	Objective met
	E215758 north basin deep center	Sep 28	14	8.9 - 13.5 mg/L	Objective met
Turbidity ≤ 1 NTU seasonal av 5 NTU max	Christina Lake	2004	0	no data collected	Omitted 2004
Secchi Depth 3 m min seasonal av > 10 m	0200078 Christina Lake at Christina	Apr 1 - Sep 28	2	10.3 - 10.9 m	Objective met
			1	av = 10.6 m	Objective met
	E215758 north basin deep center	Apr 1 - Sep 28	2	9.2 - 11.8 m	Objective met
			1	av = 10.5 m	Objective met
Total Phosphorus < 0.007 mg/L av at spring overturn	0200078 Christina Lake at Christina	Apr 1	3	0.003 - 0.005 mg/L	
			1	av = 0.0037 mg/L	Objective met
	E215758 north basin deep center	Apr 1	2	0.003 mg/L	
			1	av = 0.003 mg/L	Objective met
Total Nitrogen ≤ 0.200 mg/L av at spring overturn	0200078 Christina Lake at Christina	Apr 1	3	0.08 - 0.08 mg/L	
			1	av = 0.087 mg/L	Objective met
	E215758 north basin deep center	Apr 1	2	0.09 mg/L	
			1	av = 0.09 mg/L	Objective met
Chlorophyll - *a* ≤ 0.0025 mg/L seasonal av.	0200078 Christina Lake at Christina	Apr 1 - Sep 28	2	< 0.0005 - 0.0024 mg/L	
			1	av = 0.0015 mg/L	Objective met
	E215758 north basin deep center	Apr 1 - Sep 28	2	< 0.0005 mg/L	
			1	av = < 0.0005 mg/L	Objective met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Periphyton Chlorophyll - *a* 10 mg/m^2 seasonal av.	Christina Lake	2004	0	no data collected	Omitted 2004
Fecal Coliforms ≤ 10/100 mL 90th perc. (np) over 30 days	Christina Lake	2004	0	no data collected	Omitted 2004

Table 17. Thompson River Water Quality Objectives – 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliform < 10 CFU/100 mL 90th percentile. (np)	0600135 South Thompson River Kamloops d/s Peterson Cr.	Feb 9 - Dec 30	3	< 1 - 1 CFU/100 mL	No 5-in-30 samples
			1	np = 1 CFU/100 mL	Indefinite result
	0600164 North Thompson River at Kamloops u/s Paul Cr.	Feb 9 - Dec 30	3	< 1 - 1 CFU/100 mL	No 5-in-30 samples
			1	np. = 1 CFU/100 mL	Indefinite result
	E218768 Kamloops Lake near outlet	Feb 9 - Dec 8	7	< 1 - 6 CFU/100 mL	No 5-in-30 samples
			1	np. = 3.6 CFU/100 mL	Indefinite result
	0600004 Lower Thompson at Savona	Feb 9 - Mar 23	2	all < 1 CFU/100 mL	No 5-in-30 samples
			1	np. = < 1 CFU/100 mL	Indefinite result
	0600163 Lower Thompson d/s Walhachin	Feb 9 - Mar 23	2	all < 1 CFU/100 mL	No 5-in-30 samples
			1	np. = < 1 CFU/100 mL	Indefinite result
	0600005 Lower Thompson at Spences Bridge	Feb 9 - Mar 23	2	all < 1 CFU/100 mL	No 5-in-30 samples
			1	np. = < 1 CFU/100 mL	Indefinite result
	E206586 Lower Thompson at Spences Br. d/s Nicola R.	Jan 20 - Dec 20	25	< 1 - 58 CFU/100 mL	No 5-in-30 samples
			1	np. = 7.8 CFU/100 mL	Indefinite result
E. coli < 200/100 mL geometric mean (gm)	0600135 South Thompson River Kamloops d/s Peterson Cr.	Feb 9 - Dec 30	3	all < 1 CFU/100 mL	No 5-in-30 samples
			1	np = < 1 CFU/100 mL	Indefinite result
	0600164 North Thompson River at Kamloops u/s Paul Cr.	Feb 9 - Dec 30	3	all < 1 CFU/100 mL	No 5-in-30 samples
			1	np = < 1 CFU/100 mL	Indefinite result
	E218768 Kamloops Lake near outlet	Feb 9 - Dec 8	7	< 1 - 5 CFU/100 mL	No 5-in-30 samples
			1	np. = 2.6 CFU/100 mL	Indefinite result
	0600004 Lower Thompson at Savona	Feb 9 - Mar 23	2	all < 1 CFU/100 mL	No 5-in-30 samples
			1	np. = < 1 CFU/100 mL	Indefinite result
	0600163 Lower Thompson d/s Walhachin	Feb 9 - Mar 23	2	< 1 - 1 CFU/100 mL	No 5-in-30 samples
			1	np. = 1 CFU/100 mL	Indefinite result
	0600005 Lower Thompson at Spences Bridge	Feb 9 - Mar 23	2	< 1 - 1 CFU/100 mL	No 5-in-30 samples
			1	np. = 1 CFU/100 mL	Indefinite result

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Colour 15 TCU max.	E218768 Kamloops Lake near outlet	Feb 9 - Dec 8	7	< 5 - 10 TCU	Objective met
or 5 TCU increase over average of	0600163 Lower Thompson d/s Walhachin	Feb 9 - Mar 23	2	all < 5 TCU	Objective met
N + S Thompson Rivers	0600005 Lower Thompson at Spences Bridge	Feb 9 - Mar 23	2	all < 5 TCU	Objective met
	E206586 Lower Thompson at Spences Br. d/s Nicola R.	Jan 20 - Dec 20	25	< 5 - 5 TCU	Objective met
Chlorophyll - a < 50 mg/m2	Thompson River at Savona	Feb 17 Mar 9 Oct 4	5 5 5	4.56 - 41.5 mg/m2 19.6 - 28.6 mg/m2 2.2 - 35.9 mg/m2	
			3	av. = 17.6 - 26.4 mg/m2	Objective met
	Thompson River at Walhachin	Feb 17 Mar 9 Oct 4	5 5 5	7.46 - 13.5 mg/m2 13.7 - 28.3 mg/m2 3.8 - 16.7 mg/m2	
			3	av. = 9.0 - 20.7 mg/m2	Objective met
	Thompson River	Oct 4	6	8.9 - 32.5 mg/m2	
	at Ashcroft		1	av. = 18.0 mg/m2	Objective met
	Thompson River	Oct 4	6	7.5 - 13.9 mg/m2	
	at Martel		1	av. = 9.1 mg/m2	Objective met
	Thompson River	Oct 4	6	5.6 - 7.9 mg/m2	
	at Spences Bridge		1	av. = 7.0 mg/m2	Objective met
Dioxins & Furans 0.2 pg/L max. TEQ-TCDD	Thompson River Kamloops Lake	2004	0	no data collected	Omitted 2004
Dioxins & Furans 1.0 pg/g max. TEQ-TCDD wet weight in fish	Thompson River Kamloops Lake	2004	0	no data collected	Omitted 2004
Dioxins & Furans 0.7 pg/g max. TEQ-TCDD dry weight in seds.	Thompson River Kamloops Lake	2004	0	no data collected	Omitted 2004
Resin Acids 12 µg/L DHA max. 45 µg/L total max. at pH = 7.5	Thompson River Kamloops Lake	2004	0	no data collected	Omitted 2004

Table 18. Toby Creek and Upper Columbia River Water Quality Objectives - 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliform < 10/100 mL 90th percentile (np) Toby Creek Columbia River (Toby Creek to Radium Hot Springs)	Toby Creek: 0200333 above Panorama STP	Jan 6 - Dec 28	17	< 1 - 18 CFU/100 mL	
		Feb 29 - Mar 29	1	np = 1 CFU/100 mL	Objective met
	E247080 SE Panorama STP	Jan 6 - Dec 28	17	< 1 - 13 CFU/100 mL	
		Feb 29 - Mar 29	1	np = 1 CFU/100 mL	Objective met
	E247081 2km D/S Panorama STP	Jan 12 - Dec 28	16	< 1 - 10 CFU/100 mL	
		Mar 1 - Mar 29	1	np = 6.4 CFU/100 mL	Objective met
Fecal Coliform < 400/100 mL 90th percentile (np) < 200/100 mL geometric mean (gm)	Columbia River: E207529 U/S Edgewater STP	Mar 30 - Apr 26	5	< 1 - 2 CFU/100 mL	
			1	np = 1.6 CFU/100 mL	Objective met
			1	geomean = 1.1 CFU/100 mL	Objective met
	E207530 D/S Edgewater STP	Mar 30 - Apr 26	5	< 1 - 5 CFU/100 mL	
			1	np = 3.4 CFU/100 mL	Objective met
			1	geomean = 1.4 CFU/100 mL	Objective met
Turbidity 5 NTU or 10% max increase	Toby Creek	2004	0	no data collected	Omitted 2004
Suspended Solids 10 mg/L max increase	Toby Creek 0200333 above Panorama STP	Jan 6 - Dec 28	17	0.01 - 12.8 mg/L	Control
	E247080 SE Panorama STP	Jan 6 - Dec 28	17	0.01 - 13.2 mg/L	
			17	increase = 0 - 0.4 mg/L	Objective met
	E247081 2km D/S Panorama STP	Jan 12 - Dec 28	16	0.01 - 12.8 mg/L	
			16	increase = 0 - 0.8 mg/L	Objective met
Periphyton Growth 25% max increase	Toby Creek	2004	0	no data collected	Omitted 2004
Total Ammonia 0.007 mg/L avg 0.030 mg/L max	Toby Creek: 0200333 above Panorama STP	Mar 29 - Dec 28	12	< 0.001 - 0.028 mg/L	Max obj. met
		Jan 6 - Mar 22	5	0.057 - 0.309 mg/L	Max obj. not met
		Feb 29 - Mar 29	1	av = 0.102 mg/L	Av obj. not met
	E247080 SE Panorama STP	Mar 29 - Dec 28	10	< 0.001 - 0.021 mg/L	Max obj. met
		Jan 6 - Dec 7	7	0.031 - 0.273 mg/L	Max obj. not met
		Feb 29 - Mar 29	1	av = 0.1 mg/L	Av obj. not met
	E247081 2km D/S Panorama STP	Mar 29 - Dec 20	10	< 0.001 - 0.029 mg/L	Max obj. met
		Jan 12 - Dec 28	6	0.033 - 0.309 mg/L	Max obj. not met
		Mar 1 - Mar 29	1	av =0.098 mg/L	Av obj. not met
Total Nitrite 0.020 mg/L avg 0.060 mg/L max	Toby Creek: 0200333 above Panorama STP	Jan 26 - Dec 28	15	0.004 - 0.01 mg/L	Max obj. met
		Feb 29 - Mar 8	2	0.08 - 0.1 mg/L	Max obj. not met
		Feb 29 - Mar 29	1	av. = 0.041 mg/L	Av obj. not met
	E247080 SE Panorama STP	Jan 26 - Dec 28	15	0.004 - 0.01 mg/L	Max obj. met
		Feb 29 - Mar 8	2	0.07 - 0.1 mg/L	Max obj. not met
		Feb 29 - Mar 29	1	av. = 0.039 mg/L	Av obj. not met
	E247081 2km D/S Panorama STP	Jan 26 - Dec 28	14	0.004 - 0.02 mg/L	Max obj. met
		Feb 29 - Mar 8	2	0.08 - 0.1 mg/L	Max obj. not met
		Mar 1 - Mar 29	1	av = 0.043 mg/L	Av obj. not met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total Lead 0.005 mg/L max at hardness < 95 mg/L 0.010 mg/L max at hardness > 95 mg/L	Toby Creek	2004	0	no data collected	Omitted 2004
Total Barium 1.0 mg/L max	Toby Creek	2004	0	no data collected	Omitted 2004
Total Cadmium 0.0002 mg/L max	Toby Creek	2004	0	no data collected	Omitted 2004
Total Zinc 0.05 mg/L max	Toby Creek	2004	0	no data collected	Omitted 2004
Dissolved Copper 0.002 mg/L max	Toby Creek	2004	0	no data collected	Omitted 2004

Table 19. Columbia River (Birchbank to International Border) Water Quality Objectives - 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliform < 100/100 mL 90th percentile (np)	Columbia River: 0200003 at Birchbank	Jan 5 - Feb 4 Feb 10 - Feb 25 Apr 26 - May 24	5 5 5	< 1 - 2 CFU/100 mL < 1 - 5 CFU/100 mL < 1 - 6 CFU/100 mL	
			5	np = 1.6 - 4.6 CFU/100 mL	Objective met
	E223893 100 m D/S RDKB STP outfall	Feb 10 - Feb 25	5	< 1 - 7 CFU/100 mL	
			1	np. = 7 CFU/100 mL	Objective met
	0200559 at Waneta	Jan 6 - Feb 4 Feb 10 - Feb 25 Mar 8 - Apr 5 Apr 26 - May 24 Jul 5 - Aug 4 Aug 11 - Sep 7 Oct 19 - Nov 17 Nov 22 - Dec 20	5 5 5 5 5 5 5 5	< 1 - 6 CFU/100 mL 1 - 34 CFU/100 mL < 1 - 3 CFU/100 mL < 1 - 5 CFU/100 mL < 1 - 200 CFU/100 mL 3 - 103 CFU/100 mL 1 - 4 CFU/100 mL < 1 - 1 CFU/100 mL	
			7 1	np. = 1 - 73 CFU/100 mL np = 140 CFU/100 mL	Objective met Objective not met
Enterococcus sp. < 25 /100mL 90th percentile (np)	Columbia River: 0200003 at Birchbank	Feb 10 - Feb 25	5	< 1 - 2 CFU/100 mL	
			1	np = < 2 CFU/100 mL	Objective met
	E223893 100 m D/S RDKB STP outfall	Feb 10 - Feb 25	5	< 1 - 18 CFU/100 mL	
			1	np = 14.8 CFU/100 mL	Objective met
	0200559 at Waneta	Feb 10 - Feb 25	5	< 1 - 10 CFU/100 mL	
			1	np = 9.6 CFU/100 mL	Objective met
E. coli < 100 /100mL 90th percentile (np)	Columbia River: 0200003 at Birchbank	Feb 10 - Feb 25	5	< 1 - 4 CFU/100 mL	
			1	np = 2.8 CFU/100 mL	Objective met
	E223893 100 m D/S RDKB STP outfall	Feb 10 - Feb 25	5	1 - 9 CFU/100 mL	
			1	np = 8.6 CFU/100 mL	Objective met
	0200559 at Waneta	Feb 10 - Feb 25	5	1 - 29 CFU/100 mL	
			1	np = 18.6 CFU/100 mL	Objective met
Ammonia 30-day average 1.13 mg/L at 10ºC and pH 8.0 5.86 mg/L max. at 10ºC and pH 8.0	Columbia River: 0200003 at Birchbank	Feb 10 - Feb 25	5	< 0.005 - 0.007 mg/L	Max obj. met
			1	av. = 0.005 mg/L	Av. obj. met
	E223892 D/S Stoney Creek	Feb 10 - Feb 25	5	< 0.011 - 0.021 mg/L	Max obj. met
			1	av. = 0.016 mg/L	Av. obj. met
	New Trail Bridge	Feb 10 - Feb 25	5	0.026 - 0.047 mg/L	Max obj. met
			1	av. = 0.036 mg/L	Av. obj. met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Ammonia (continued) 30-day average 1.13 mg/L at 10ºC and pH 8.0 5.86 mg/L max. at 10ºC and pH 8.0	E216137 Old Trail Bridge	Feb 10 - Feb 25	5	0.010 - 0.022 mg/L	Max obj. met
			1	av. = 0.015 mg/L	Av. obj. met
	E223893 100 m D/S RDKB STP outfall	Feb 10 - Feb 25	5	0.021 - 0.040 mg/L	Max obj. met
			1	av. = 0.030 mg/L	Av. obj. met
	0200559 at Waneta	Feb 10 - Feb 25	5	0.015 - 0.039 mg/L	Max obj. met
			1	av. = 0.021 mg/L	Av. obj. met
pH 6.5 - 8.5	Columbia River: 0200003 at Birchbank	Jan 6 - Dec 14	37	6.6 - 8.1	Objective met
	E223892 D/S Stoney Creek	Feb 10 - Feb 25	5	all 7.9	Objective met
	0200558 New Trail Bridge	Feb 10 - Feb 25	5	all 7.9	Objective met
	E216137 Old Trail Bridge	Feb 10 - Feb 25	5	all 7.9	Objective met
	E223893 100 m D/S RDKB STP outfall	Feb 10 - Feb 25	5	7.9 - 8.0	Objective met
	0200559 at Waneta	Feb 10 - Feb 25	5	7.9 - 8.0	Objective met
Dissolved Oxygen May to October 5 mg/L min. 8 mg/L ave November to April 9 mg/L min 11 mg/L ave	Columbia River: 0200003 at Birchbank	Feb 10 - Feb 25	5	9.8 - 11.6 mg/L	Min. obj. met
			1	av. = 10.6 mg/L	Av. obj. not met
	E223892 D/S Stoney Creek	Feb 10 - Feb 25	5	10.0 - 12.8 mg/L	Min. obj. met
			1	av. = 11.1 mg/L	Av. obj. met
	0200558 New Trail Bridge	Feb 10 - Feb 25	5	10.2 - 11.8 mg/L	Min. obj. met
			1	av. = 11.1 mg/L	Av. obj. met
	E216137 Old Trail Bridge	Feb 10 - Feb 25	5	10.4 - 11.7 mg/L	Min. obj. met
			1	av. = 11.2 mg/L	Av. obj. met
	E223893 100 m D/S RDKB STP outfall	Feb 10 - Feb 25	5	10.0 - 12.6 mg/L	Min. obj. met
			1	av. = 11.5 mg/L	Av. obj. met
	0200559 at Waneta	Feb 10 - Feb 25	5	10.1 - 12.4 mg/L	Min. obj. met
			1	av. = 11.1 mg/L	Av. obj. met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Dissolved Gas 110% max.	Columbia River: 0200003 at Birchbank	Feb 10 - Feb 25	5	100 - 101 %	Max obj. met
	0200559 at Waneta	Feb 10 - Feb 25	5	101 - 101 %	Max obj. met
Total As 5 µg/L av.	Columbia River: 0200003 at Birchbank	Jan 6 - Feb 4 Feb 10 - Feb 25 Apr 26 - May 19	5 5 5	0.19 - 0.28 µg/L all 0.2 µg/L 0.07 - 0.25 µg/L	
			3	av. = 0.20 – 0.23 µg/L	Av. obj. met
	E223892 D/S Stoney Creek	Feb 10 - Feb 25	5	0.1 - 0.4 µg/L	
			1	av. = 0.2 µg/L	Av. obj. met
	0200558 New Trail Bridge	Feb 10 - Feb 25	5	0.1 - 0.3 µg/L	
			1	av. = 0.2 µg/L	Av. obj. met
	E216137 Old Trail Bridge	Feb 10 - Feb 25	5	0.1 - 0.2 µg/L	
			1	av. = 0.2 µg/L	Av. obj. met
	E223893 100 m D/S RDKB STP outfall	Feb 10 - Feb 25	5	0.1 - 0.2 µg/L	
			1	av. = 0.2 µg/L	Av. obj. met
	0200559 at Waneta	Jan 6 - Feb 4 Feb 10 - Feb 25 Mar 8 - Apr 5 Apr 26 - May 24 Jul 5 - Aug 4 Aug 11 - Sep 7 Sep 19 - Oct 19 Nov 17 - Dec 14	5 5 5 5 5 5 5 5	0.21 - 0.28 µg/L 0.1 - 0.2 µg/L 0.21 - 0.38 µg/L 0.23 - 0.28 µg/L 0.19 - 0.24 µg/L 0.17 - 0.2 µg/L 0.2 - 0.26 µg/L 0.17 - 0.19 µg/L	
			8	av. = 0.18 - 0.27 µg/L	Av. obj. met
Total Cd 0.05 µg/L av.	Columbia River: 0200003 at Birchbank	Jan 6 - Feb 4 Feb 10 - Feb 25 Apr 26 - May 19	5 5 5	0.011 - 0.016 µg/L < 0.01 - 0.01 µg/L 0.01 - 0.02 µg/L	
			3	av. = 0.01 - 0.02 µg/L	Av. obj. met
	E223892 D/S Stoney Creek	Feb 10 - Feb 25	5	0.03 - 0.63 µg/L	
			1	av. = 0.23 µg/L	Av. obj. not met
	0200558 New Trail Bridge	Feb 10 - Feb 25	5	0.13 - 0.37 µg/L	
			1	av. = 0.26 µg/L	Av. obj. not met
	E216137 Old Trail Bridge	Feb 10 - Feb 25	5	0.04 - 0.16 µg/L	
			1	av. = 0.08 µg/L	Av. obj. not met
	E223893 100 m D/S RDKB STP outfall	Feb 10 - Feb 25	5	0.03 - 0.09 µg/L	
			1	av. = 0.05 µg/L	Av. obj. met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total Cd (continued)	0200559 at Waneta	Jan 6 - Feb 4	5	0.037 - 0.064 µg/L	
0.05 µg/L av.		Feb 10 - Feb 25	5	0.04 - 0.07 µg/L	
		Mar 8 - Apr 5	5	0.033 - 0.068 µg/L	
		Apr 26 - May 24	5	0.027 - 0.05 µg/L	
		Jul 5 - Aug 4	5	0.023 - 0.042 µg/L	
		Aug 11 - Sep 7	5	0.017 - 0.023 µg/L	
		Sep 19 - Oct 19	5	0.03 - 0.054 µg/L	
		Nov 17 - Dec 14	5	0.022 - 0.023 µg/L	
			7	0.020 - 0.050 µg/L	Av. obj. met
			1	av. = 0.051 µg/L	Av. obj. not met
Total Cr	Columbia River: 0200003	Jan 6 - Feb 4	5	0.054 - 0.149 µg/L	
1 µg/L av.	at Birchbank	Feb 10 - Feb 25	5	0.8 - 2.3 µg/L	
		Apr 26 - May 19	5	0.042 - 0.105 µg/L	
			2	av. = 0.081 - 0.096 µg/L	Av. obj. met
			1	av. = 1.4 µg/L	Av. obj. not met
	E223892 D/S Stoney Creek	Feb 10 - Feb 25	5	0.9 - 2.2 µg/L	
			1	av. = 1.6 µg/L	Av. obj. not met
	0200558 New Trail Bridge	Feb 10 - Feb 25	5	0.8 - 2.4 µg/L	
			1	av. = 1.4 µg/L	Av. obj. not met
	E216137 Old Trail Bridge	Feb 10 - Feb 25	5	0.8 - 2.4 µg/L	
			1	av. = 1.7 µg/L	Av. obj. not met
	E223893 100 m D/S RDKB STP outfall	Feb 10 - Feb 25	5	0.4 - 2.5 µg/L	
			1	av. = 1.5 µg/L	Av. obj. not met
	0200559 at Waneta	Jan 6 - Feb 4	5	0.064 - 0.114 µg/L	
		Feb 10 - Feb 25	5	1.0 - 2.4 µg/L	
		Mar 8 - Apr 5	5	0.062 - 0.377 µg/L	
		Apr 26 - May 24	5	0.068 - 0.102 µg/L	
		Jul 5 - Aug 4	5	0.075 - 0.104 µg/L	
		Aug 11 - Sep 7	5	0.059 - 0.087 µg/L	
		Sep 19 - Oct 19	5	0.052 - 0.075 µg/L	
		Nov 17 - Dec 14	5	0.053 - 0.102 µg/L	
			7	0.064 - 0.134 µg/L	Av. obj. met
			1	av. = 1.6 µg/L	Av. obj. not met
Total Cu	Columbia River: 0200003	Jan 6 - Feb 4	5	0.33 - 0.44 µg/L	Max. obj. met
7.17 µg/L max	at Birchbank	Feb 10 - Feb 25	5	0.31 - 0.36 µg/L	Max. obj. met
2 µg/L av.		Feb 11 - Dec 14	21	0.21 - 0.45 µg/L	Max. obj. met
		Apr 26 - May 19	5	0.28 - 0.51 µg/L	Max. obj. met
			3	av. = 0.34 - 0.38 µg/L	Av. obj. met
	E223892 D/S Stoney Creek	Feb 10 - Feb 25	5	0.35 - 0.87 µg/L	Max. obj. met
			1	av. = 0.57 µg/L	Av. obj. met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total Cu (continued) 7.17 µg/L max 2 µg/L av.	0200558 New Trail Bridge	Feb 10 - Feb 25	5	0.38 - 0.89 µg/L	Max. obj. met
			1	av. = 0.56 µg/L	Av. obj. met
	E216137 Old Trail Bridge	Feb 10 - Feb 25	5	0.34 - 0.50 µg/L	Max. obj. met
			1	av. = 0.41 µg/L	Av. obj. met
	E223893 100 m D/S RDKB STP outfall	Feb 10 - Feb 25	5	0.37 - 0.50 µg/L	Max. obj. met
			1	av. = 0.44 µg/L	Av. obj. met
	0200559 at Waneta	Jan 6 - Feb 4	5	0.4 - 0.54 µg/L	Max. obj. met
		Feb 10 - Feb 25	5	0.53 - 0.73 µg/L	Max. obj. met
		Feb 11 - Dec 20	12	0.32 - 0.94 µg/L	Max. obj. met
		Mar 8 - Apr 5	5	0.39 - 1.59 µg/L	Max. obj. met
		Apr 26 - May 24	5	0.36 - 0.51 µg/L	Max. obj. met
		Jul 5 - Aug 4	5	0.41 - 0.45 µg/L	Max. obj. met
		Aug 11 - Sep 7	5	0.36 - 0.45 µg/L	Max. obj. met
		Sep 19 - Oct 19	5	0.38 - 0.52 µg/L	Max. obj. met
		Nov 17 - Dec 14	5	0.36 - 0.42 µg/L	Max. obj. met
			8	av. = 0.39 - 0.70 µg/L	Av. obj. met
Total Pb 37.9 µg/L max 4.8 µg/L av.	Columbia River: 0200003 at Birchbank	Jan 6 - Feb 4	5	0.029 - 0.182 µg/L	Max. obj. met
		Feb 10 - Feb 25	5	0.04 - 0.06 µg/L	Max. obj. met
		Feb 11 - Dec 14	21	0.034 - 0.164 µg/L	Max. obj. met
		Apr 26 - May 19	5	< 0.005 - 0.098 µg/L	Max. obj. met
			3	av. = 0.048 - 0.080 µg/L	Av. obj. met
	E223892 D/S Stoney Creek	Feb 10 - Feb 25	5	0.05 - 0.25 µg/L	Max. obj. met
			1	av. = 0.11 µg/L	Av. obj. met
	0200558 New Trail Bridge	Feb 10 - Feb 25	5	0.26 - 0.54 µg/L	Max. obj. met
			1	av. = 0.39 µg/L	Av. obj. met
	E216137 Old Trail Bridge	Feb 10 - Feb 25	5	0.08 - 0.20 µg/L	Max. obj. met
			1	av. = 0.15 µg/L	Av. obj. met
	E223893 100 m D/S RDKB STP outfall	Feb 10 - Feb 25	5	0.08 - 0.24 µg/L	Max. obj. met
			1	av. = 0.18 µg/L	Av. obj. met
	0200559 at Waneta	Jan 6 - Feb 4	5	0.134 - 0.25 µg/L	Max. obj. met
		Feb 10 - Feb 25	5	0.14 - 0.44 µg/L	Max. obj. met
		Feb 11 - Dec 20	12	0.05 - 1.92 µg/L	Max. obj. met
		Mar 8 - Apr 5	5	0.109 - 1.67 µg/L	Max. obj. met
		Apr 26 - May 24	5	0.165 - 0.315 µg/L	Max. obj. met
		Jul 5 - Aug 4	5	0.146 - 0.289 µg/L	Max. obj. met
		Aug 11 - Sep 7	5	0.104 - 0.225 µg/L	Max. obj. met
		Sep 19 - Oct 19	5	0.118 - 0.194 µg/L	Max. obj. met
		Nov 17 - Dec 14	5	0.081 - 0.133 µg/L	Max. obj. met
			8	av. = 0.11 - 0.47 µg/L	Av. obj. met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total Tl 0.8 µg/L av.	Columbia River: 0200003 at Birchbank	Jan 6 - Feb 4 Feb 10 - Feb 25 Apr 26 - May 19	5 5 5	0.003 - 0.008 µg/L 0.002 - 0.003 µg/L 0.001 - 0.01 µg/L	
			3	av. = 0.003 - 0.005 µg/L	Av. obj. met
	E223892 D/S Stoney Creek	Feb 10 - Feb 25	5	0.002 - 0.005 µg/L	
			1	av. = 0.004 µg/L	Av. obj. met
	0200558 New Trail Bridge	Feb 10 - Feb 25	5	0.104 - 0.314 µg/L	
			1	av. = 0.219 µg/L	Av. obj. met
	E216137 Old Trail Bridge	Feb 10 - Feb 25	5	0.030 - 0.086 µg/L	
			1	av. = 0.051 µg/L	Av. obj. met
	E223893 100 m D/S RDKB STP outfall	Feb 10 - Feb 25	5	0.012 - 0.035 µg/L	
			1	av. = 0.024 µg/L	Av. obj. met
	0200559 at Waneta	Jan 6 - Feb 4 Feb 10 - Feb 25 Mar 8 - Apr 5 Apr 26 - May 24 Jul 5 - Aug 4 Aug 11 - Sep 7 Sep 19 - Oct 19 Nov 17 - Dec 14	5 5 5 5 5 5 5 5	0.011 - 0.033 µg/L 0.020 - 0.045 µg/L 0.006 - 0.042 µg/L 0.017 - 0.033 µg/L 0.011 - 0.034 µg/L 0.011 - 0.056 µg/L 0.025 - 0.053 µg/L 0.011 - 0.052 µg/L	
			8	av. = 0.020 - 0.045 µg/L	Av. obj. met
Total Zn 33 µg/L max 7.5 µg/L av.	Columbia River: 0200003 at Birchbank	Jan 6 - Feb 4 Feb 10 - Feb 25 Feb 11 - Dec 14 Apr 26 - May 19	5 5 21 5	0.49 - 1.19 µg/L 0.6 - 0.9 µg/L 0.34 - 2.08 µg/L 0.43 - 1.81 µg/L	Max. obj. met Max. obj. met Max. obj. met Max. obj. met
			3	av. = 0.73 - 1.33 µg/L	Av. obj. met
	E223892 D/S Stoney Creek	Feb 10 - Feb 25	5	1.9 - 19.7 µg/L	Max. obj. met
			1	av. = 9.2 µg/L	Av. obj. not met
	0200558 New Trail Bridge	Feb 10 - Feb 25	5	6.6 - 25.3 µg/L	Max. obj. met
			1	av. = 13.6 µg/L	Av. obj. not met
	E216137 Old Trail Bridge	Feb 10 - Feb 25	5	1.6 - 6.2 µg/L	Max. obj. met
			1	av. = 4.2 µg/L	Av. obj. met
	E223893 100 m D/S RDKB STP outfall	Feb 10 - Feb 25	5	1.9 - 3.8 µg/L	Max. obj. met
			1	av. = 2.7 µg/L	Av. obj. met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total Zn (continued) 33 µg/L max 7.5 µg/L av.	0200559 at Waneta	Jan 6 - Feb 4	5	1.67 - 3.29 µg/L	Max. obj. met
		Feb 10 - Feb 25	5	3.2 - 4.3 µg/L	Max. obj. met
		Feb 11 - Dec 20	12	0.6 - 7.95 µg/L	Max. obj. met
		Mar 8 - Apr 5	5	2.17 - 8.63 µg/L	Max. obj. met
		Apr 26 - May 24	5	2.36 - 3.32 µg/L	Max. obj. met
		Jul 5 - Aug 4	5	1.62 - 2.6 µg/L	Max. obj. met
		Aug 11 - Sep 7	5	1.08 - 1.9 µg/L	Max. obj. met
		Sep 19 - Oct 19	5	1.48 - 2.07 µg/L	Max. obj. met
		Nov 17 - Dec 14	5	1.27 - 6.26 µg/L	Max. obj. met
			8	av. = 1.33 - 4.23 µg/L	Av. obj. met
Total As 5.7 µg/g dry weight max in sediments	Columbia River: 0200003 at Birchbank	Nov 9	1	1.3 µg/g	Objective met
	E257539 1.5km D/S Bear Ck	Nov 9	1	13.5 µg/g	Objective not met
	0200559 at Waneta	Nov 10	1	16.9 µg/g	Objective not met
Total Cd 0.6 µg/g dry weight max in sediments	Columbia River: 0200003 at Birchbank	Nov 9	1	0.51 µg/g	Objective met
	E257539 1.5km D/S Bear Ck	Nov 9	1	1.27 µg/g	Objective not met
	0200559 at Waneta	Nov 10	1	0.73 µg/g	Objective not met
Total Cr 36.4 µg/g dry weight max in sediments	Columbia River: 0200003 at Birchbank	Nov 9	1	17 µg/g	Objective met
	E257539 1.5km D/S Bear Ck	Nov 9	1	47 µg/g	Objective not met
	0200559 at Waneta	Nov 10	1	79 µg/g	Objective not met
Total Cu 35.1 µg/g dry weight max in sediments	Columbia River: 0200003 at Birchbank	Nov 9	1	9.7 µg/g	Objective met
	E257539 1.5km D/S Bear Ck	Nov 9	1	792 µg/g	Objective not met
	0200559 at Waneta	Nov 10	1	1620 µg/g	Objective not met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total Pb 33.4 µg/g dry weight max in sediments	Columbia River: 0200003 at Birchbank	Nov 9	1	11.6 µg/g	Objective met
	E257539 1.5km D/S Bear Ck	Nov 9	1	177 µg/g	Objective not met
	0200559 at Waneta	Nov 10	1	281 µg/g	Objective not met
Total Hg 0.16 µg/g dry weight max in sediments	Columbia River: 0200003 at Birchbank	Nov 9	1	<0.05 µg/g	Objective met
	E257539 1.5km D/S Bear Ck	Nov 9	1	0.07 µg/g	Objective met
	0200559 at Waneta	Nov 10	1	0.06 µg/g	Objective met
Total Zn 120 µg/g dry weight max in sediments	Columbia River: 0200003 at Birchbank	Nov 9	1	100 µg/g	Objective met
	E257539 1.5km D/S Bear Ck	Nov 9	1	4930 µg/g	Objective not met
	0200559 at Waneta	Nov 10	1	14400 µg/g	Objective not met
Total As 471 µg/kg wet weight max in fish	Genelle to Birchbank	Oct 22 - Oct 28	24	500 - 800 µg/kg	Objective not met
	Beaver Creek to Pend d'Oreille	Oct 19 - Oct 20 Oct 19 - Oct 20	2 22	400 µg/kg 500 - 800 µg/kg	Objective met Objective not met
Total Cd 900 µg/kg wet weight max in fish	Genelle to Birchbank	Oct 22 - Oct 28	24	all < 50 µg/kg	Objective met
	Beaver Creek to Pend d'Oreille	Oct 19 - Oct 20	24	all < 50 µg/kg	Objective met
Total Cr 940 µg/kg wet weight max in fish	Genelle to Birchbank	Oct 22 - Oct 28	24	< 200 - 900 µg/kg	Objective met
	Beaver Creek to Pend d'Oreille	Oct 19 - Oct 20	24	all < 200 µg/kg	Objective met

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Total Pb 160 µg/kg wet weight max in fish	Genelle to Birchbank	Oct 22 - Oct 28 Oct 22	23 1	< 100 - 100 µg/kg 200 µg/kg	Objective met Objective not met
	Beaver Creek to Pend d'Oreille	Oct 19 - Oct 20 Oct 20	23 1	< 100 µg/kg 200 µg/kg	Objective met
Total Hg 100 µg/kg wet weight max in fish	Genelle to Birchbank	Oct 22 - Oct 28 Oct 22 - Oct 28	10 14	< 50 - 100 µg/kg 120 - 580 µg/kg	Objective met Objective not met
	Beaver Creek to Pend d'Oreille	Oct 19 - Oct 20 Oct 19 - Oct 20	8 16	60 - 90 µg/kg 120 - 610 µg/kg	Objective met Objective not met
Dioxins & Furans 0.85 pg/g PCDD and PCDF TEQ max. in sediments (dry weight)	Columbia River	2004	0	no data collected	Omitted 2004
Dioxins & Furans 0.71 pg/g PCDD and PCDF TEQ max. in fish (wet weight)	Genelle to Birchbank	Oct 22 - Oct 28 Oct 22	10 2	0.30 - 0.48 pg/g 1.60 - 1.91 pg/g	Objective met Objective not met
	Beaver Creek to Pend d'Oreille	Oct 19 - Oct 20	12	0.25 - 0.70 pg/g	Objective met

Table 20. Elk River Water Quality Objectives - 2004.

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Suspended Solids	Elk River 0200102	Jan 12 - Apr 4, Sept 5 - Dec 14	12	< 1 - 5 mg/L	Max objective met
< 25 mg/L av	D/S Sparwood		1	av. = 1.9 mg/L	Indefinite result - no 5-in-30
80 mg/L max Sept - mid April	0200016 near Elko	Jan 26 - Apr 4, Sept 19 - Dec 14	14	< 4 - 33 mg/L	Max objective met
			1	av. = 5.1 mg/L	Indefinite result - no 5-in-30
Substrate Sediment no increase in particulates < 3 mm Sept - mid April	Elk River	2004	0	no data collected	Omitted 2004

Table 21. Fraser River (Kanaka Creek to the Mouth) Water Quality Objectives - 2004.

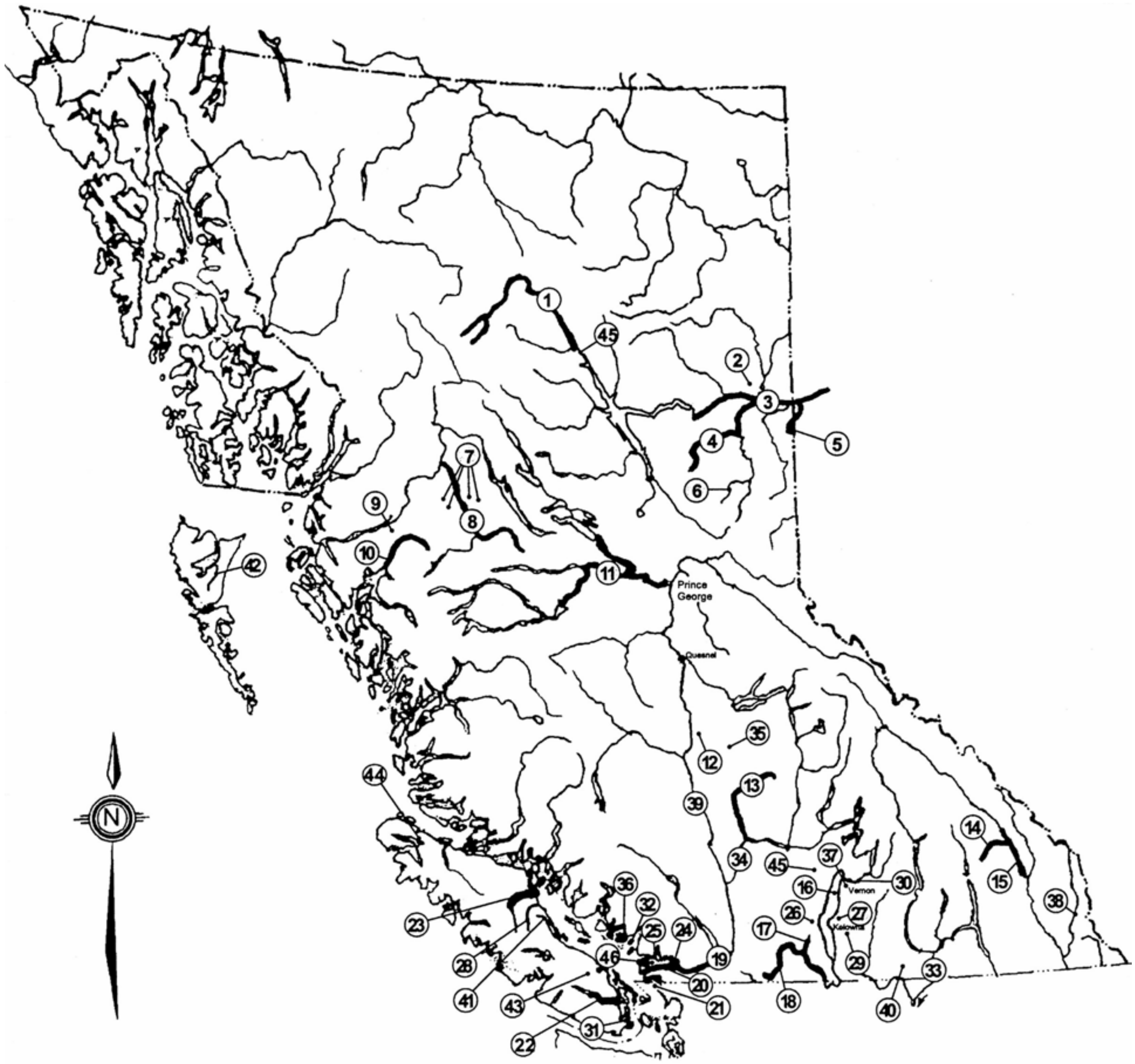
VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Fecal Coliforms < 200 CFU /100 mL geometric mean (gm) April - October	Main Stem Main Arm North Arm Middle Arm Sturgeon Bank Roberts Bank	2004	0	no data collected	Omitted 2004
Enterococci < 20 CFU /100 mL geometric mean (gm) April - October	Main Stem Main Arm North Arm Middle Arm Sturgeon Bank Roberts Bank	2004	0	no data collected	Omitted 2004
Escherichia coli < 77 CFU /100 mL geometric mean (gm) April - October	Main Stem Main Arm North Arm Middle Arm Sturgeon Bank Roberts Bank	2004	0	no data collected	Omitted 2004
Pseudomonas aeruginosa < 10 CFU /100 mL geometric mean (gm) April - October	Main Stem Main Arm North Arm Middle Arm Sturgeon Bank Roberts Bank	2004	0	no data collected	Omitted 2004
Suspended Solids max. increase: 10 mg/L or 10 %	Main Stem Main Arm North Arm Middle Arm	2004	0	no data collected	Omitted 2004
Ammonia-N 1.85 mg/L av 17.6 mg/L max. at pH = 7.2 temp = 10°C	Main Stem Main Arm North Arm Middle Arm	2004	0	no data collected	Omitted 2004
Nitrite - N 0.02 mg/L av 0.06 mg/L max. at chloride < 2 mg/L	Main Stem Main Arm North Arm Middle Arm	2004	0	no data collected	Omitted 2004

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Dissolved Oxygen May-October: 5 mg/L inst. min. 30-d mean > 8.0 mg/L or 80% saturation (whichever is higher) November - April: 9 mg/L inst. min. 30-d mean > 11.0 mg/L	Main Stem Main Arm North Arm Middle Arm	2004	0	no data collected	Omitted 2004
Dissolved Oxygen 5 mg/L inst. min. 30-d mean > 8.0 mg/L or 80% saturation (whichever is higher)	Sturgeon Bank Roberts Bank	2004	0	no data collected	Omitted 2004
pH 6.5 - 8.5	Main Stem Main Arm North Arm Middle Arm	2004	0	no data collected	Omitted 2004
Total Cu <0.004 mg/L av 0.006 mg/L max. at hardness > 35 or 20% increase	North Arm 0300002 at Oak Street Bridge	Jan 29 - Feb 24	5	0.0105 - 0.0344 mg/L	Max objective not met
			1	0.02124 mg/L	Av. obj. not met
Total Pb < 0.003 mg/L av 0.010 mg/L max.	North Arm 0300002 at Oak Street Bridge	Jan 29 - Feb 24	5	0.0003 - 0.0007 mg/L	Max objective met
			1	0.00052 mg/L	Av. obj. met
Total Mn 0.1 mg/L max	North Arm 0300002 at Oak Street Bridge	Jan 29 - Feb 24	5	0.0278 - 0.0308 mg/L	Max objective met
Total Zn < 0.050 mg/L av. 0.100 mg/L max.	North Arm 0300002 at Oak Street Bridge	Jan 29 - Feb 24	5	0.0056 - 0.0108 mg/L	Max objective met
			1	0.00806 mg/L	Av. obj. met
Chlorophenols (tri + tetra + penta-CP) in water 0.0002 mg/L max.	Main Stem Main Arm North Arm Middle Arm	2004	0	no data collected	Omitted 2004
Chlorophenols (tri + tetra + penta-CP) in water 0.0002 mg/L max.	Main Stem Main Arm North Arm Middle Arm Sturgeon Bank Roberts Bank	2004	0	no data collected	Omitted 2004

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
Chlorophenols (tri + tetra + penta - CP) in sediments 0.01 ug/g max. av of replicates (dry weight)	Main Stem Main Arm North Arm Middle Arm Sturgeon Bank Roberts Bank	2004	0	no data collected	Omitted 2004
Chlorophenols (tri + tetra + penta-CP) in fish 0.10 ug/g max. (wet weight)	Main Stem Main Arm North Arm	2004	0	no data collected	Omitted 2004
PCBs in sediments < 0.03 ug/g max. av of replicates (dry weight)	Main Stem Main Arm North Arm Middle Arm	2004	0	no data collected	Omitted 2004
PCBs in fish 0.50 ug/g max. (wet weight)	Main Stem Main Arm North Arm Middle Arm	2004	0	no data collected	Omitted 2004
Dioxins and Furans in sediments 2,3,7,8-T4CDD TEQs	Main Stem Main Arm North Arm Middle Arm	2004	0	no data collected	Omitted 2004
Furans in fish 2,3,7,8-T4CDD TEQs < 50 pg TEQ/g wet weight in fish muscle or egg tissue	Main Stem North Arm Middle Arm Main Arm	2004	0	no data collected	Omitted 2004
PAHs acridine in sediment < 1 ug/g max. av of replicates (dry weight)	Main Stem North Arm Middle Arm Main Arm	2004	0	no data collected	Omitted 2004
PAHs acenaphthene in sediment < 0.15 ug/g max. av of replicates (dry weight)	Main Stem North Arm Middle Arm Main Arm	2004	0	no data collected	Omitted 2004

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
PAHs acenaphthylene in sediment < 0.66 ug/g max. av of replicates (dry weight) (September - April)	Main Stem North Arm Middle Arm Main Arm	2004	0	no data collected	Omitted 2004
PAHs benzo(a)anthracene in sediment < 0.06 ug/g max. av of replicates (dry weight)	Main Stem North Arm Middle Arm Main Arm	2004	0	no data collected	Omitted 2004
PAHs benzo(a)pyrene in sediment < 0.06 ug/g max. av of replicates (dry weight)	Main Stem North Arm Middle Arm Main Arm	2004	0	no data collected	Omitted 2004
PAHs benzo(a)pyrene in fish < 1 ug/kg max. av of replicates (wet weight)	Main Stem North Arm Middle Arm Main Arm	2004	0	no data collected	Omitted 2004
PAHs chrysene in sediment < 0.2 ug/g max. av of replicates (dry weight)	Main Stem North Arm Middle Arm Main Arm	2004	0	no data collected	Omitted 2004
PAHs dibenzo(a,h)anthracene in sediment < 0.005 ug/g max. av of replicates (dry weight)	Main Stem North Arm Middle Arm Main Arm	2004	0	no data collected	Omitted 2004
PAHs fluoranthene in sediment < 2 ug/g max. av of replicates (dry weight)	Main Stem North Arm Middle Arm Main Arm	2004	0	no data collected	Omitted 2004
PAHs fluorene in sediment < 0.2 ug/g max. av of replicates (dry weight)	Main Stem North Arm Middle Arm Main Arm	2004	0	no data collected	Omitted 2004

VARIABLE & OBJECTIVE	MEASUREMENT				CONCLUSION
	SITE	DATE	n	VALUE	
PAHs naphthalene in sediment < 0.01 ug/g max. av of replicates (dry weight)	Main Stem North Arm Middle Arm Main Arm	2004	0	no data collected	Omitted 2004
PAHs phenanthrene in sediment < 0.0867 ug/g max. av of replicates (dry weight) (September - April)	Main Stem North Arm Middle Arm Main Arm	2004	0	no data collected	Omitted 2004



1. Upper Finlay River
2. Charlie Lake
3. Peace River
4. Pine River
5. Pouce Coupe River
6. Bullmoose Creek
7. Kathlyn, Seymour, Round, and Tyhee Lakes
8. Bulkley River
9. Lakelse Lake
10. Lower Kitimat River and Arm
11. Nechako River
12. Williams Lake
13. Bonaparte River
14. Toby Creek
15. Columbia and Windermere Lakes
16. Okanagan Valley Lakes
17. Cahill Creek
18. Similkameen River
19. Fraser River (Hope to Kanaka)
20. Fraser River (Kanaka to Mouth)
21. Boundary Bay
22. Cowichan-Koksilah Rivers
23. Quinsam River
24. Lower Fraser River Tributaries
25. Burrard Inlet
26. Okanagan Tribs., Westbank
27. Okanagan Tribs., Kelowna
28. Oyster River
29. Hydraulic Creek
30. Bessette Creek
31. Elk and Beaver Lakes
32. Pender Harbour
33. Columbia River (to Birchbank)
34. Thompson River
35. San José River
36. Sechelt Inlet
37. Okanagan Tribs. Vernon
38. Elk River
39. Fraser River (Prince George to Hope)
40. Christina Lake
41. Tsolum River
42. Yakoun River
43. Holland Cr & Stocking Lk
44. Quatse Lake
45. Lower Finlay River
46. Burrard Inlet Trib.

Figure 2. Map of British Columbia showing locations of watersheds with water quality objectives.

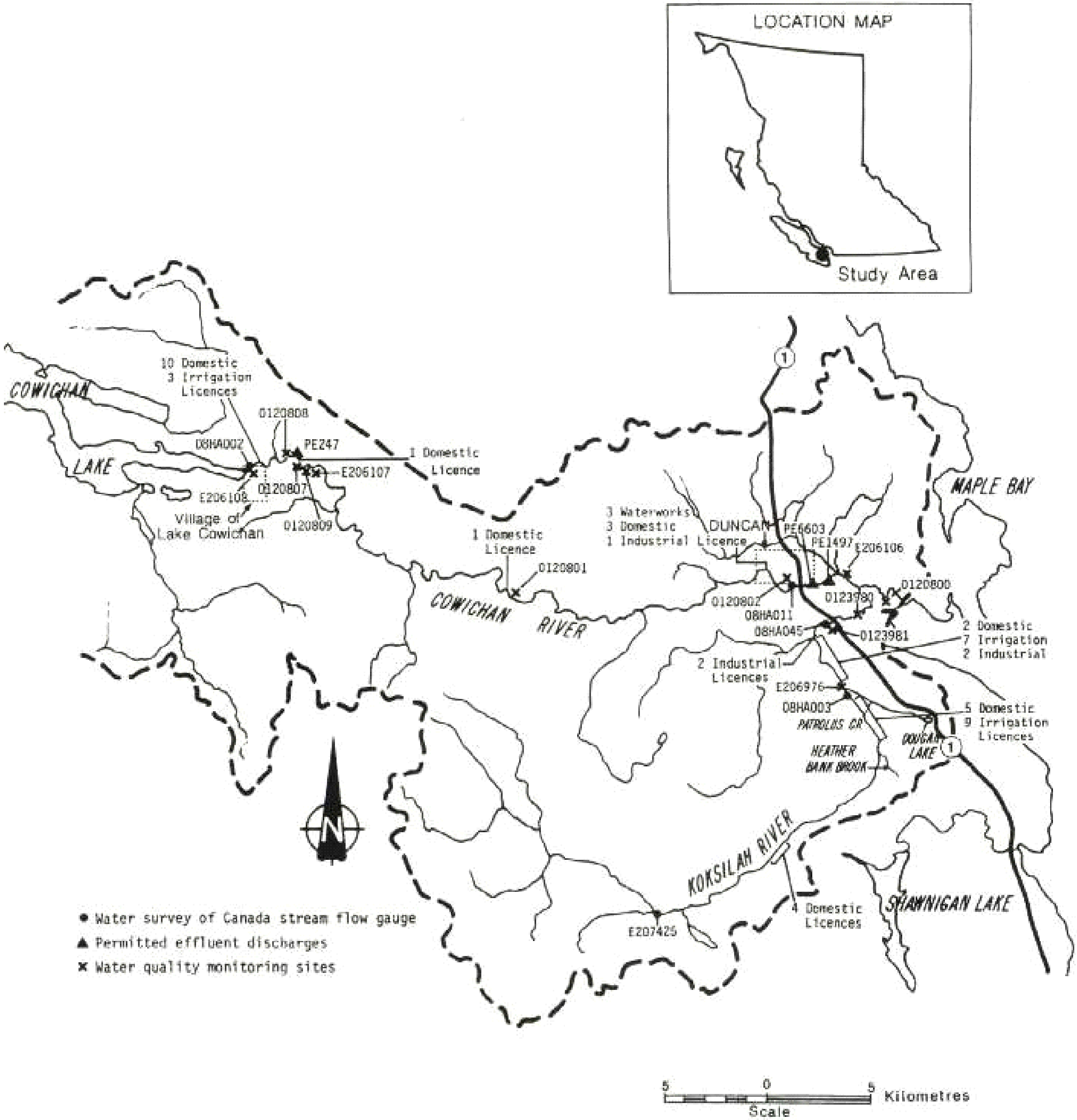


Figure 3 Cowichan - Koksilah Rivers

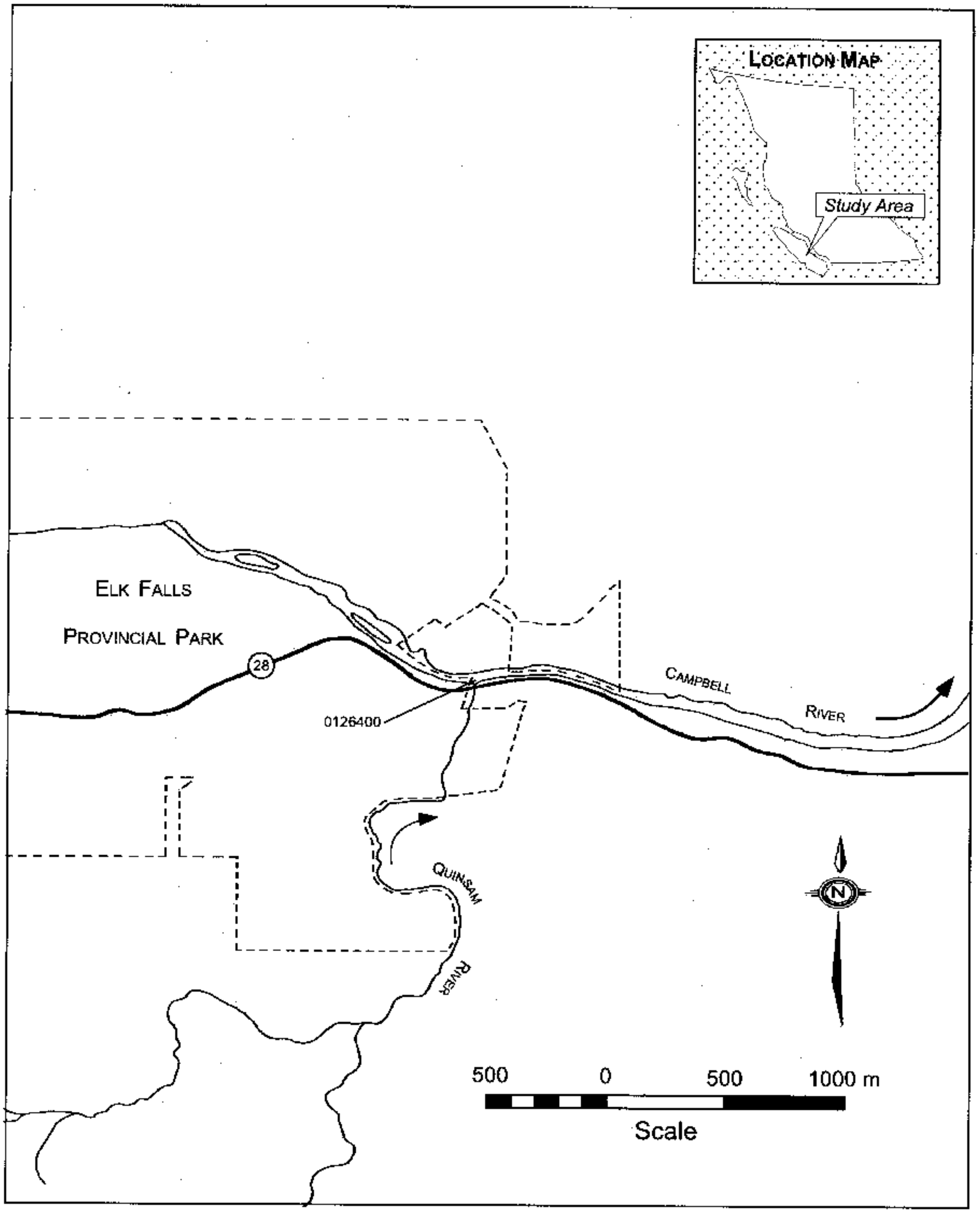


Figure 4. Quinsam River

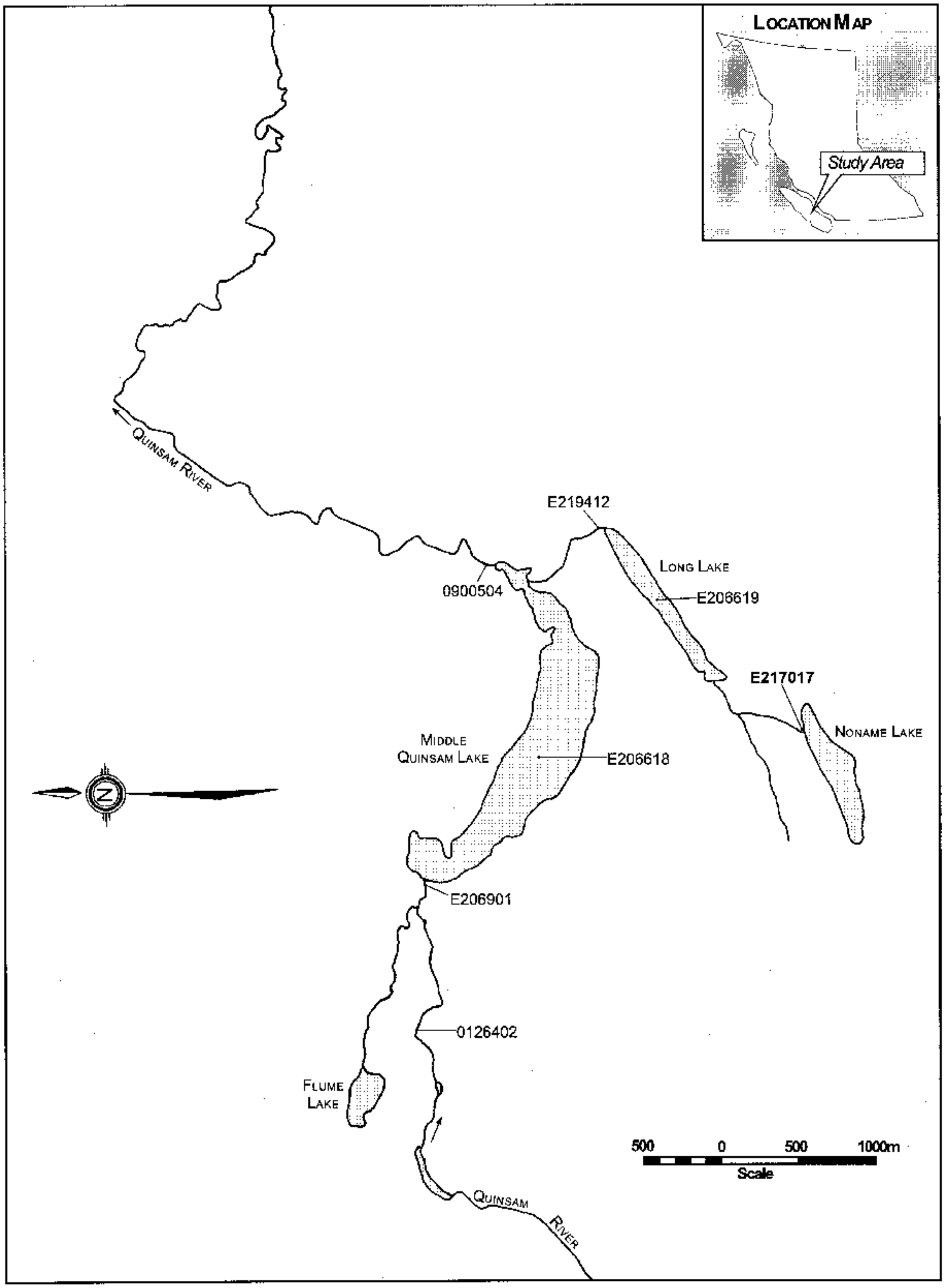


Figure 5. Middle Quinsam Lake.

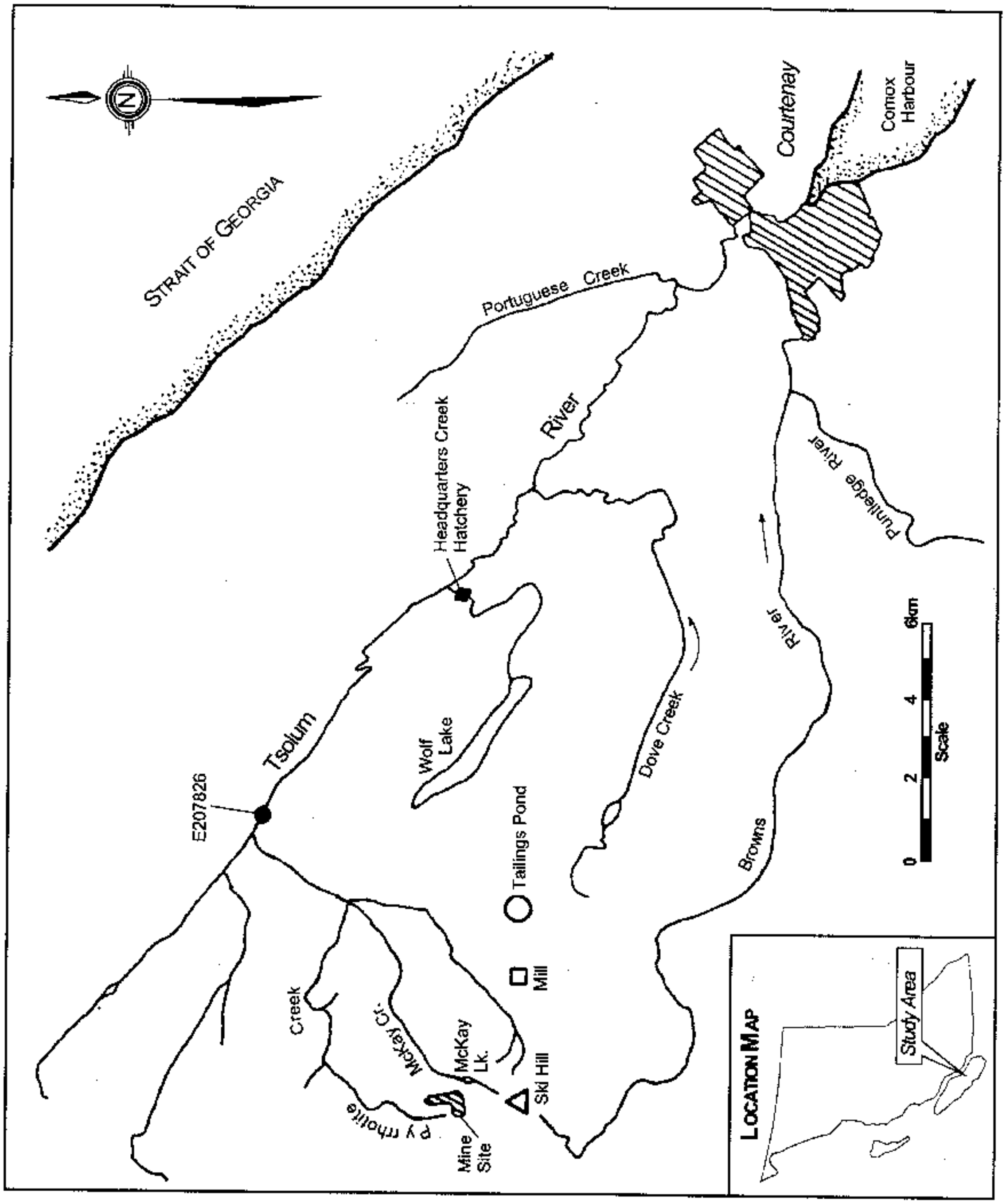


Figure 6. Tsolum River

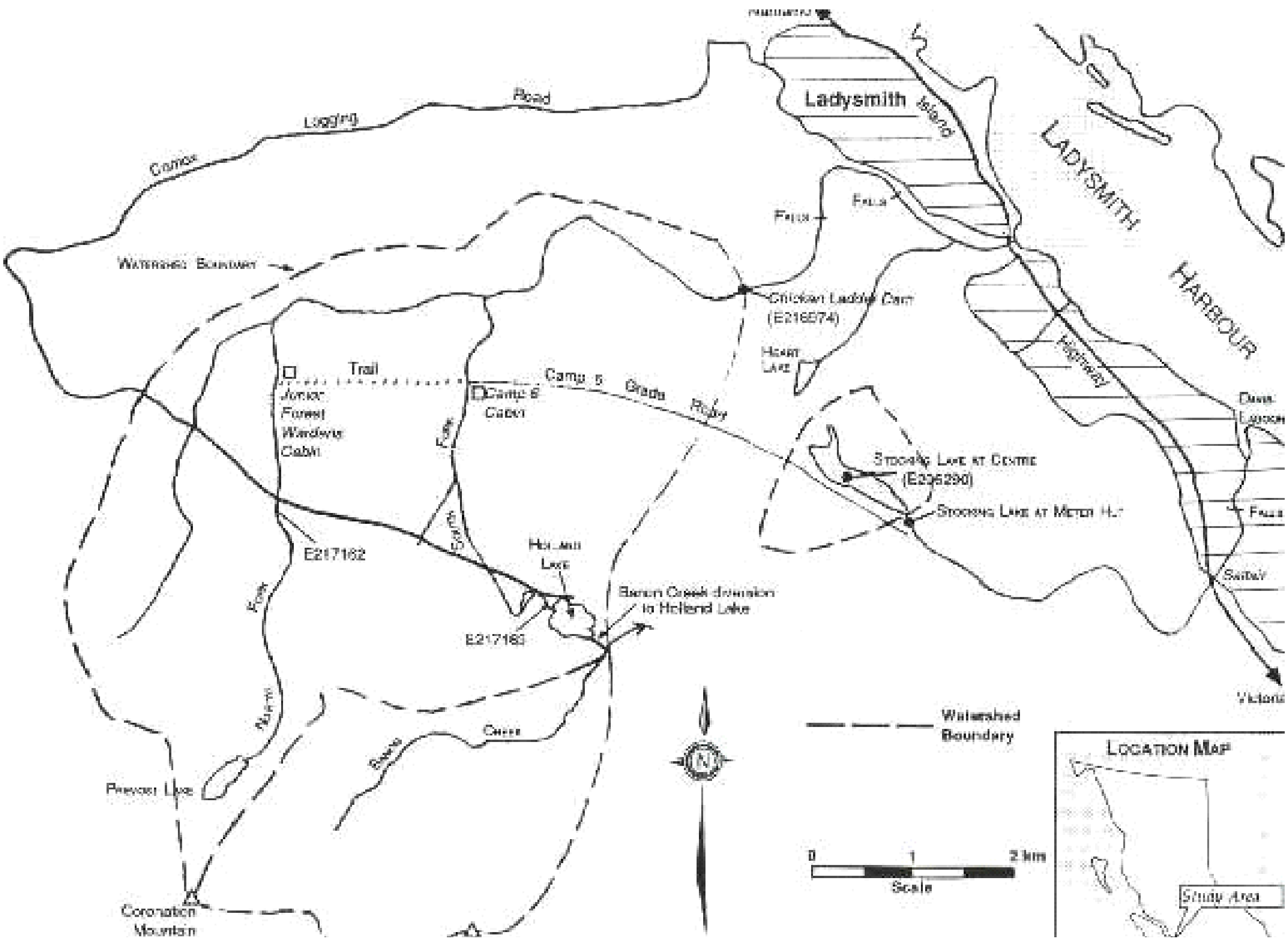


Figure 7. Holland Creek and Stocking Lake

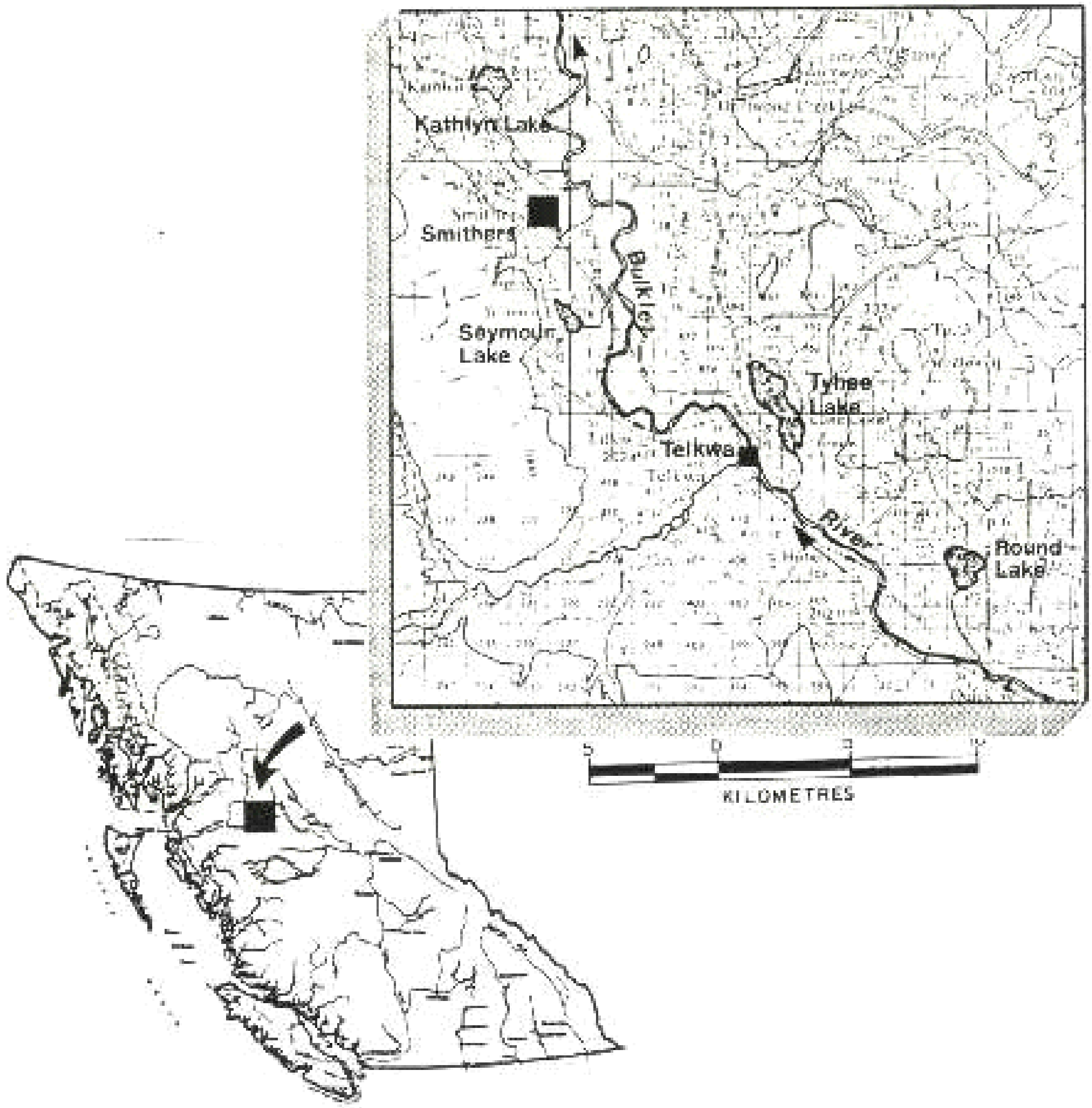


Figure 8. Kathlyn, Seymour, Round and Tyhee Lakes

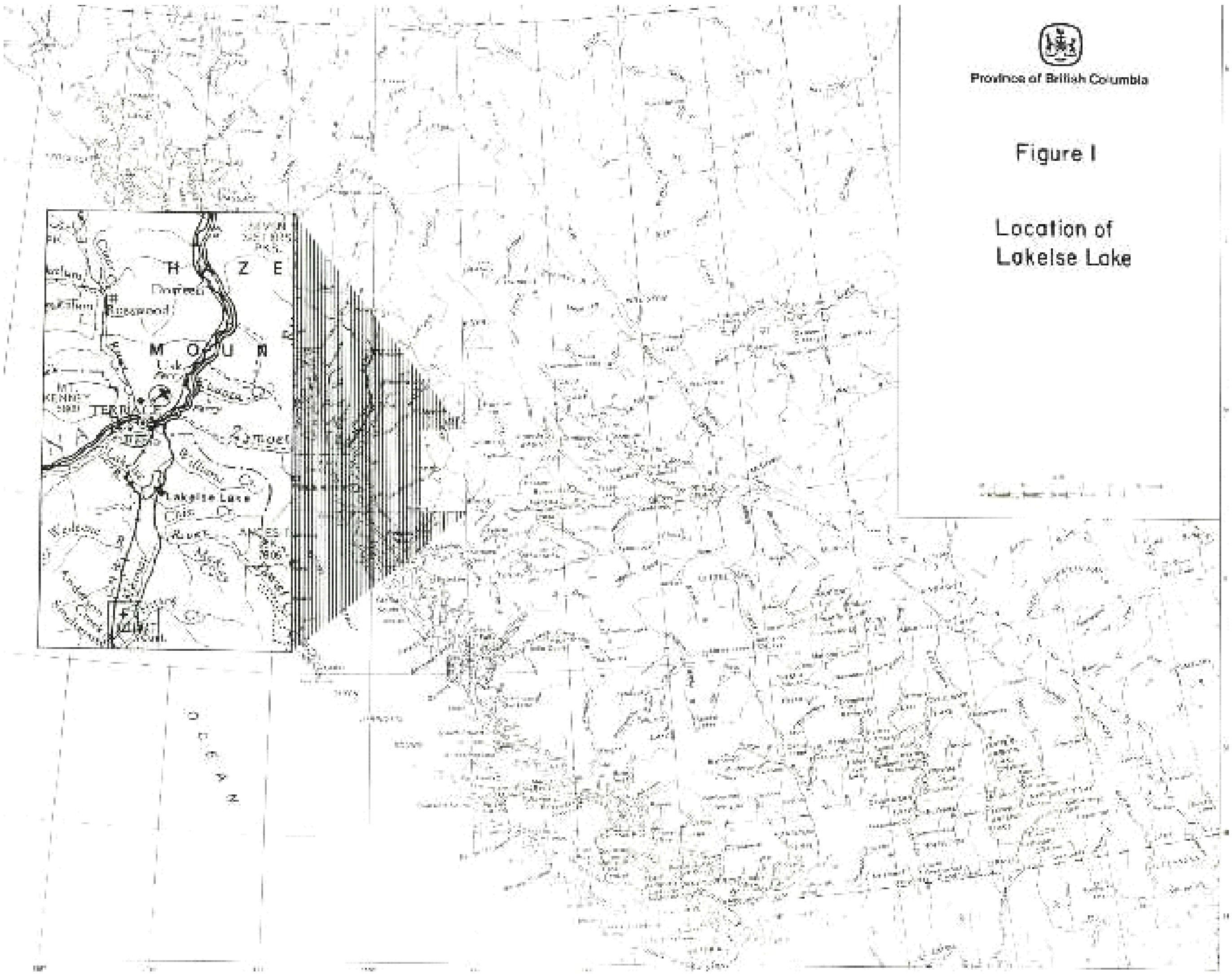


Figure 9. Lakelse Lake.

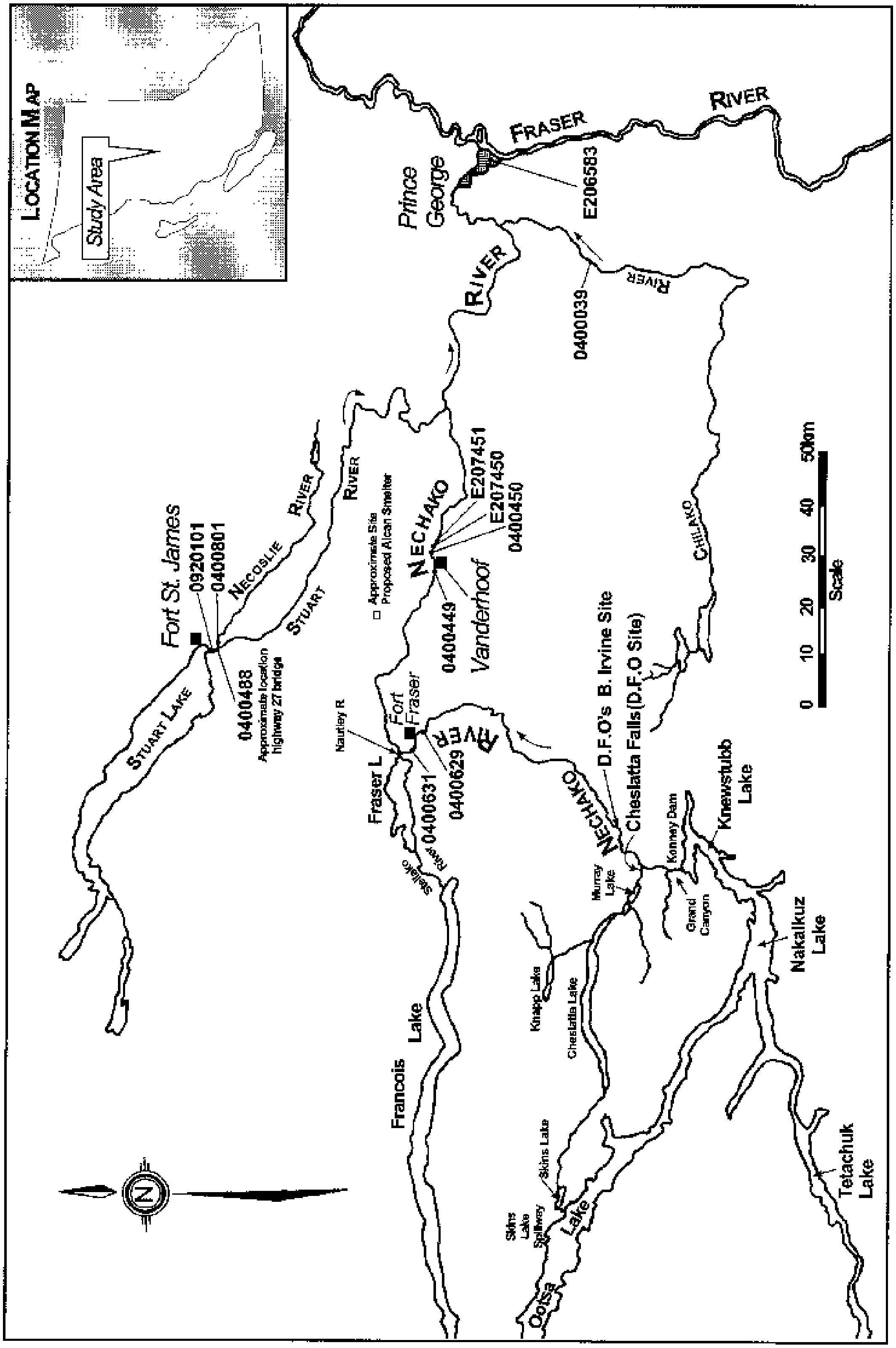
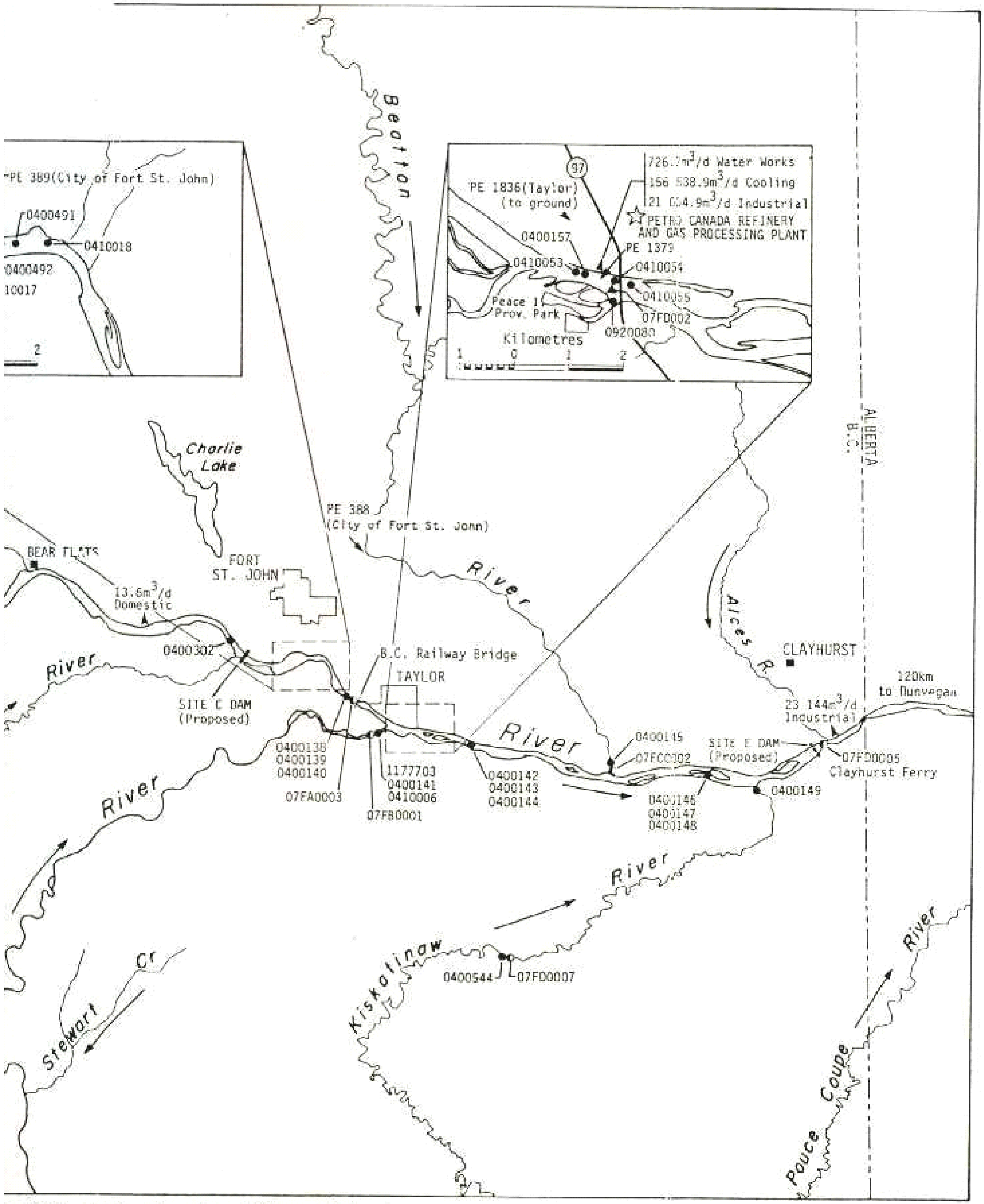


Figure 10. Nechako River



er Sub-basin showing Effluent Discharges,
er Sites, and Water Withdrawals.

Figure 11. Peace River

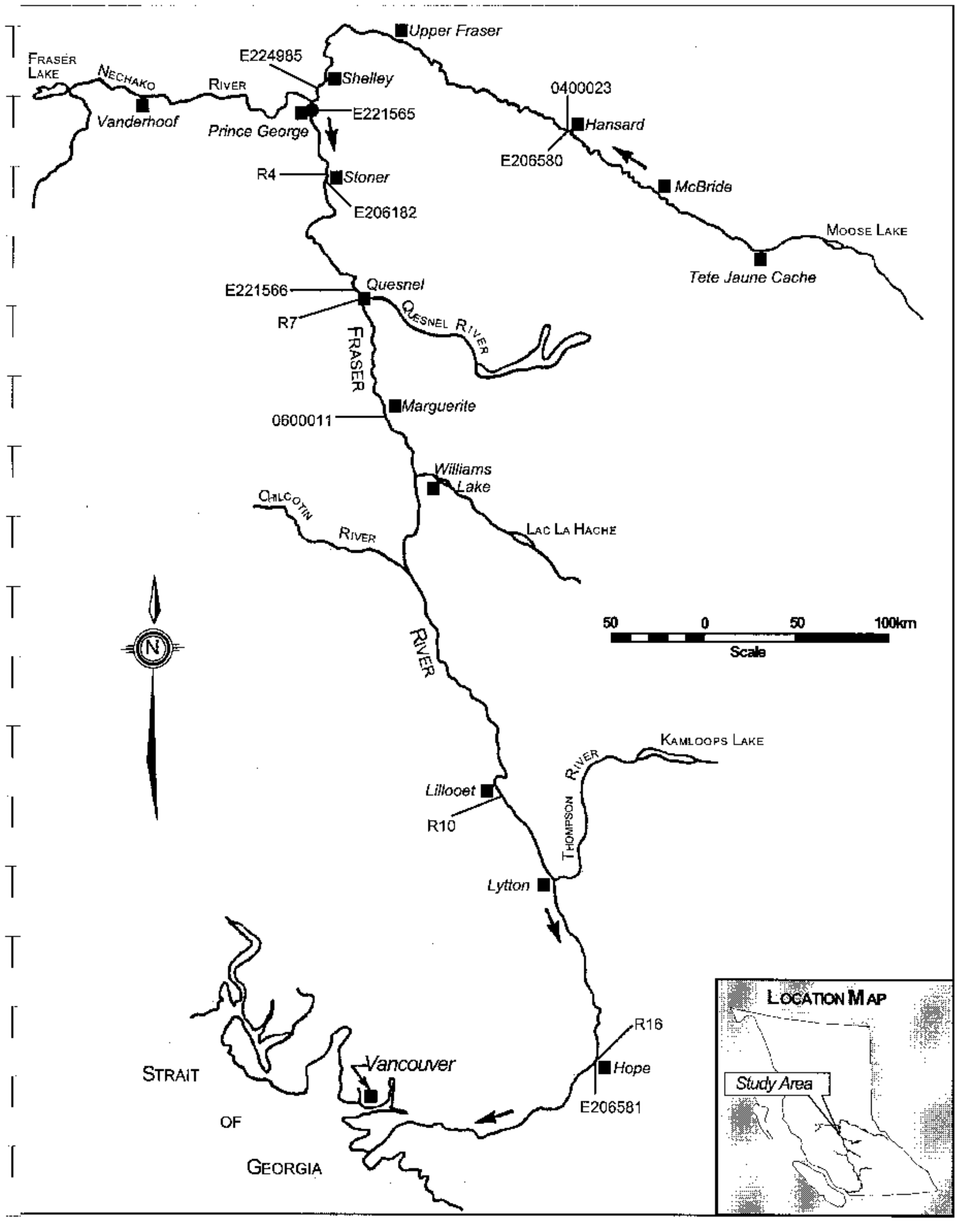


Figure 12. Upper Fraser River

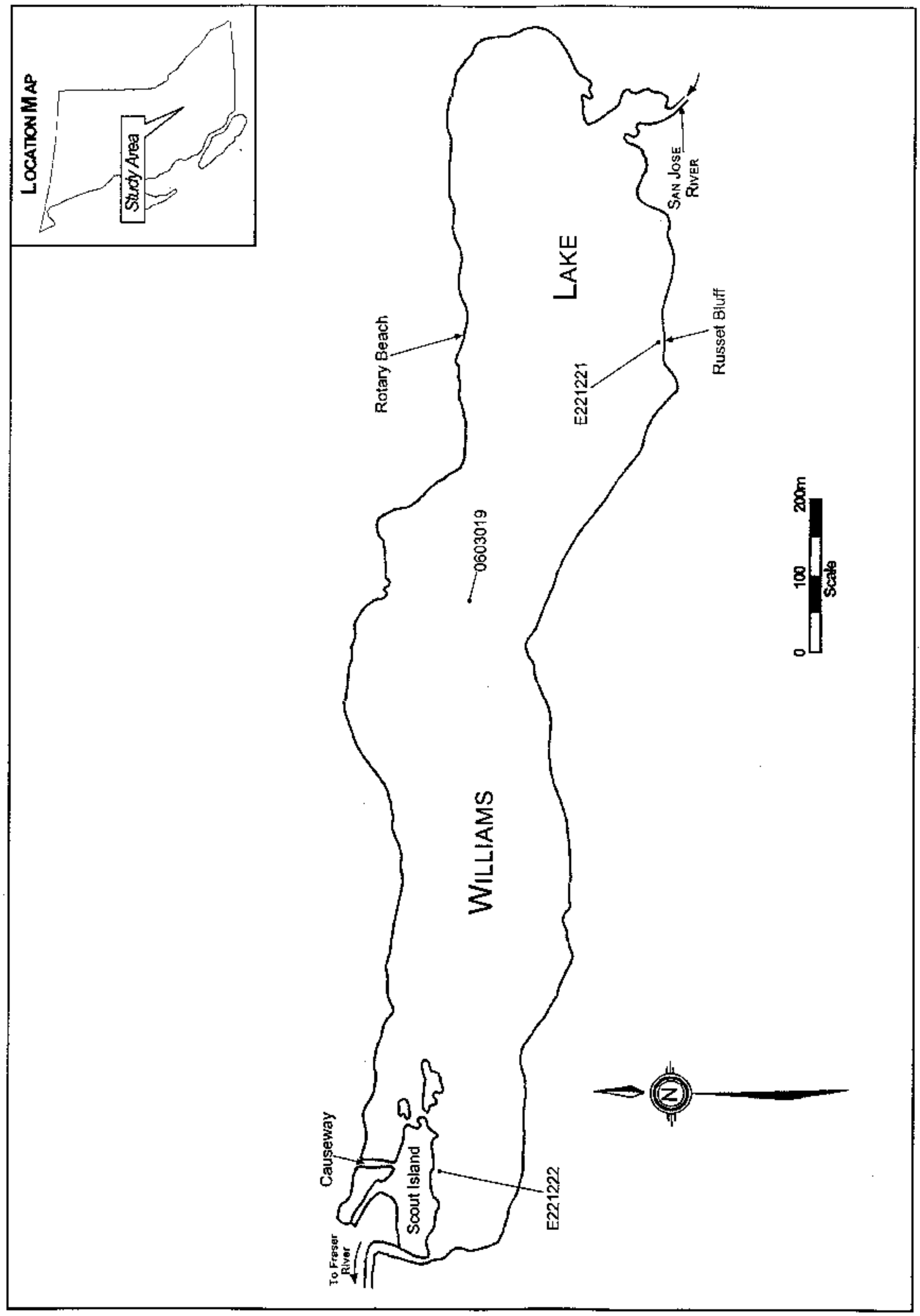


Figure 13. Williams Lake

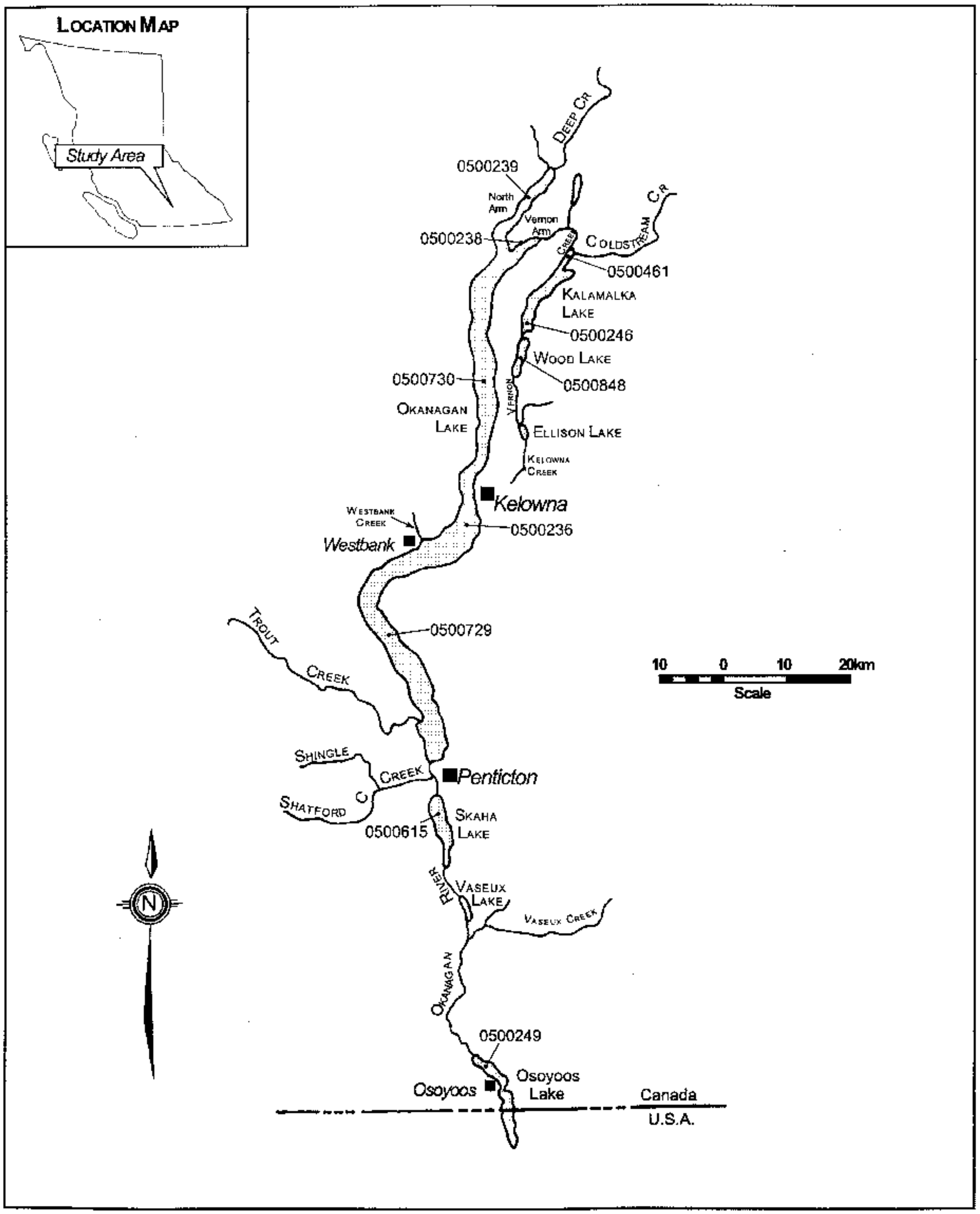


Figure 14. Okanagan Valley Lakes.

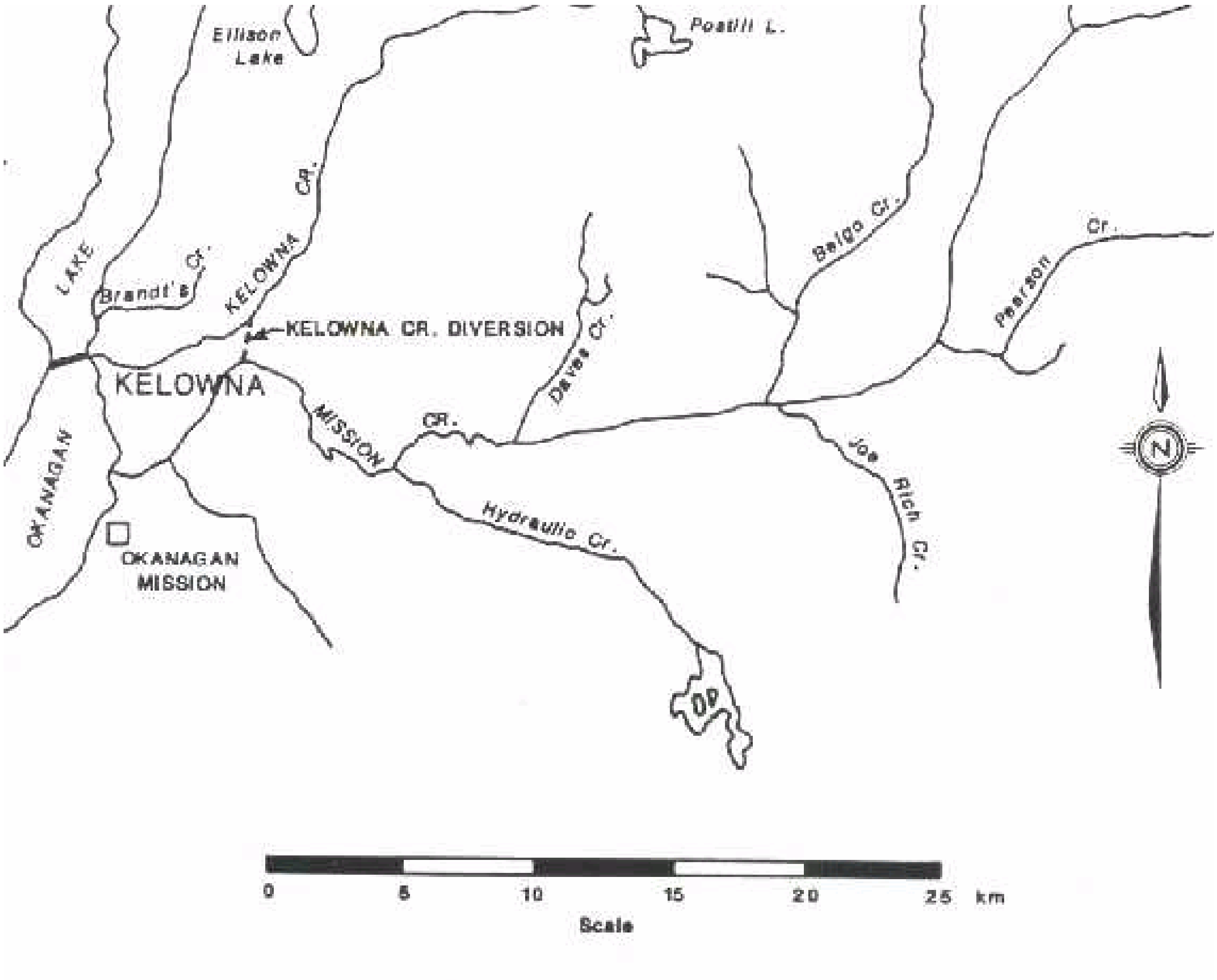


Figure 15. Okanagan Tributaries Near Kelowna.

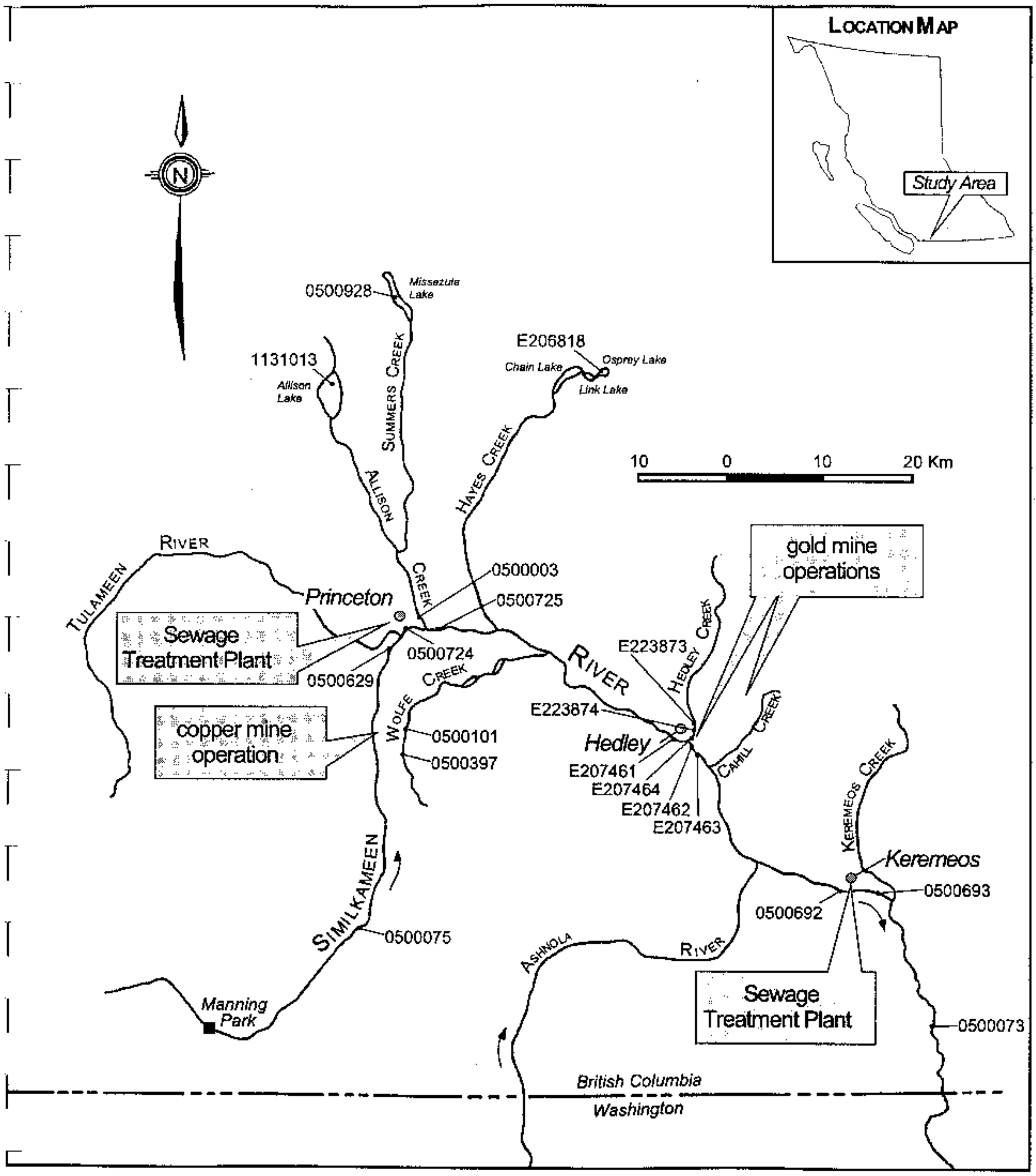


Figure 16. Similkameen River.

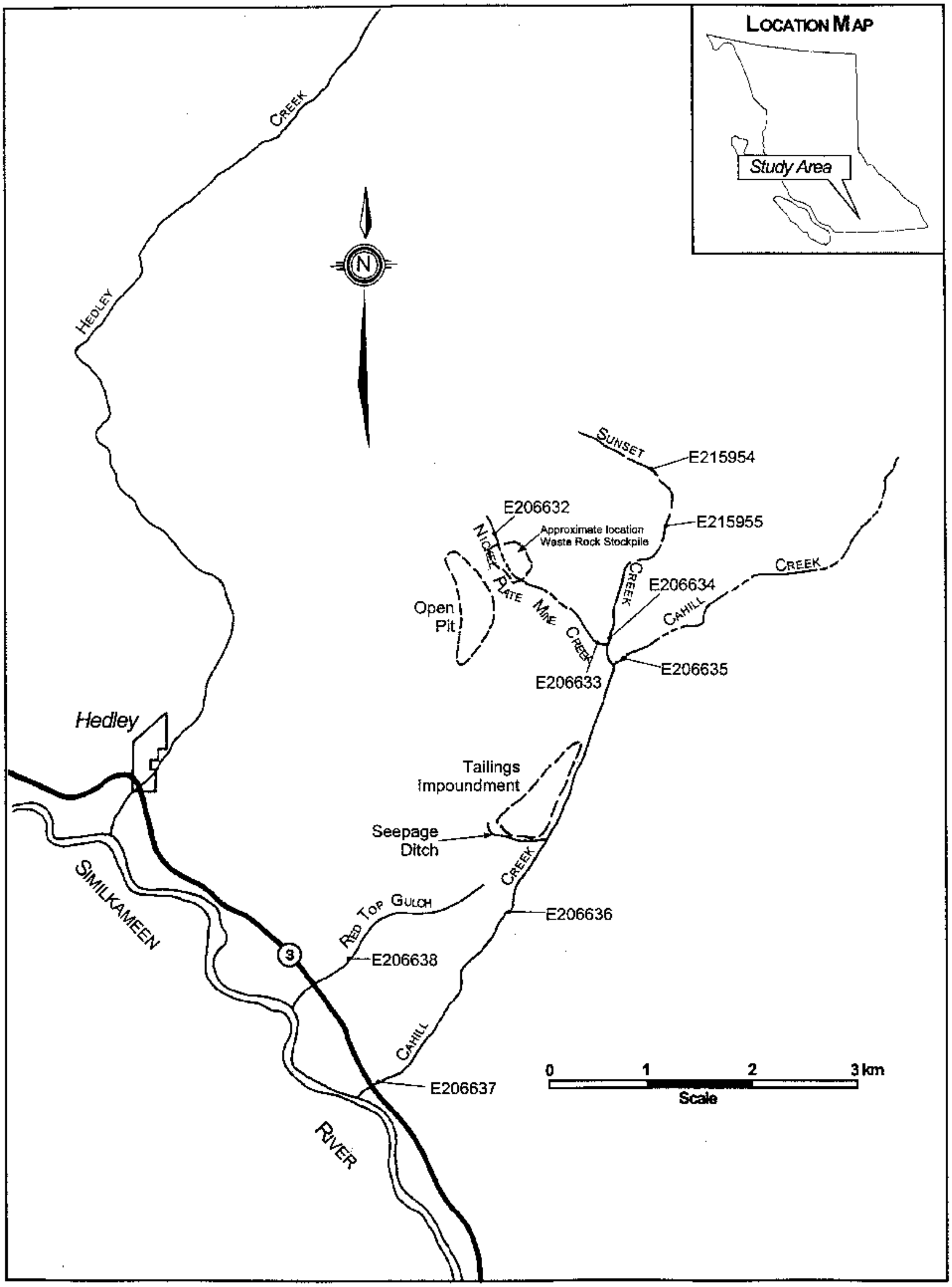


Figure 17. Cahill Creek.

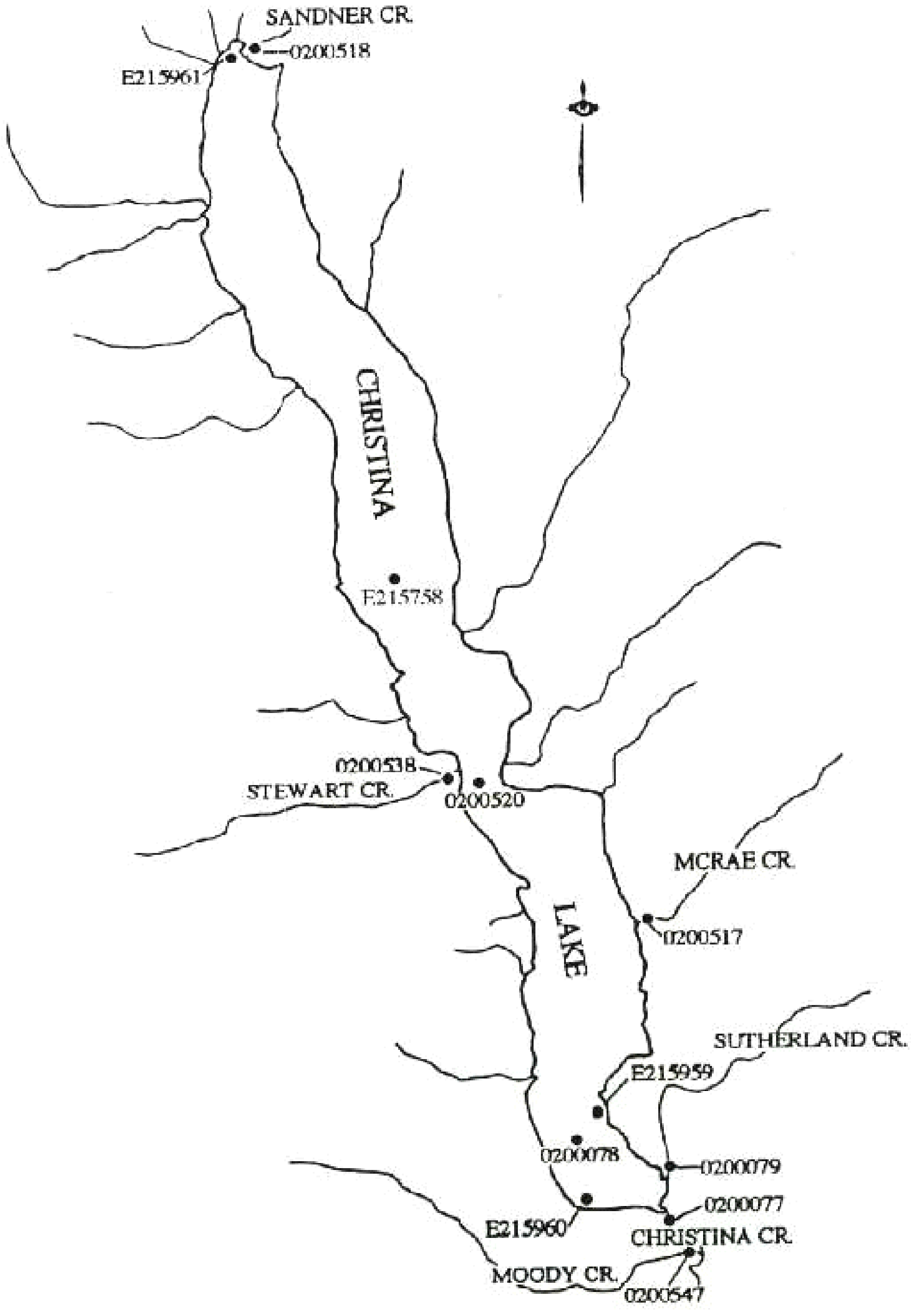


Figure 18. Christina Lake

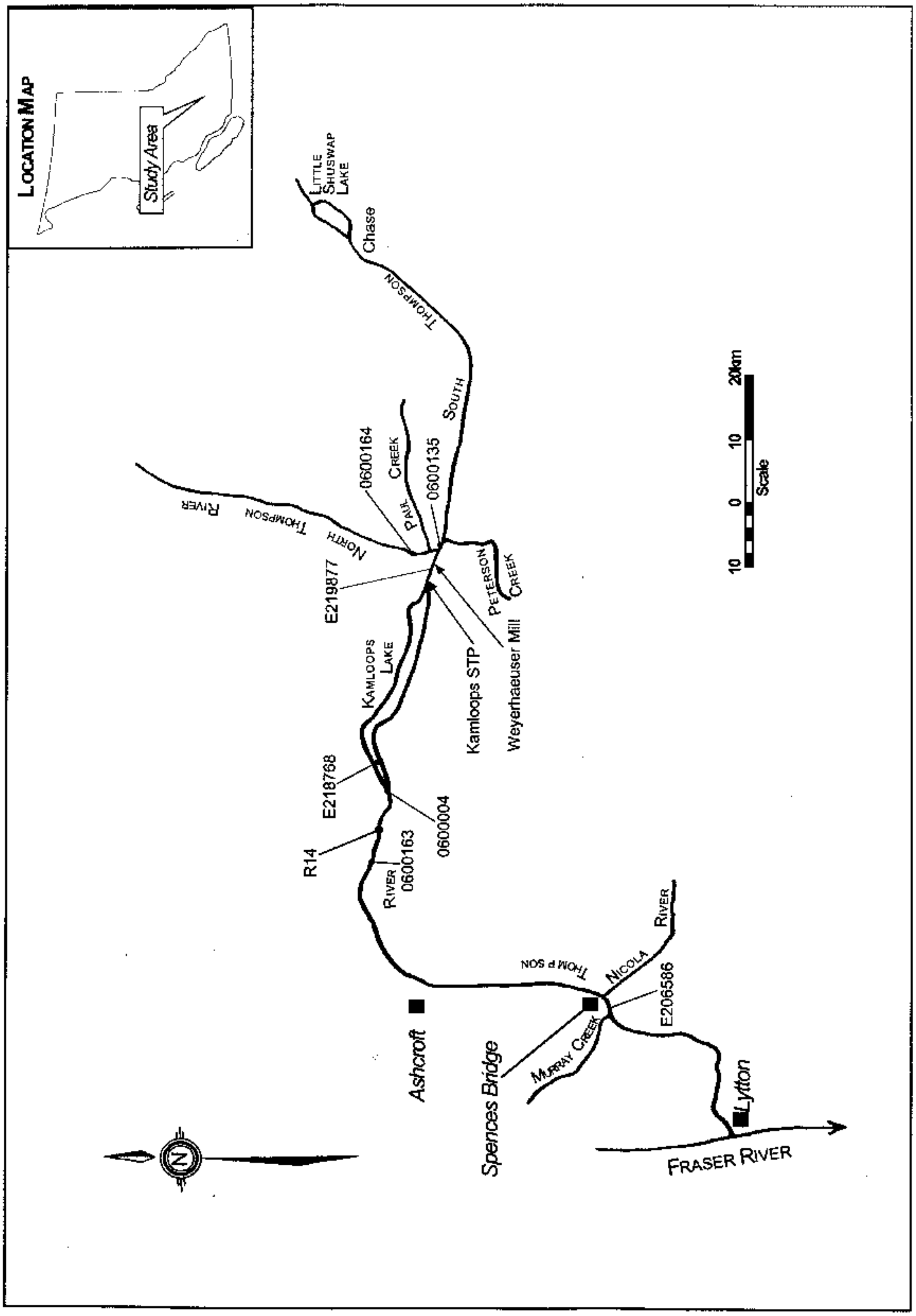


Figure 19. Thompson River.

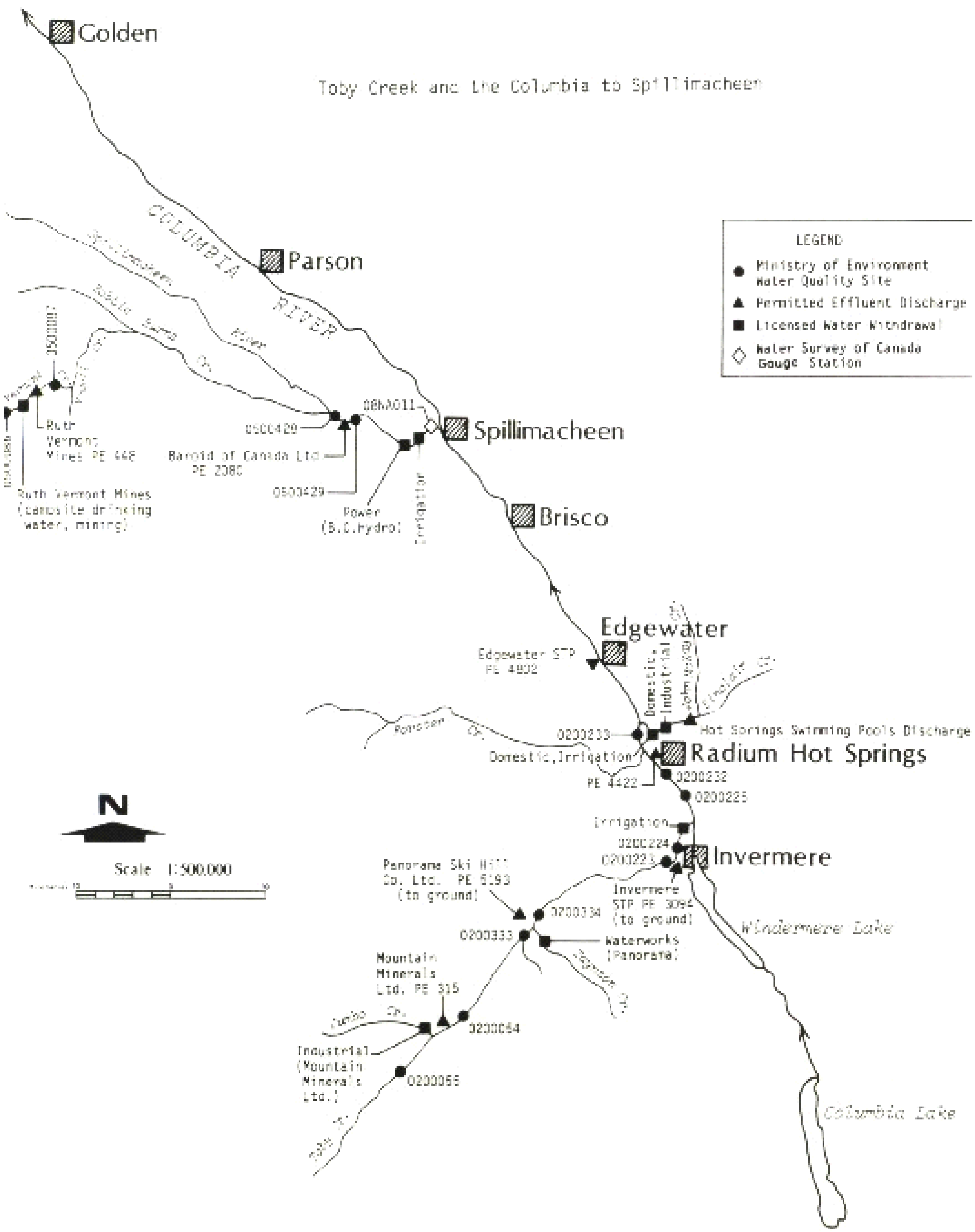


Figure 20. Toby Creek and Upper Columbia River.

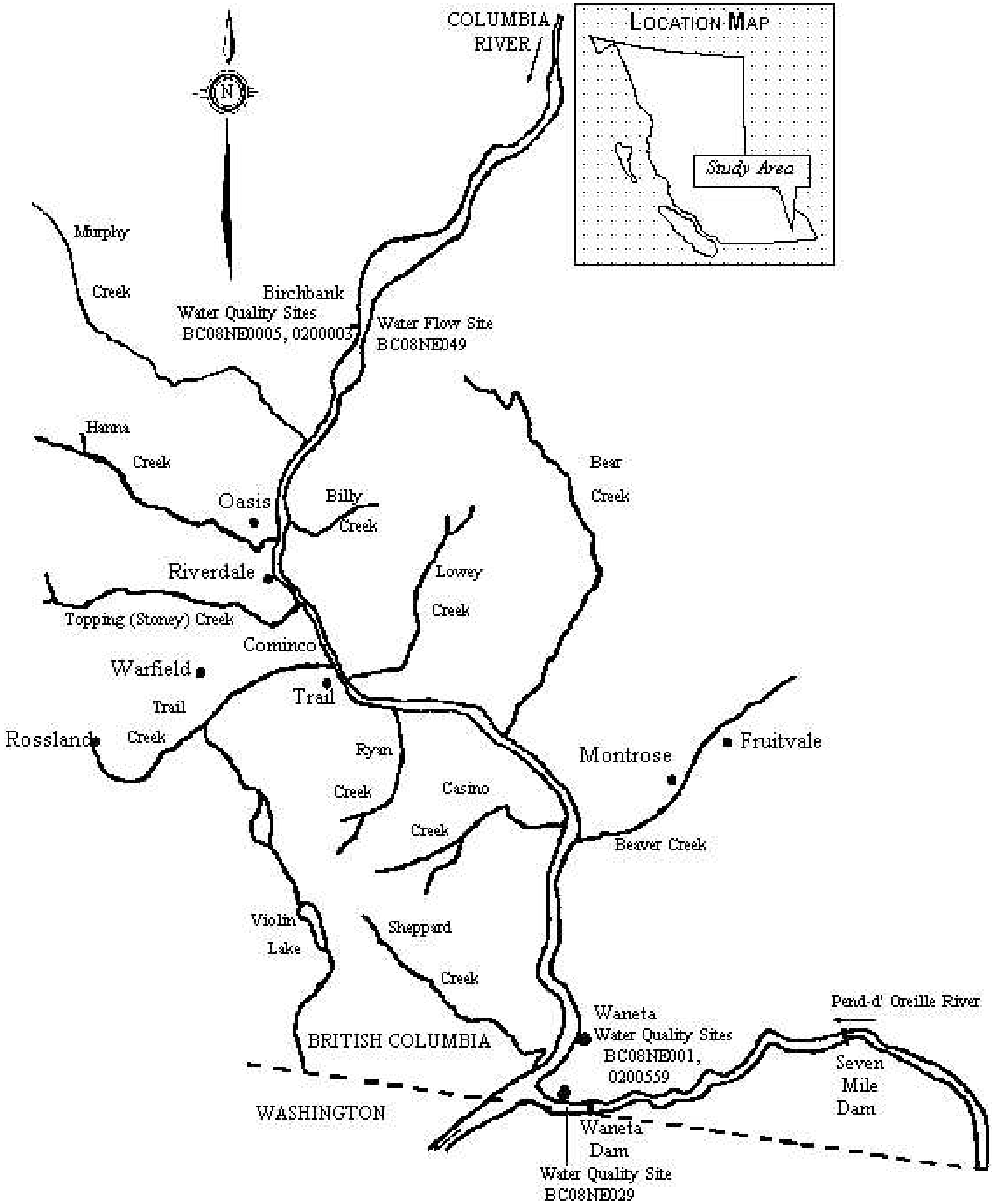


Figure 21. Columbia River from Birchbank to the International Border.

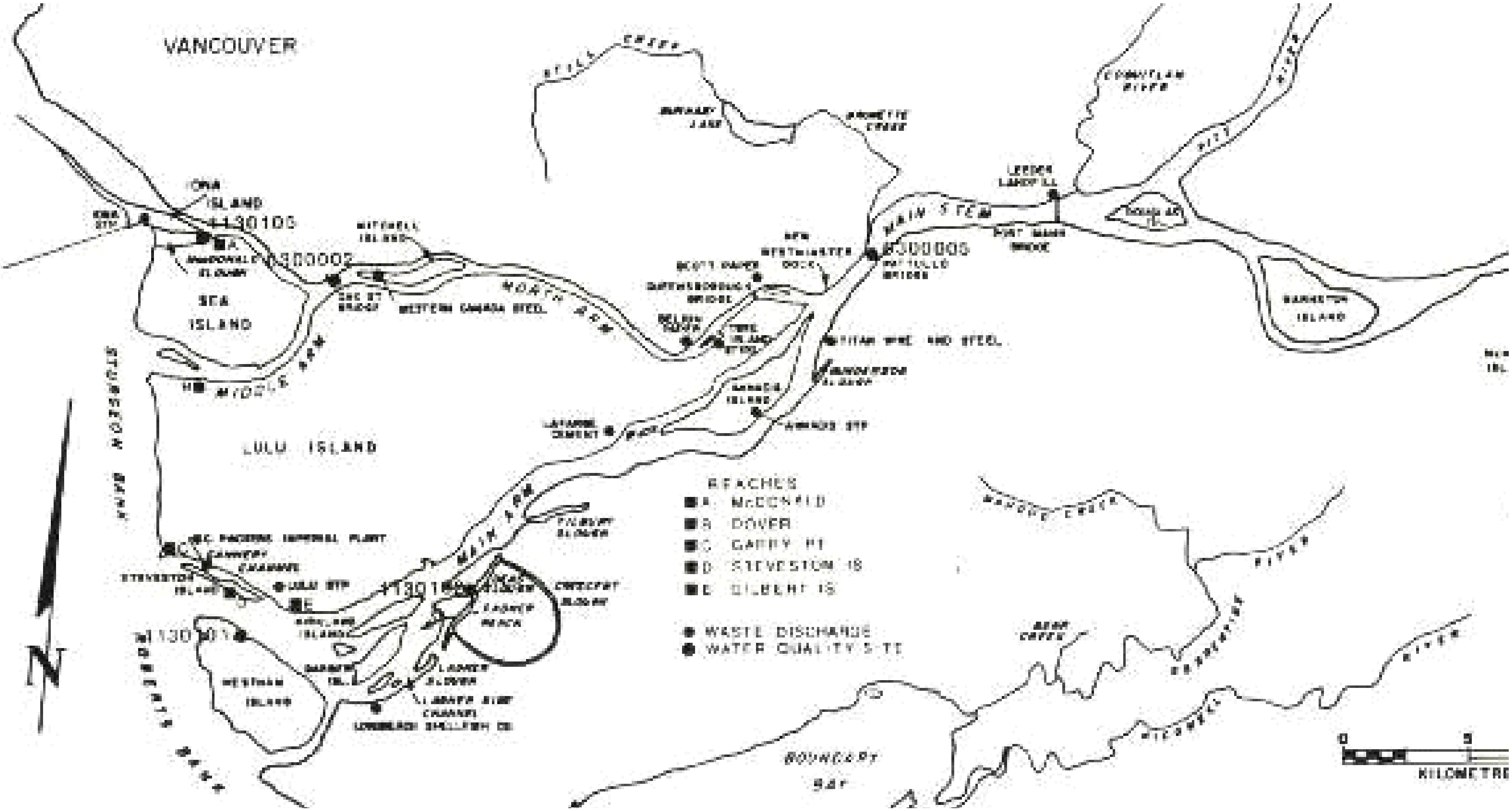


Figure 22. Fraser River - Kanaka Creek to the Mouth.