

# **WATER QUALITY**

## **British Columbia Water Quality Status Report**

**April 1996**

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### ***A Message from the Minister***

I am pleased to present the first Water Quality Status Report for the province of British Columbia. We are blessed with an abundance of fresh water from streams, lakes, and ground water, and we have an extensive coastline sheltering marine aquatic life. Perhaps because of its sheer size, we have in the past tended to take for granted both the availability and quality of this vast resource. However, as many of you know, human activity has affected the quality of water in many areas.

For several years now, the ministry has been monitoring the quality of water, concentrating on those areas impacted by developments of various kinds. This document is intended to share this information with the public, explaining its meaning, and indicating actions required to improve water quality.

In an endeavour of this sort, when you decide to grade water quality, you must proceed from the complexity of the numerous measurements to the simplicity of the final ranking system. This was achieved by developing a water quality index for British Columbia waters.

The application of this index to over 120 bodies of water, where human activity has occurred, has resulted in this first water quality status report for the province. It describes the state of water quality in selected areas and grades the quality of the water in these areas for various uses.

As the population of the province increases, so do the development pressures and the risks to water quality. Protection of water quality is not just a job for governments and industry. We are all stewards of the resource and we can all take measures to protect it. A status report of this sort, and other more extensive reports in the future, provide the sort of information we need to help maintain clean and healthy water for now and for future generations.

The Honourable Paul Ramsey  
Minister of Environment, Lands and Parks (now called Water, Land and Air Protection)  
Victoria

### ***Highlights of the British Columbia Water Quality Status Report***

#### **Provincial Ecosystem Goal**

Clean, healthy and safe land, water, and air for all living things is one of the goals of the Ministry of Environment, Lands and Parks. Water quality is an early indicator of ecosystem vitality, much the same as blood pressure is for humans. This report is a snapshot of the status of our water quality and tells us how close we are to achieving the ministry goal for water.

## **Data Source**

To ensure that water is kept clean for fish, wildlife and human uses, we continually sample and analyze fresh and marine waters. Over time, we have built up information on the water column, the bottom sediments, and the aquatic life. Using a newly-developed water quality index, we have reduced this large quantity of technical information to five simpler categories or ranks describing the state of water quality.

## **Water Quality Index**

The index categories are excellent, good, fair, borderline, and poor water quality. These rankings describe the overall condition of a body of water and its general suitability for various uses. The index is thus a general statement on water quality which averages changes over short periods of time or from one locale to the next in a waterbody. Information in this report should be used as an indicator and not an exhaustive analysis of the health of the waterbody.

## **Waterbodies Considered**

In this first water quality status report for the province, we have ranked 124 bodies of water. These include 81 river sections or creeks, 26 lakes, 12 marine bays or inlets, and 5 ground water aquifers. These are areas where we collected information because problems with the quality of the water were expected. This series of status reports will therefore tend to give a more negative view of water quality than actually exists province-wide since there are many places where water is still in its natural or pristine state.

## **Ranking Overall Water Quality**

Of the 124 waterbodies considered, 48 percent are ranked as having fair water quality and 35 percent as good. Fair means most uses of the water are protected with conditions only sometimes different from natural levels while good indicates all uses are protected with conditions close to natural levels. The remainder are either excellent (7 percent), borderline (5 percent), or poor (5 percent).

## **Ranking Each Water Use**

Regarding the suitability of water for use by aquatic life, the waterbodies are about equally divided among the excellent, good, and fair categories, with just 2 percent being borderline. For use by wildlife, nearly 90 percent of the waterbodies fall in the excellent and good categories with the remainder being fair. Uses for drinking, recreation, irrigation, and livestock watering do not occur in all the waterbodies. When they do occur, the percent of each use that ranks good to excellent is about 60 for drinking, 80 for recreation, 95 for irrigation and 80 for livestock watering.

## **Future Action**

Each status report indicates action that is needed to improve water quality. This includes simple measures the public can take to protect water such as not dumping waste oil or other wastes into storm drains or limiting the use of fertilizer and pesticide. Whether we are experts in the field or not, we are all stewards of this vital resource and we must all help in the job of protecting water quality and correcting problems.

## **Acknowledgements**

Thanks are due to those members of the following agencies and organizations who provided valuable suggestions and review comments in the drafting of this document: regional offices of the Ministry of

Environment, Lands and Parks (now Ministry of Water, Land and Air Protection), the State of Environment Reporting office of the ministry, the Ministry of Health, the federal Department of Fisheries and Oceans, Environment Canada, the Water Caucus of the BC Environmental Network, the Coquitlam Centennial School, the Council of Forest Industries, and the Union of BC Municipalities.

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## ***Introduction***

### **Welcome to the first water quality status report for British Columbia**

The following questions and answers will introduce you to the status report, explain what it means and how it was derived, and guide you through its use.

#### **Why prepare a water quality status report for BC?**

The Ministry of Environment, Lands and Parks has been collecting technical data on water quality for some time. Because of the growing public interest and demand for such information, the Ministry is publishing the data using a status report format. It fulfills the public's right to know about the state of the resource, guides people in their decisions on how to use water, and promotes action to correct water quality problems.

#### **What is the status report based on?**

The status report is based mainly on data collected to check the attainment of water quality objectives. This information is ranked in the status report according to a system called a water quality index.

#### **What are water quality objectives?**

Objectives are safe limits set by the ministry to protect all uses of a body of water. They establish a reference against which the health of water quality can be checked. The status report lists the objectives set for each body of water and describes how they are met over a period of three or more years.

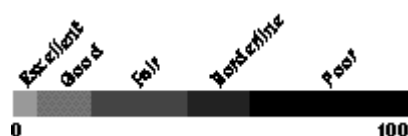
#### **What is the water quality index?**

The index is based on the attainment of water quality objectives. It takes into account the number of objectives not met, the frequency with which they are not met, and the amount by which they are not met.

The index ranks water quality relative to its natural or desirable state, and thus measures the degree to which the quality of water is affected by human activity.

### How is water quality ranked by the index?

The index ranks water quality into the following five categories: excellent, good, fair, borderline, and poor. The status report presents an overall index for each body of water and a breakdown in graphical form showing the suitability of water for specific uses. The index ranges from 0 for the best water to 100 for the poorest. This scale is in keeping with other environmental indices, such as the air quality index, where index values increase as conditions worsen.



### What do the five index categories mean?

Excellent (0-3) means all uses of water are protected and none are threatened or impaired. Good (4-17) means all uses are protected with only a minor degree of threat or impairment. Fair (18-43) means most uses are protected but a few are threatened or impaired. Borderline (44-59) means several uses are threatened or impaired. Poor (60-100) means most uses are threatened, impaired or even lost. The range of index values is different for each category because the index is influenced by empirical factors. For more detail on the index please consult the report: "The B.C. Water Quality Index" available from the Water Quality Branch in Victoria.



drinking



recreation



irrigation



livestock watering



aquatic life



wildlife

### Which uses of water are we talking about?

There are six uses of water, represented in the status report by the pictograms shown on this page. If the body of water in its natural state is suitable for drinking, recreation, irrigation, and livestock watering, objectives are set to protect such uses. Uses by aquatic life and wildlife are nearly always naturally sustainable and hence are always protected by objectives.

### How well does the ranking represent actual water quality?

There is always some degree of uncertainty with environmental measurements and this can affect the index result. The ranking calculated for this status report uses the precautionary principle, meaning it tends to represent water quality as possibly worse than it actually is rather than better. There are two reasons for this. Firstly, due to limited resources, our sampling is not extensive and we monitor only under the worst case when we expect objectives may not be met. Secondly, the concentrations of many substances, such as metals, are so low in the environment that minor contamination of samples can sometimes produce artificially high results that we accept as real. This uncertainty gap can only be narrowed by more frequent monitoring and better sampling and laboratory techniques.

### Does a high ranking for drinking mean I can drink the water directly?

No. Water for drinking, in the status report, refers to the water

source as it exists in streams or lakes before it is delivered to the consumer's tap. Such water always needs at least disinfection before drinking even if it is ranked as excellent and, in some cases, further treatment may be needed as indicated in the status reports.

### **Is water quality ranking connected to stream suitability as fish habitat?**

Not necessarily. While the quality of the water may be good for fish from a chemical and physical standpoint, the stream may be affected in other ways to make the habitat less suitable for fish. For example, spawning beds may be silted over, water levels may be too low due to water diversions, or stream velocities too high due to changes to the channel. Known habitat problems are mentioned in the status reports where appropriate. An ecosystem index that would incorporate water quantity and other habitat problems is needed but has yet to be developed.

### **How does the ranking reflect extreme and localized conditions?**

While the ranking tends to give a general statement about water quality, it can be influenced by either extreme events depending on their frequency, or localized conditions depending on their extent. When extreme or localized conditions are known to affect uses, including use by aquatic life, these are mentioned in the status reports.

### **What is the scope of this status report?**

This first status report covers 124 bodies of water, including 5 ground water aquifers, where water quality objectives have been set and checked. Since we have only set objectives in areas where problems with the quality of the water might be expected, this series of status reports will tend to give a more negative view of water quality than actually exists province-wide. There are thousands of lakes and streams where water is in its natural state. On the other hand, there are also bodies of water where problems exist but where we do not yet have enough data to prepare a status report. Information on such waterbodies of concern is available from regional staff of the ministry.

### **How is the status report organized?**

The waterbodies are compiled according to the Ministry of Environment's seven regions listed in the [Table of Contents](#), and as shown in a map of the province. We then present a map of each region, which locates the waterbodies described in the detailed status reports, and a regional summary. Each status report that follows consists of one page describing the state of water quality. A more detailed map showing the main features that influence water quality precedes each set of status reports. There is an index at the back which lists all the waterbodies alphabetically.

### **Are the data also presented to show the big picture?**

A summary of results is presented for the whole province and for each region of the ministry. Each summary shows, in graphical

form, the number of waterbodies distributed among the various water quality categories, from excellent to poor. Look for these summaries following the map of the Province and each regional map.

### **How do I find out about threats to water quality?**

The main potential sources of contamination are described in the status report and shown on the detailed map by five pictograms. These illustrate industrial plants, logging, mining, urban development, and agriculture, as shown on this page. Note that industrial plants encompass a range of operations from pulp mills to fish hatcheries and that urban development includes sewage and stormwater. The status reports state what will or should be done to improve water quality in each waterbody, where applicable.



**industrial plants**



**logging**



**mining**



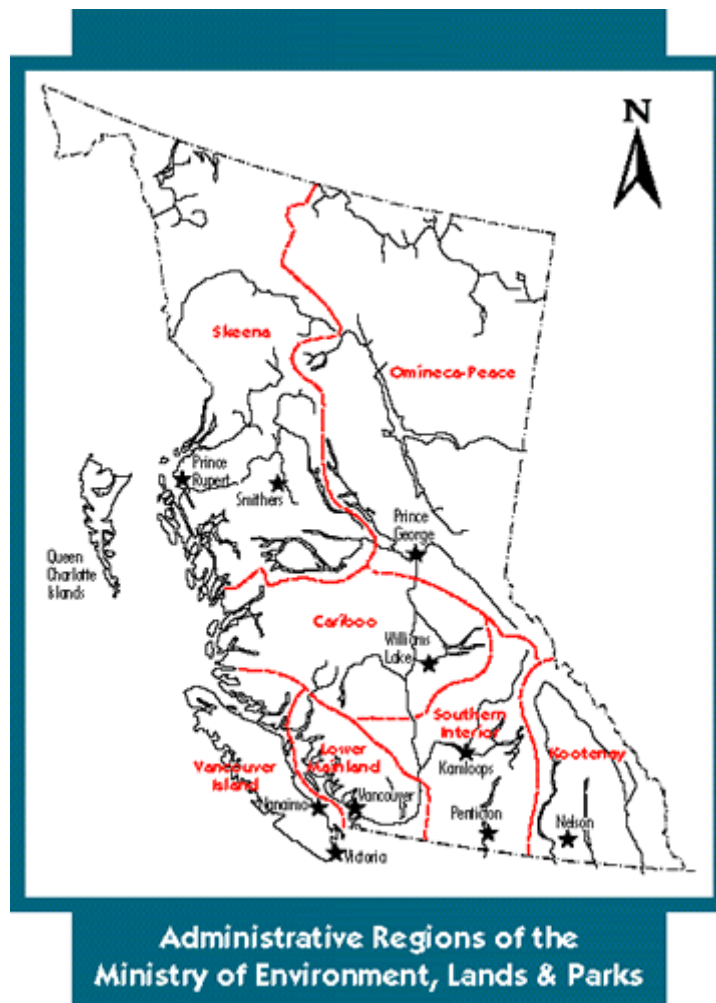
**urban development**



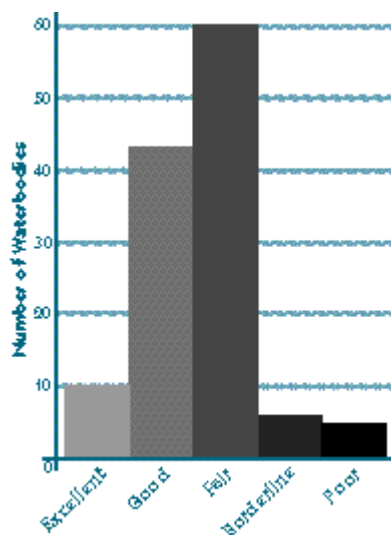
**agriculture**

### **What can I do, as a member of the public, to improve water quality?**

Use "environmentally friendly" products, such as low phosphorus detergents, biodegradable cleansers, and organic fertilizers. Do not throw toxic materials down sinks and toilets. The toxicants end up entering streams and lakes via the sewers. Also, do not dispose of waste oil or other wastes to storm sewers or to the ground because the wastes will contaminate nearby streams or ground water. If you are on a septic tank, ensure that the system is working and located properly to prevent contamination of the environment, especially from nutrients. Use only biodegradable fertilizers and pesticides in your garden and use them sparingly. These and other measures are mentioned in the status reports, where appropriate.



## Provincial Summary



The Ministry of Environment, Lands and Parks (now called Ministry of Water, Land and Air Protection) has divided the province into seven administrative regions, as shown on the attached map. The staff in each region looks after the quality of waterbodies in its area. For this reason, the status reports are grouped by region using a one-page status report per waterbody.

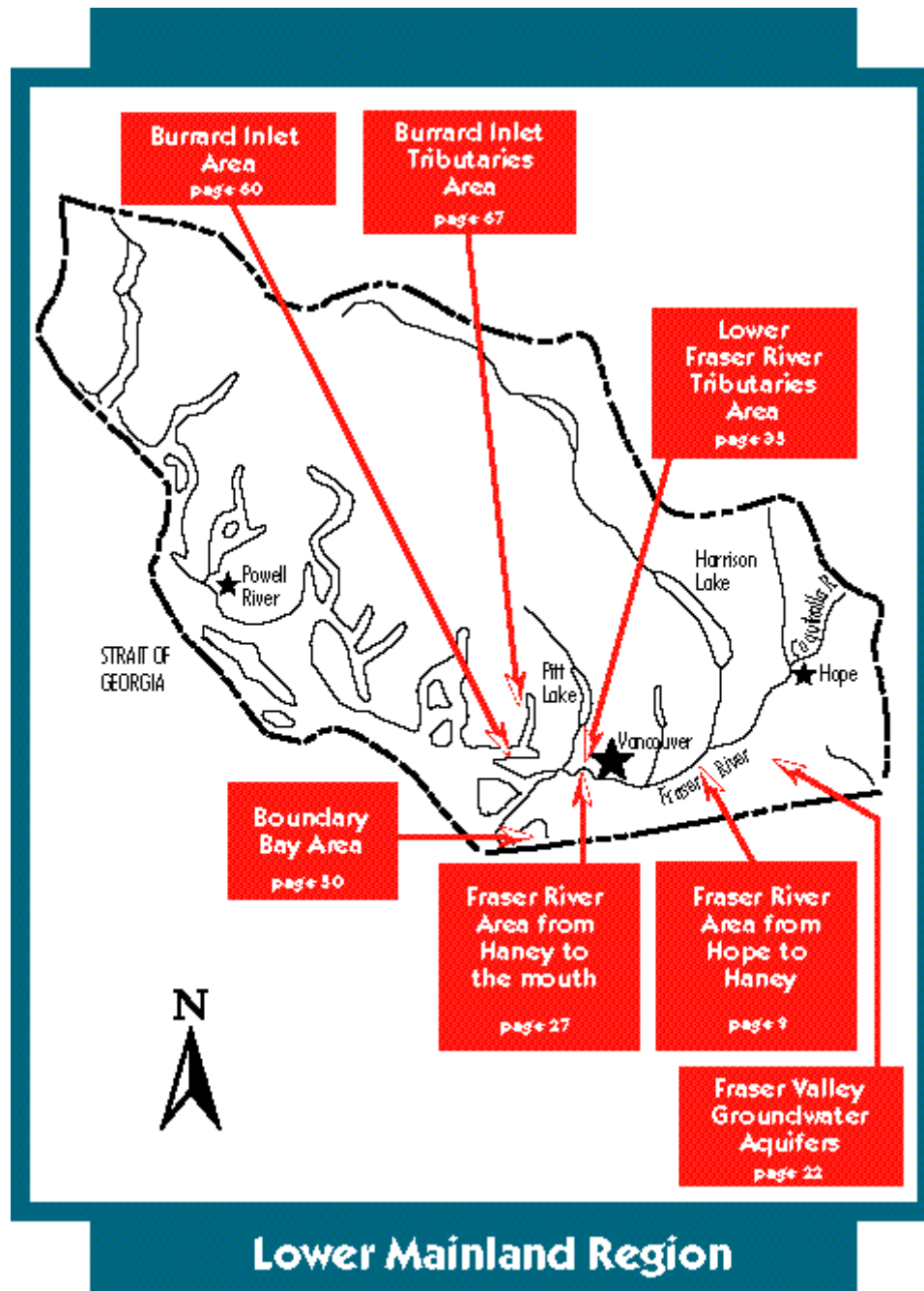
The total number of status reports for all regions is 124. These cover 26 lakes, 81 reaches of streams (such as rivers and creeks), 12 marine areas (such as bays and inlets), and 5 ground water aquifers.

The bar graph on this page shows how the water quality rating is distributed among all 124 waterbodies in the Province. The greatest number, 48 percent, are ranked as having fair water quality. The next most frequent ranking is that of good water quality which covers 35 percent of the waterbodies. Overall, 90 percent of all the waterbodies are in the excellent to fair category.

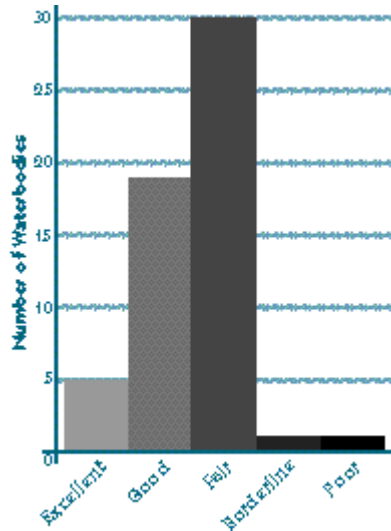
Similar summaries are given for each region and include the regional contacts needed for further information.



## Lower Mainland Region



## Lower Mainland Region Summary



The Lower Mainland Region is located in the south-western part of the Province bordering Washington State. It extends from the Coquihalla River in the east to Georgia Strait up to Powell River in the west, as shown on the attached map. The main regional office of the Ministry is located in Surrey.

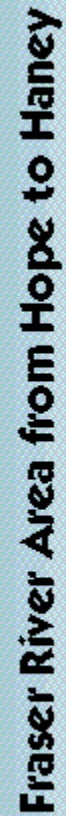
There are 55 status reports for this Region covering 5 lakes, 36 reaches of streams, 10 marine areas, and 4 ground water aquifers. The bar-graph on this page shows that 55 percent of these water-bodies are ranked as having fair water quality. The next most frequent ranking is that of good water quality covering 33 percent of the waterbodies.

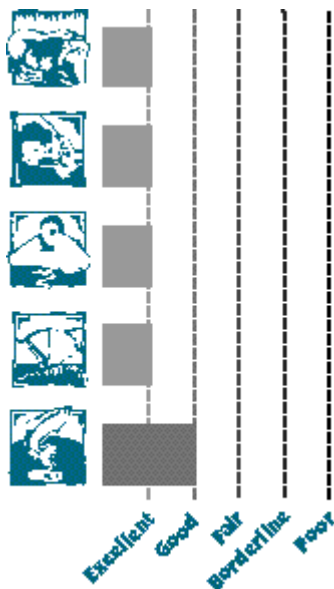
If you have any questions on the status reports or would like more information on other waterbodies in the Region, please contact:

Mike Gow for surface water  
and  
Valerie Cameron for ground water

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[vcameron@surrey.env.gov.bc.ca](mailto:vcameron@surrey.env.gov.bc.ca)





Haney, a number of small-volume treated discharges from municipal and industrial operations, and pulp mills and municipal discharges upstream from Hope.

#### Which objectives have been set?

The objectives for this reach of the Fraser River are presently being updated, with revised objectives expected to be published in 1996. Objectives were set in 1985 for those characteristics related to contaminant sources between Hope and Haney. They include objectives for ammonia, fecal coliforms, dissolved oxygen, and pH.

#### What are the main uses of the river?

Uses include irrigation, livestock watering, recreation such as fishing, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

#### Which objectives were not met?

Objectives not met were those for ammonia and dissolved oxygen in 1988. Otherwise, all the objectives were met between 1987 and 1993.

#### What does it mean to not meet these objectives?

The amount by which the dissolved oxygen objective was not met was very small, so that the impact on aquatic life that one year would have been minimal. The average ammonia concentration in 1988 near the Chilliwack sewage outfall could have caused some chronic impacts to aquatic life in a restricted area of the river.

#### What was done to improve matters?

The Ministry worked with the municipality to improve the discharge from the sewage treatment plant at Chilliwack so that ammonia concentrations in the river can meet the objectives at all times.

## Hope Slough

#### What is the general state of water quality?

Hope Slough water quality is good (index = 16). The Ministry will continue to work to improve agricultural practices in the area.

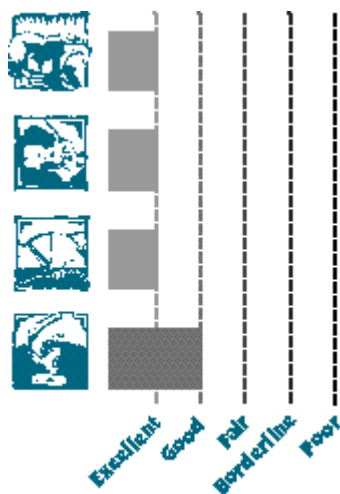
**Good**

#### What are the main attributes of Hope Slough?

Hope Slough, which flows into the Fraser River near Chilliwack, is important as habitat for salmonids.

#### What are the potential sources of contamination?

These include non-point sources such as agriculture.



### Which objectives have been set?

Those for fecal coliforms, ammonia, pH, and dissolved oxygen. The objectives were set for characteristics that relate to agriculture.

### What are the main uses of the slough?

Uses include those of aquatic life, wildlife, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1987 to 1993, the objective for dissolved oxygen was often not met.

### What does it mean to not meet this objective?

Low dissolved oxygen concentrations mean that there could be some impact on fish. The general state of water quality is based on limited sampling and reflects the average condition over several years. It does not account for occasional extreme events of low dissolved oxygen that could kill fish.

### What will be done to improve matters?

The Ministry is working with 11 farm operations to improve agricultural practices. This work will continue.

## Elk Creek

### What is the general state of water quality?

Elk Creek water quality is fair (index = 32). The Ministry will continue to work to improve agricultural practices in the area.

## Fair

### What are the main attributes of Elk Creek?

Elk Creek, a tributary to Hope Slough, is important as rearing habitat for salmonids.

### What are the potential sources of contamination?

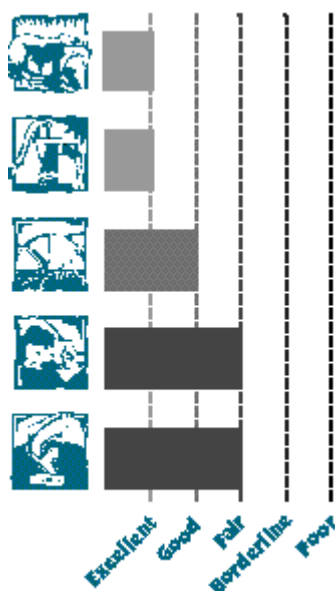
These include non-point sources such as agriculture.

### Which objectives have been set?

Those for fecal coliforms, ammonia, pH, and dissolved oxygen. The objectives were set for those characteristics that relate to agriculture.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, irrigation, and drinking water with complete treatment plus disinfection. These uses are protected



when the objectives are met.

### Which objectives were not met?

Between 1988 and 1993, the objectives for dissolved oxygen and fecal coliforms were often not met.

### What does it mean to not meet these objectives?

Low dissolved oxygen concentrations mean that there could be some impact on fish. High fecal coliform levels mean that livestock can be exposed to disease-causing organisms.

### What will be done to improve matters?

The Ministry will be working with several dairy operations to improve storage of wastes by using larger lagoons and controlling drainage.

## Chilliwack Creek

### What is the general state of water quality?

Chilliwack Creek water quality is good (index = 8). The Ministry will continue to work to improve agricultural practices in the area.

### Good

### What are the main attributes of Chilliwack Creek?

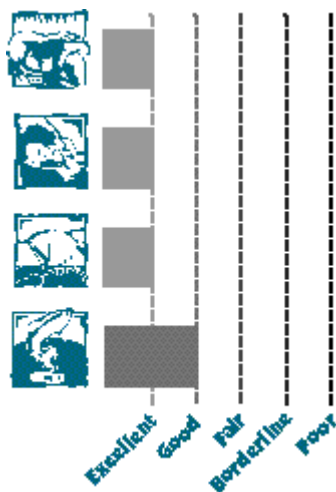
Chilliwack Creek, a tributary to the Fraser River, is important for spawning and rearing of salmonids.

### What are the potential sources of contamination?

These include non-point sources such as agriculture.

### Which objectives have been set?

Those for fecal coliforms, ammonia, pH, and dissolved oxygen. The objectives were set for those characteristics that relate to agriculture.



### What will be done to improve matters?

The Ministry will work with farmers to ensure that manure, woodwaste, and compost piles are covered and that contaminated runoff from intensively farmed areas is treated.

## Luckakuck Creek

### What is the general state of water quality?

Luckakuck Creek water quality is good (index = 11). The Ministry will continue to work to improve agricultural practices in the area.

### Good

### What are the main attributes of Luckakuck Creek?

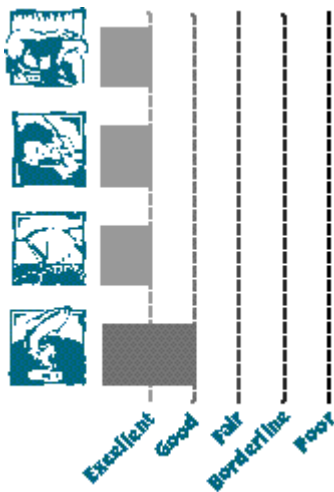
Luckakuck Creek, a tributary of Chilliwack Creek, is important as habitat for salmonids.

### What are the potential sources of contamination?

These include non-point sources such as agriculture.

### Which objectives have been set?

Those for fecal coliforms, ammonia, pH, and dissolved oxygen. The objectives were set for characteristics that relate to agriculture.



### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objective was not met?

Between 1988 and 1993, the objective for dissolved oxygen was often not met.

### What does it mean to not meet this objective?

Low dissolved oxygen concentrations mean that there could be some impact on fish. The general state of water quality is based on limited sampling and reflects the average condition over several years. It does not account for occasional extreme events of low dissolved oxygen that could kill fish.

### What will be done to improve matters?

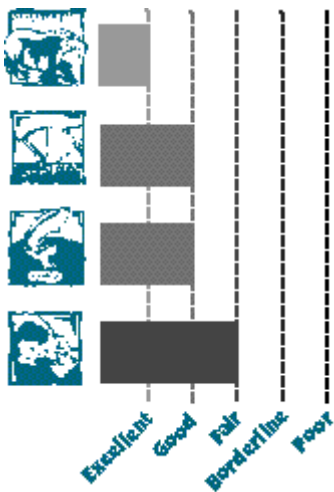
The Ministry will work with farmers to ensure that manure, woodwaste, and compost piles are covered and that contaminated runoff from intensively farmed areas is treated.

## Atchelitz Creek

### What is the general state of water quality?

Atchelitz Creek water quality is fair (index = 20). The Ministry will continue to work to improve agricultural practices in the area.

### Fair



### What are the main attributes of Atchelitz Creek?

Atchelitz Creek, a tributary to Chilliwack Creek, is important as habitat for salmonids.

### What are the potential sources of contamination?

These include non-point sources such as agriculture.

### Which objectives have been set?

Those for fecal coliforms, ammonia, pH, and dissolved oxygen. The objectives were set for those characteristics that relate to agriculture.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?



Between 1988 and 1993, the objectives for dissolved oxygen were not usually met, while the fecal coliform objective was occasionally not met.

#### What does it mean to not meet these objectives?

Low dissolved oxygen concentrations would result in some impact on fish. High fecal coliform levels mean that livestock can be exposed to disease-causing organisms.

#### What will be done to improve matters?

The Ministry will work with farmers to ensure that manure, woodwaste, and compost piles are covered and that contaminated runoff from intensively farmed areas is treated.

## Chilliwack River

#### What is the general state of water quality?

Chilliwack River water quality is excellent (index = 0). The Ministry will continue to monitor to ensure that water quality is maintained at this high level.

### Excellent

#### What are the main attributes of the Chilliwack River?

The Chilliwack River, which flows into the Vedder River, is one of the most important spawning and rearing habitats for salmon in the lower Fraser River area, and is also important for recreation.

#### What are the potential sources of contamination?

These include non-point sources such as forestry and agriculture.

#### Which objectives have been set?

Those for fecal coliforms and dissolved oxygen.

#### What are the main uses of the river?

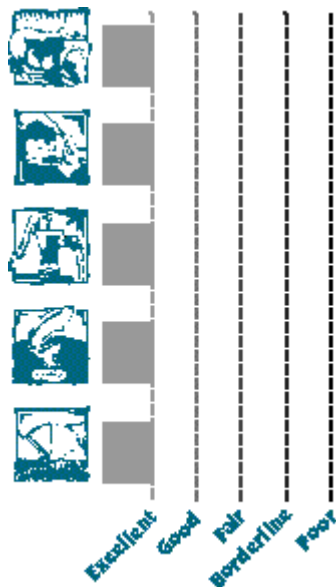
Uses include those of aquatic life, wildlife, livestock watering, recreation such as swimming, drinking with partial treatment, and irrigation. These uses are protected when the objectives are met.

#### Were any objectives not met?

Between 1987 and 1993, the two objectives were met.

#### What does it mean to meet these objectives?

Drinking water users should ensure that treatment systems are working properly.



## Does anything need to be done to improve matters?

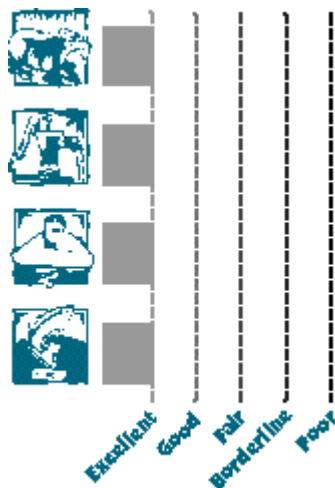
The Ministry has been working with chicken farmers to ensure installation of new water systems which allow proper washdown of wastes. Monitoring should continue to check that water quality is maintained at this high level.

## Cultus Lake

### What is the general state of water quality?

Cultus Lake water quality is excellent (index = 0). The Ministry will continue to monitor to ensure that water quality is maintained at this high level.

### Excellent



### What are the main attributes of Cultus Lake?

Cultus Lake, which drains into the Vedder River, is important as a spawning and rearing habitat and is heavily used for recreation.

### What are the potential sources of contamination?

These include non-point sources such as septic tanks. Concerns exist about the presence of Eurasian water milfoil in the lake and its spread to areas of the lake where sockeye salmon spawn.

### Which objectives have been set?

Those for fecal coliforms, phosphorus, and dissolved oxygen.

### What are the main uses of the lake?

Uses include those of aquatic life, wildlife, recreation such as swimming, and drinking water with disinfection only. These uses are protected when the objectives are met.

### Were any objectives not met?

Between 1987 and 1993, partial testing showed objectives were met.

### What does it mean to meet these objectives?

Drinking water users should ensure that treatment systems are working properly.

## Does anything need to be done to improve matters?

The Ministry is presently working with three hog farmers to have manure storage facilities installed. Monitoring should continue to check that water quality is maintained at this high level. Residents near the lake should ensure their septic tanks are working properly and should minimize the use of fertilizer and pesticide.

## Sumas River

### What is the general state of water quality?

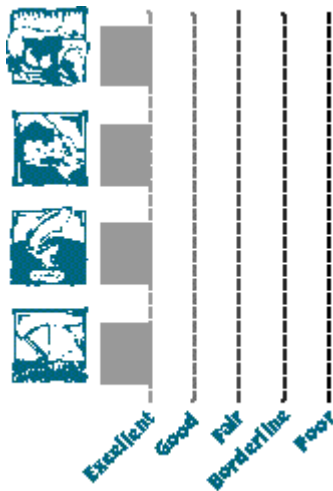
Sumas River water quality is good (index =

### What are the main attributes of Sumas River?

The Sumas River, which enters the Vedder Canal just

4). Work to reduce wastes from hog and dairy farms in the area will continue.

## Good



above the Fraser River, is important as rearing habitat for salmonids.

### What are the potential sources of contamination?

These include non-point sources such as agriculture.

### Which objectives have been set?

Those for fecal coliforms and dissolved oxygen. The objectives were set for characteristics that relate to agriculture.

### What are the main uses of the river?

Uses include those of aquatic life, wildlife, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

In 1992, the objective for dissolved oxygen was not met once by a small margin.

### What does it mean to meet this objective?

Low dissolved oxygen levels can, on occasion, impact fish.

### Why is the general state worse than any use rating?

The general state reflects possible minor impacts on aquatic life. The general state of water quality is based on limited sampling and reflects the average condition over several years. It does not account for occasional extreme events of low dissolved oxygen that could kill fish.

### What will be done to improve matters?

The Ministry has been working with over 50 hog and dairy farms to cover manure piles and treat liquid wastes. This work will continue.

## Saar Creek

### What is the general state of water quality?

Saar Creek water quality is poor (index = 66). The Ministry will continue to work to improve agricultural practices in the area.

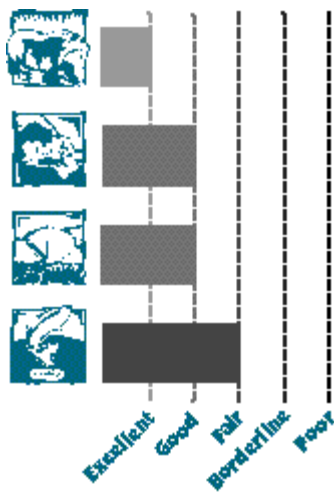
## Poor

### What are the main attributes of Saar Creek?

Saar Creek, a tributary to the Sumas River, is important as habitat for salmonids.

### What are the potential sources of contamination?

These include non-point sources such as agriculture.



### Which objectives have been set?

Those for fecal coliforms and dissolved oxygen. The objectives were set for characteristics that relate to agriculture.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

Between 1987 and 1993, the objective for dissolved oxygen was often not met and the objective for fecal coliforms was not met at times.

### What does it mean to not meet these objectives?

Low dissolved oxygen concentrations will threaten fish and high fecal coliform levels can impair the use for irrigation and livestock watering.

### Why is the general state worse than any use rating?

The general state reflects the fact that several uses of the water can be impacted.

### What will be done to improve matters?

The Ministry is working with Washington State to eliminate overflows from a lagoon at a dairy in the State. This type of work will continue.

## Salmon River

### What is the general state of water quality?

Salmon River water quality is good (index = 14) and will be maintained through continued work by the Ministry to improve agricultural practices in the area. The restoration of the river as salmon habitat is considered important.

### Good

### What are the main attributes of the Salmon River?

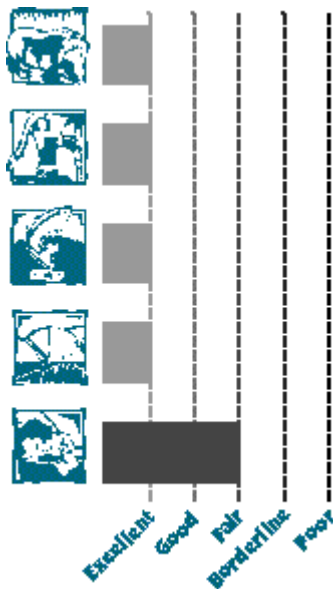
The Salmon River, a tributary to the Fraser River, is important as habitat for salmonids.

### What are the potential sources of contamination?

These include non-point sources such as agriculture.

### Which objectives have been set?

Those for fecal coliforms, ammonia, pH, and dissolved oxygen. The objectives were set for characteristics that relate to agriculture.



### What are the main uses of the river?

Uses include those of aquatic life, wildlife, livestock watering, irrigation, and drinking water with complete treatment. These uses are protected when the objectives are met.

### Which objectives were not met?

In 1989 and 1992, the objectives for fecal coliforms to protect livestock water were not met.

### What does it mean to not meet these objectives?

High fecal coliform levels mean that livestock can be exposed to disease-causing organisms.

### What will be done to improve matters?

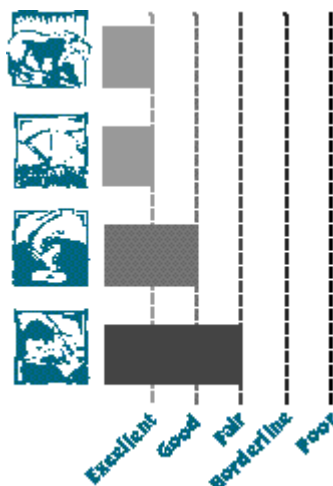
The Ministry has been working at nearly 60 farming operations to ensure that woodwaste, manure, and mushroom compost piles are covered and that waste streams are collected and treated. This work will continue.

## Bertrand Creek

### What is the general state of water quality?

Bertrand Creek water quality is good (index = 10) and will be maintained through the work by the Ministry to improve agricultural practices in the area. The restoration of the creek as salmon habitat is considered important.

### Good



### What are the main attributes of Bertrand Creek?

Bertrand Creek, which flows south into the U.S., is important as habitat for salmonids.

### What are the potential sources of contamination?

These include non-point sources such as agriculture.

### Which objectives have been set?

Those for fecal coliforms, ammonia, pH, and dissolved oxygen. The objectives were set for those characteristics that relate to agriculture.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

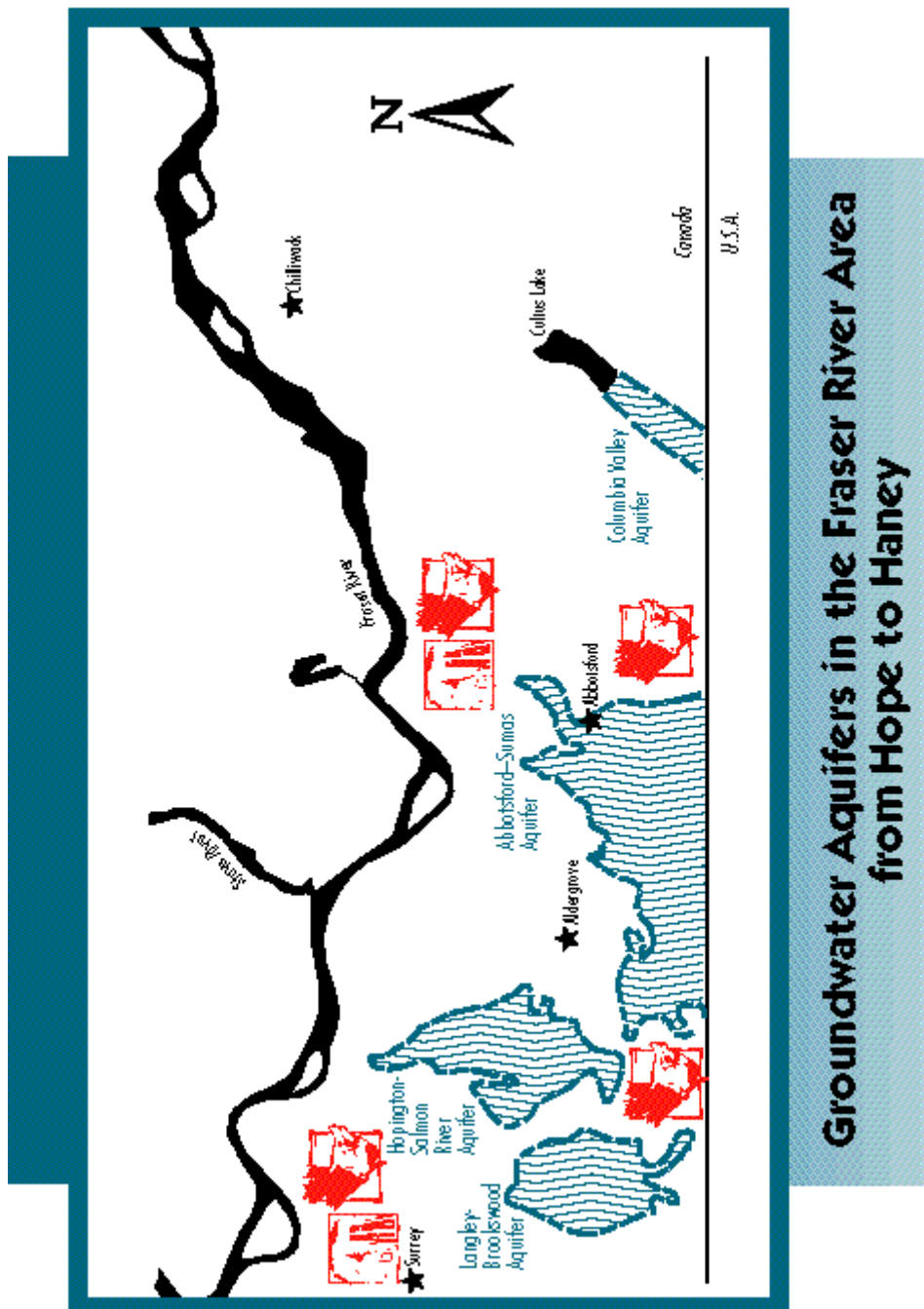
Between 1987 and 1993, the objectives for dissolved oxygen and fecal coliforms were not met on occasion.

### What does it mean to not meet these objectives?

Low dissolved oxygen concentrations could result in some impact on fish. High fecal coliform levels mean that livestock can be exposed to disease-causing organisms.

### What will be done to improve matters?

The Ministry is working with a poultry farm to reduce and treat runoff. This type of work will continue.

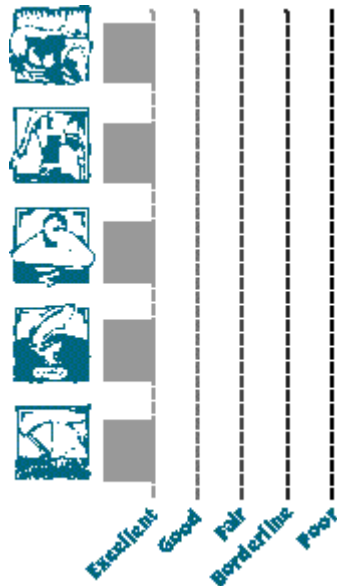


# Columbia Valley Aquifer

## What is the general state of water quality?

The water quality of the Columbia Valley aquifer is excellent (index = 0). Nitrate-nitrogen concentrations, a key water quality indicator, meet acceptable levels for drinking water.

## Excellent



## What are the main attributes of the Columbia Valley Aquifer ?

The Columbia Valley Aquifer occupies a significant portion of the Columbia Valley southwest of Cultus Lake. The aquifer is an important source of local water supply and is highly vulnerable to contamination.

## What are the potential sources of contamination?

These include non-point sources of nitrate from agricultural activities (manure and chemical fertilizers) and septic systems.

## Which objectives have been set?

Although no water quality objectives have been set for this aquifer yet, the index ranking is based on the drinking water guideline for nitrate nitrogen.

## What are the main uses of the aquifer?

Uses include drinking water, livestock watering, and irrigation.

## Which objectives were not met?

From 1993 to 1994 there were no cases of nitrate-nitrogen exceeding the drinking water guideline.

## What would it mean to not meet this guideline?

High nitrate-nitrogen concentrations above the drinking water guideline can cause methaemoglobinaemia (blue baby syndrome) when consumed by young infants.

## What will be done to maintain quality?

The Ministry has been working with hog farmers in the area to ensure installation of manure storage facilities. The Ministry will continue to encourage the close application of the Code of Agricultural Practice for Waste Management to ensure that water quality is not threatened. Local residents can help by minimizing their use of fertilizers and pesticides and by ensuring their septic tanks are working properly.

# Abbotsford-Sumas Aquifer

## What is the general state of water quality?

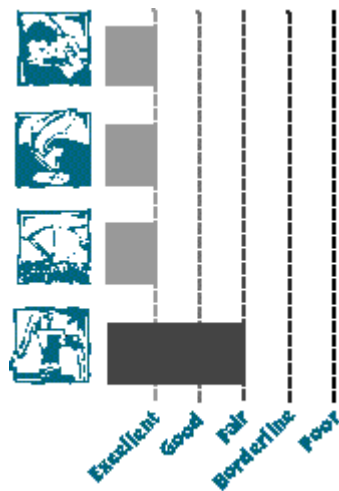
The water quality of the Abbotsford-Sumas aquifer is fair (index = 28), with nitrate-nitrogen concentrations not meeting acceptable levels for drinking water in certain parts of the aquifer. Better control of

## What are the main attributes of the Abbotsford-Sumas Aquifer ?

The aquifer straddles the international boundary just south of the City of Abbotsford. It is the largest and most heavily used aquifer in the Lower Mainland and is highly vulnerable to contamination. This report covers the

agricultural wastes being applied to farmland will help improve water quality.

## Fair



Canadian portion of the aquifer.

### What are the potential sources of contamination?

These include nitrate from agricultural activities (manures and chemical fertilizers) and septic systems. There are also manufactured materials, such as gasoline or pesticides, which can enter ground water in trace amounts.

### Which objectives have been set?

Although no water quality objectives have been set for this aquifer yet, the index ranking is based on the drinking water guideline for nitrate nitrogen.

### What are the main uses of the aquifer?

Uses include drinking water, livestock watering, irrigation, industrial supplies, and a fish hatchery.

### Which objectives were not met?

From 1993 to 1994, the drinking water guideline for nitrate-nitrogen was not met in certain areas of the aquifer. The general state of water quality represents average conditions in the aquifer, with the drinking guideline for nitrate being exceeded in a number of specific wells.

### What does it mean to not meet this guideline?

High nitrate-nitrogen concentrations above the drinking water guideline in ground water can cause methaemoglobinaemia (blue baby syndrome) when consumed by young infants.

### What will be done to improve matters?

The Ministry will continue to monitor ground water quality in the aquifer and will encourage development of well and aquifer protection plans at the local level. The major remedy will be reductions in manure applications. An International Task Force has been established to examine water quality concerns on both sides of the border and has made recommendations to improve the situation. Local residents can help by minimizing their use of fertilizers and pesticides and by ensuring their septic tanks are working properly.

## Hopington-Salmon River Aquifer

### What is the general state of water quality?

The water quality of the Hopington- Salmon River aquifer is fair (index = 18) with nitrate-nitrogen concentrations not meeting acceptable levels for drinking water in certain parts of the aquifer. Better control of agricultural wastes being applied to farmland

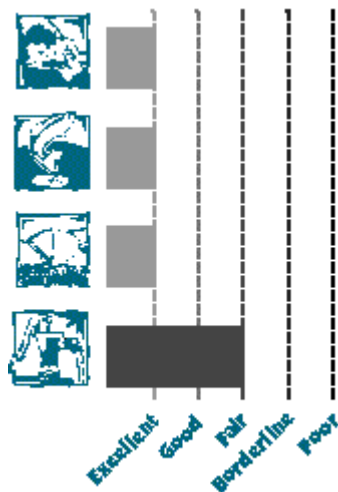
### What are the main attributes of the Hopington-Salmon River Aquifer?

The aquifer occupies a portion of the Salmon River watershed northeast of Langley. The aquifer is an important source of water supply and is highly vulnerable to contamination.



will help improve water quality.

## Fair



### What are the potential sources of contamination?

These include nitrate from agricultural activities (manures and chemical fertilizers) and septic systems. There are also manufactured materials, such as gasoline or pesticides, which can enter ground water in trace amounts.

### Which objectives have been set?

Although no water quality objectives have been set for this aquifer yet, the index ranking is based on the drinking water guideline for nitrate nitrogen.

### What are the main uses of the aquifer?

Uses include drinking water, livestock watering, irrigation, and industrial supplies. The aquifer discharges into the Salmon River and can potentially impact aquatic life.

### Which objectives were not met?

From 1993 to 1994, the drinking water guideline for nitrate-nitrogen was not met in certain areas of the aquifer. The general state of water quality represents average conditions in the aquifer, with the drinking guideline for nitrate being exceeded in a number of specific wells.

### What does it mean to not meet this guideline?

High nitrate-nitrogen concentrations above the drinking water guideline can cause methaemoglobinaemia (blue baby syndrome) when consumed by young infants.

### What will be done to improve matters?

The Ministry will continue to monitor ground water quality in the aquifer and encourage the development of well and aquifer protection plans at the local level. The major remedy will be reductions in manure applications. Local residents can help by minimizing the use of fertilizers and pesticides and by ensuring their septic tanks are working properly.

## Langley-Brookswood Aquifer

### What is the general state of water quality?

The water quality of the Langley-Brookswood Aquifer is fair (index = 26) with nitrate-nitrogen concentrations not meeting acceptable levels for drinking water in certain areas of the aquifer. Better control of agricultural wastes applied to farmland will help improve water quality.

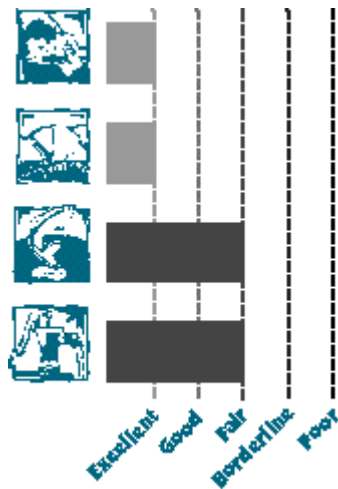
### What are the main attributes of the Langley-Brookswood Aquifer?

The aquifer, south of Langley, is an important source of water supply and is highly vulnerable to contamination.

### What are the potential sources of contamination?

These include nitrate from agricultural activities (manures and chemical fertilizers) and septic systems. There are also manufactured materials, such as gasoline or

## Fair



pesticides, which can enter ground water in trace amounts.

### Which objectives have been set?

Although no water quality objectives have been set for this aquifer yet, the index ranking is based on the drinking water guideline for nitrate nitrogen.

### What are the main uses of the aquifer ?

Uses include drinking water, livestock watering, irrigation and industrial supplies. The aquifer discharges into surface water sources and may thus impact aquatic life.

### Which objectives were not met?

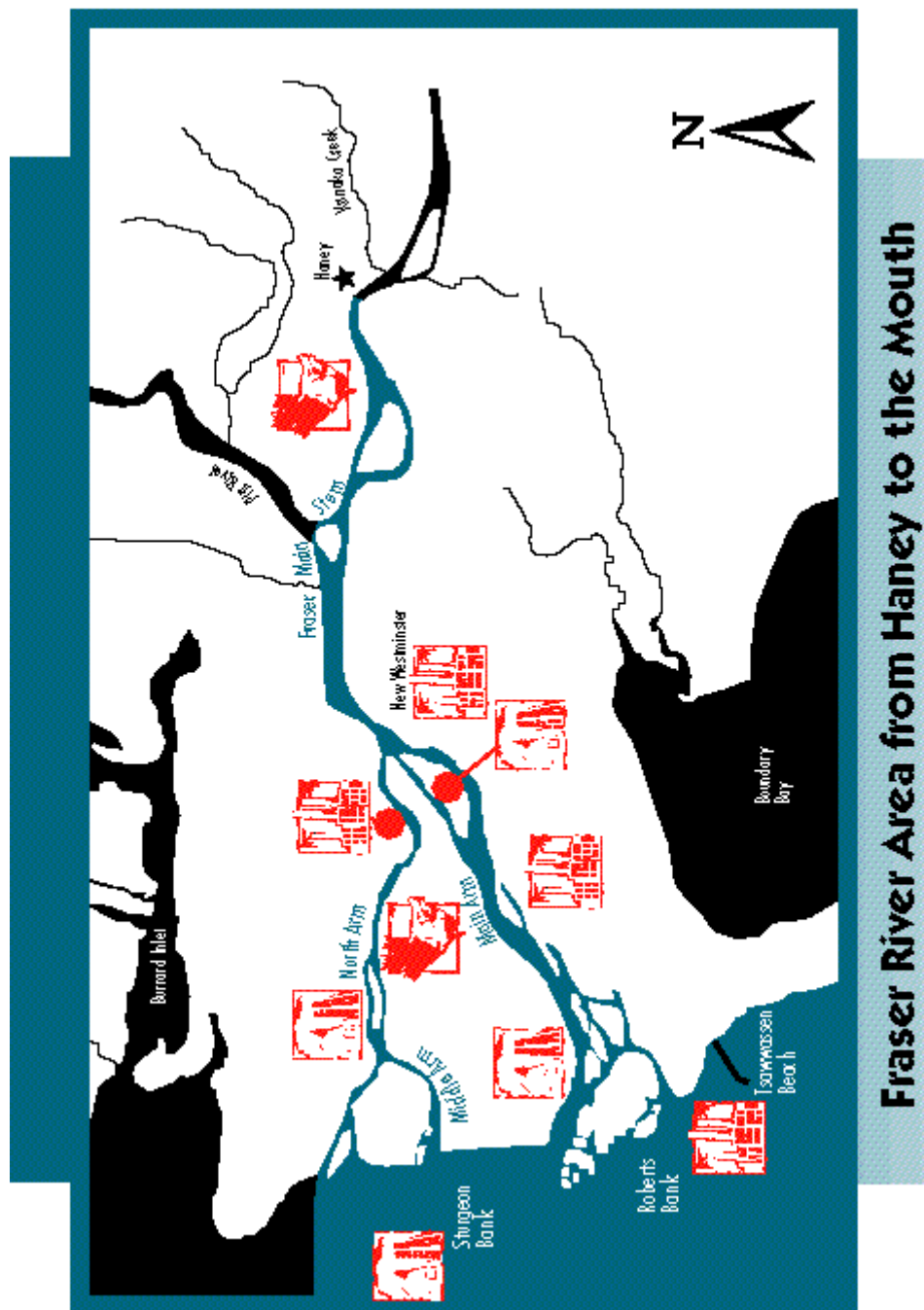
From 1993 to 1994, the drinking water guideline for nitrate-nitrogen was not met in certain areas of the aquifer. The general state of water quality represents average conditions in the aquifer, with the drinking guideline for nitrate being exceeded in a number of specific wells.

### What does it mean to not meet this guideline?

High nitrate-nitrogen concentrations above the drinking water guideline can cause methaemoglobinaemia (blue baby syndrome) when consumed by young infants. Where ground water recharges surface streams, high nitrate values could impact fish at low stream flows.

### What will be done to improve matters?

The Ministry will continue to monitor ground water quality in the aquifer and encourage the development of well and aquifer protection plans at the local level. The main remedy will be reductions in manure applications. Local residents can help by minimizing their use of fertilizers and pesticides and by ensuring their septic tanks are working properly.



**Fraser River Area from Haney to the Mouth**

## Fraser River from Haney to New Westminster

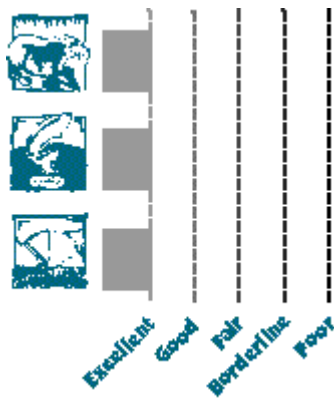
### What is the general state of water quality?

Fraser River water quality from Haney to New Westminster is good (index = 4). There may be some minor effects due to agricultural operations or combined sewer overflows.

### What are the main attributes of the Fraser River from Haney to New Westminster?

The Fraser River between Haney and New Westminster is a world-class migratory route for five species of salmon. It also provides a habitat for spawning for a large number of resident fish species.

## Good



### What are the potential sources of contamination?

These include agriculture, pulp mills and municipal discharges further upstream, and a number of treated municipal and industrial discharges located between Haney and New Westminster.

### Which objectives have been set?

The objectives for this reach of the Fraser River are presently being updated, with revised objectives to be published in 1996. Objectives were set in 1985 for those characteristics related to contaminant sources between Haney and New Westminster. They include objectives for fecal coliforms, dissolved oxygen, chlorophenols, PCBs, and pH.

### What are the main uses of the river?

Uses include irrigation and use by aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

Objectives not met were those for dissolved oxygen in 1987 and pH in 1991. Otherwise, all the objectives were met between 1987 and 1993.

### What does it mean to not meet these objectives?

The amount by which the dissolved oxygen and pH objectives were not met was small so that the impact on aquatic life that one year would be minimal.

### Why is the general state worse than any use rating?

The general state reflects possible minor impacts on aquatic life.

### What will be done to improve matters?

Objectives may have been exceeded due to agricultural practices or combined sewer overflows. Because effects were minor and infrequent, a study to find and correct the causes is a low priority at this time.

## Fraser River Main Arm

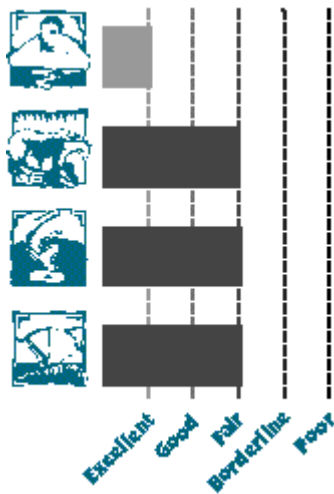
### What is the general state of water quality?

Fraser River water quality from New Westminster to the mouth in the Main Arm is fair (index = 28). Fecal coliforms levels were high on a regular basis, but will be reduced by the upgrading at Annacis and Lulu.

### What are the main attributes of the Fraser River Main (or South) Arm?

The Fraser River Main Arm between New Westminster and the mouth is a world-class migratory route for five species of salmon and provides important rearing habitat for salmon. It also provides habitat for a large number of

## Fair



resident fish species.

### What are the potential sources of contamination?

These include two primary treatment municipal discharges at Annacis and Lulu and a number of industrial discharges.

### Which objectives have been set?

The objectives for this reach of the Fraser River are presently being updated, with revised objectives to be published in 1996. Objectives set in 1985 were for those characteristics related to municipal and industrial sources between New Westminster and the mouth. They include objectives for fecal coliforms, dissolved oxygen, metals, chlorophenols, PCBs, and pH.

### What are the main uses of the arm?

Uses include irrigation, use by aquatic life and wildlife, and recreation such as boating. These uses are protected when the objectives are met.

### Which objectives were not met?

Objectives were not met for fecal coliforms between 1987 and 1993. As well, objectives for dissolved oxygen, PCBs, chlorophenols, copper and pH were not met on occasion.

### What does it mean to not meet these objectives?

The fecal coliform objectives were never achieved and were exceeded significantly. This means that irrigation with this water would be a concern, especially for crops eaten raw. The occasional depletion of dissolved oxygen in some of the sloughs could restrict the amount of useful habitat for aquatic life. Chlorophenols and PCBs, occasionally in excess of the objective, may be bio-accumulating based on one fish sample collected in 1990.

### What will be done to improve matters?

Chlorophenols are no longer used in antisapstain treatment of wood and PCB use is banned. The high fecal coliform concentrations originate from upstream sources and the discharges from the municipal sewage treatment plants. Improved disinfection should occur when the two plants at Annacis and Lulu are upgraded to secondary treatment. Residents connected to the sewerage system can help by using biodegradable cleansers and by not flushing toxic materials into the system.

## Fraser River North Arm

### What is the general state of water quality?

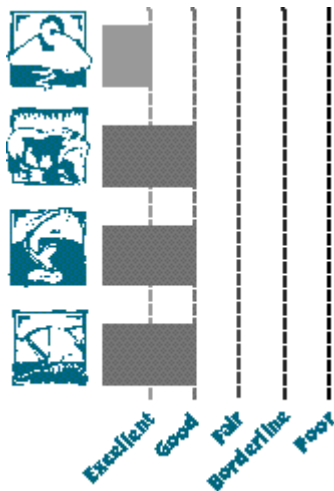
Fraser River water quality from New Westminster to the mouth in the North Arm is

### What are the main attributes of the Fraser River North Arm?

The Fraser River North Arm between New Westminster

fair (index = 18). The main problem is high fecal coliform levels which will be reduced by sewage treatment plant upgrades, although work will still be needed on combined sewer overflows.

## Fair



and the mouth is a world-class migratory route for five species of salmon. It also provides habitat for a large number of resident and migratory fish species, while being a major area for log storage.

### What are the potential sources of contamination?

These include a number of industrial discharges, a large number of storm sewers and combined sewer overflows and, on occasion, sewage from the Annacis Island sewage treatment plant.

### Which objectives have been set?

The objectives are presently being updated, with revised objectives to be published in 1996. Objectives set in 1985 were for characteristics related to stormwater, combined sewer overflows, and municipal and industrial sources between New Westminster and the mouth. They include objectives for fecal coliforms, pH, dissolved oxygen, metals, chlorophenols, and PCBs.

### What are the main uses of the arm?

Uses include irrigation, use by aquatic life and wildlife, and recreation such as boating.

### Which objectives were not met?

Between 1987 and 1993, objectives for dissolved oxygen were not met at the bottom of sloughs. As well, objectives for fecal coliforms, chlorophenols, copper, pH, and suspended solids were not met on occasion in the main reach of the arm.

### What does it mean to not meet these objectives?

High fecal coliform levels could be a concern for irrigation, especially for crops eaten raw. Low dissolved oxygen values in the bottom of sloughs could restrict habitat for aquatic life.

### Why is the general state worse than any use rating?

The general state reflects the fact that several uses of the water can be impacted.

### What will be done to improve matters?

Chlorophenol is no longer used in antisapstain treatment of lumber. The high fecal coliform concentrations originate from stormwater, combined sewer overflows, and from the Annacis sewage treatment plant. Improved disinfection should occur when the plant is upgraded to secondary treatment. The combined sewer overflows will be eliminated eventually by

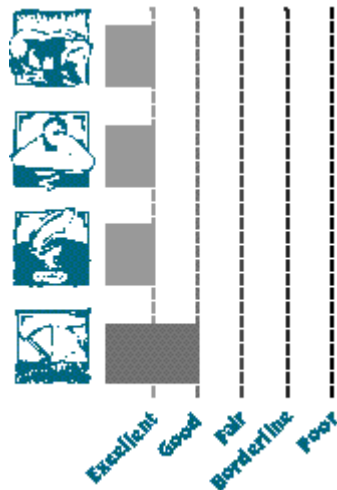
Vancouver's long-term sewer separation program. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

# Fraser River Middle Arm

## What is the general state of water quality?

Fraser River water quality from the Oak Street bridge to the mouth in the Middle Arm is good (index = 6). Most of the water quality objectives were met on a regular basis.

## Good



## What are the main attributes of the Fraser River Middle Arm?

The Fraser River Middle Arm between the Oak Street bridge and the mouth is a small part of the world-class migratory route for five species of salmon. It also provides habitat for a large number of resident and migratory fish species.

## What are the potential sources of contamination?

These include a small number of industrial discharges and stormwater sewers.

## Which objectives have been set?

The objectives for this reach of the Fraser River are presently being updated, with revised objectives to be published in 1996. Objectives set in 1985 were for those characteristics related to stormwater, combined sewer overflows, and municipal and industrial sources between New Westminster and the mouth. They include objectives for fecal coliforms, dissolved oxygen, metals, chlorophenols, PCBs, and pH.

## What are the main uses of the arm?

Uses include irrigation, recreation such as boating, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

## Which objectives were not met?

Between 1987 and 1993, objectives were not met for fecal coliforms in one year, and for dissolved oxygen, pH, and copper on single occasions.

## What does it mean to not meet these objectives?

The fecal coliform objectives were not always achieved, which means that irrigation with this water could be a concern, especially for crops eaten raw.

## What will be done to improve matters?

The high fecal coliform concentrations originate from stormwater, combined sewer overflows, and from the Annacis sewage treatment plant. Improved disinfection should occur when the plant is upgraded to secondary treatment. The combined sewer overflows will be eliminated eventually by Vancouver's long-term sewer separation program. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

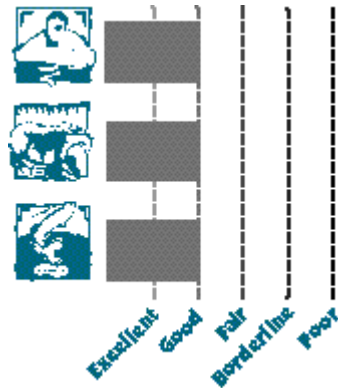


# Sturgeon Bank

## What is the general state of water quality?

Sturgeon Bank water quality is fair (index = 43). The bank was badly contaminated in the past from the old Iona sewage treatment plant outfall. Now that the outfall is to deep water, the bank is recovering.

## Fair



## What are the main attributes of Sturgeon Bank?

Sturgeon Bank is that shallow area of the Strait of Georgia into which the North and Middle Arms of the Fraser River discharge. It provides important marine habitat for a large number of aquatic species. It also has some recreational beach areas.

## What are the potential sources of contamination?

These include past deposits from the Iona sewage treatment plant and certain discharges from further upstream.

## Which objectives have been set?

The objectives for Sturgeon Bank are presently being updated, with revised objectives to be published in 1996. Objectives were set in 1985 for those characteristics related to discharges in the lower Fraser River. They include objectives for fecal coliforms, dissolved oxygen, chlorophenols, and ammonia.

## What are the main uses of the bank?

Uses include recreation such as swimming, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

## Which objectives were not met?

Objectives for dissolved oxygen, fecal coliforms at the beaches, and chlorophenols in sediments were not met in 1993. Objectives were only checked in 1988 and 1993.

## What does it mean to not meet these objectives?

Low dissolved oxygen can impact aquatic life. The presence of chlorophenols in the sediments is a warning that bioaccumulation in aquatic life could occur. The beach areas were generally good for swimming.

## Why is the general state worse than any use rating?

The general state reflects the fact that more than one use of the water can be impacted.

## Does anything need to be done to improve matters?

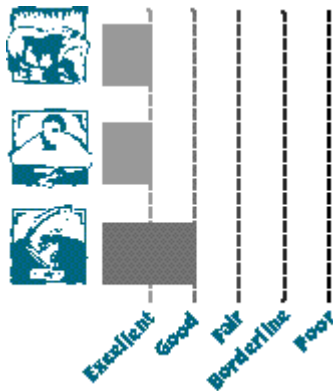
The problems on Sturgeon Bank are the result of the historic Iona discharge onto the bank. Over time, the area will recover fully now that the Iona effluent is dispersed through a deep-sea outfall beyond the bank.

## Roberts Bank

### What is the general state of water quality?

Roberts Bank water quality is good (index = 10). Most of the water quality objectives were met on a regular basis.

### Good



### What are the main attributes of Roberts Bank?

Roberts Bank is located south from Sturgeon Bank in the Strait of Georgia and receives the discharge from the Main Arm of the Fraser River. It provides important marine habitat for a large number of aquatic species. It also has some recreational beach areas.

### What are the potential sources of contamination?

These include a bulk coal loading facility and contaminants carried downstream by the Fraser River.

### Which objectives have been set?

The objectives for Roberts Bank are presently being updated, with revised objectives to be published in 1996. Objectives set in 1985 were for those characteristics related to discharges in the lower Fraser River. They include objectives for fecal coliforms, dissolved oxygen, chlorophenols, and ammonia.

### What are the main uses of the bank?

Uses include recreation such as swimming, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

Objectives for dissolved oxygen were not met once in 1993. Objectives were checked only in 1988 and 1993.

### What does it mean to not meet these objectives?

The dissolved oxygen objective was not met once, which means aquatic life might have been impacted at that time.

### Does anything need to be done to improve matters?

Further monitoring is required to ensure that the quality of the water is maintained.

## Tsawwassen Beach

### What is the general state of water quality?

Tsawwassen Beach water quality is excellent (index = 0). Fecal coliform objectives were met

### What are the main attributes of Tsawwassen Beach?

Tsawwassen Beach borders the Strait of Georgia south

on a regular basis.

## Excellent



from the BC Ferry causeway. It is an important recreational beach area.

### What are the potential sources of contamination?

They include contaminants carried downstream by the Fraser River, or north from Boundary Bay and from Blaine, Washington.

### Which objectives have been set?

The only objective is for fecal coliforms.

### What are the main uses of the beach?

The main use is for recreation, such as swimming, which is protected when the objective is met.

### Was the objective met?

The objective was met between 1987 and 1993.

### What does it mean to meet this objective?

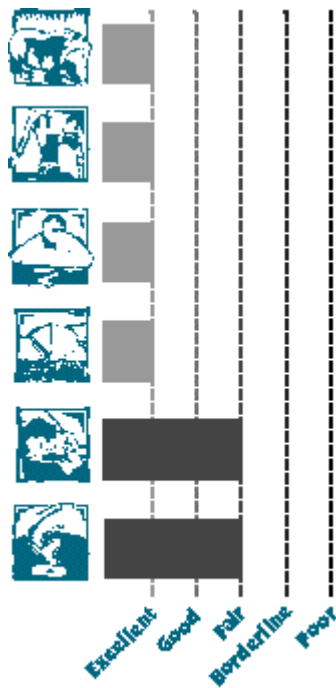
The beach area is generally excellent for swimming.

### Does anything need to be done to improve matters?

No, other than continued monitoring during the recreation season.



## Fair



These include non-point sources such as agricultural runoff.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, the growth of algae, dissolved oxygen, and pH. The objectives were set for those characteristics that relate to non-point sources.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, irrigation, drinking water with complete treatment, and recreation such as swimming. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1990 to 1993, objectives for fecal coliforms, suspended solids, and dissolved oxygen were often not met.

### What does it mean to not meet these objectives?

High fecal coliform levels can be a concern for swimming and livestock watering because of the possible presence of disease-causing organisms. Occasionally low dissolved oxygen and high suspended solids can impact aquatic life.

### What will be done to improve matters?

The Ministry will continue to work with feedlot operators to divert runoff and eliminate manure storage.

## Pitt River

### What is the general state of water quality?

Pitt River water quality is good (index = 16). The Ministry has regulated antisepstain discharges and is working with the Agricultural Waste Regulation to improve agricultural practices.

## Good

### What are the main attributes of the Pitt River?

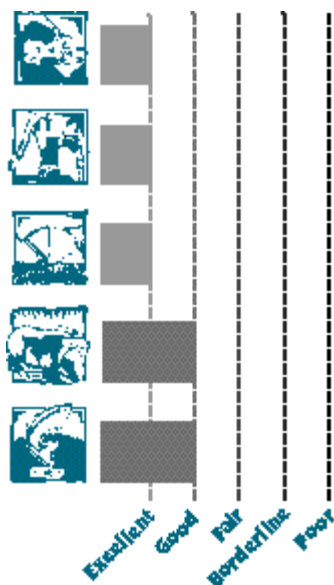
The Pitt River, a tributary to the Fraser River, provides valuable spawning and rearing grounds for salmonids.

### What are the potential sources of contamination?

These include non-point sources such as agriculture and marinas and a sawmill using antisepstain chemicals.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, chlorophenols, the growth of algae, dissolved oxygen, and pH. The objectives were set for those characteristics that relate to non-point sources



and the sawmill.

#### What are the main uses of the river?

Uses include those of aquatic life, wildlife, livestock watering, irrigation, and drinking water that needs complete treatment before consumption. These uses are protected when the objectives are met.

#### Which objectives were not met?

From 1990 to 1993, objectives for suspended solids and turbidity were often not met and the objective for chlorophenol in sediments was not met once.

#### What does it mean to not meet these objectives?

High suspended solids can on occasion impact fish. Chlorophenols in the water and sediments can be toxic to aquatic life and can enter the food chain by accumulating in sediment-dwelling organisms on which fish feed. Drinking water users should ensure that their treatment systems are working properly.

#### What will be done to improve matters?

The Ministry has regulated antisapstain discharges and is enforcing agricultural waste regulations, for example the reduction of the depth of woodwaste used by horse riding operations.

## Pitt Lake

#### What is the general state of water quality?

Pitt Lake water quality is good (index = 4). The Ministry will inspect forestry operations so as to prevent water quality degradation.

### Good

#### What are the main attributes of Pitt Lake?

Pitt Lake, which drains into the Pitt River, provides valuable spawning and rearing grounds for salmonids.

#### What are the potential sources of contamination?

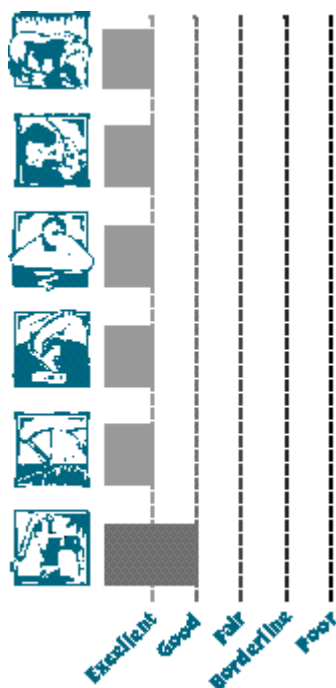
These include non-point sources such as forestry.

#### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, and pH. The objectives were set for those characteristics that relate to forest harvesting operations.

#### What are the main uses of the lake?

Uses include those of aquatic life, wildlife, recreation, livestock watering, irrigation, and drinking water that is disinfected only. These uses are protected when the objectives are met.



### Which objectives were not met?

From 1990 to 1993, objectives for turbidity were not met once.

### What does it mean to not meet these objectives?

High turbidity can detract from the aesthetics of the lake for swimmers. Drinking water users should ensure that their treatment systems are working properly.

### What will be done to improve matters?

The Ministry will be using the provisions of the Forest Practices Code to increase inspections of forest activities and thereby prevent degradation of water quality.

## Alouette River

### What is the general state of water quality?

Alouette River water quality is fair (index = 24). The Ministry will continue to enforce regulations that improve the agricultural practices of farmers.

### Fair

### What are the main attributes of the Alouette River?

The Alouette River is the most important Pitt River tributary for spawning and rearing of salmonids.

### What are the potential sources of contamination?

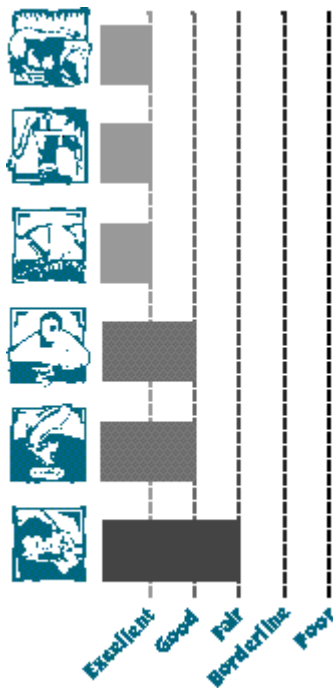
These include non-point sources such as agriculture.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, the growth of algae, dissolved oxygen, and pH. The objectives were set for those characteristics that relate to agriculture.

### What are the main uses of the river?

Uses include those of aquatic life, wildlife, livestock watering, recreation such as swimming, irrigation, and drinking water that needs complete treatment before consumption. These uses are protected when the objectives are met.



### Which objectives were not met?

From 1990 to 1993, objectives for dissolved oxygen and fecal coliforms were usually not met.

### What does it mean to not meet these objectives?

Low dissolved oxygen levels and high suspended solids can, on occasion, impact fish. High fecal coliform levels mean that livestock can be exposed to disease-causing organisms. Drinking water users should ensure that their treatment systems are working properly.

### What will be done to improve matters?

The Ministry will continue to correct problems, such as improper covering of manure piles, at nurseries, dairy farms, and feedlots. BC Hydro will control river flows in the future to improve the habitat for fish.

## North Alouette River

### What is the general state of water quality?

North Alouette River water quality is fair (index = 22). The Ministry will continue to enforce regulations that improve the agricultural practices of farmers.

### Fair

### What are the main attributes of the North Alouette River?

The North Alouette River, a tributary to the Alouette River, is important for spawning and rearing of salmonids.

### What are the potential sources of contamination?

These include non-point sources such as agriculture.

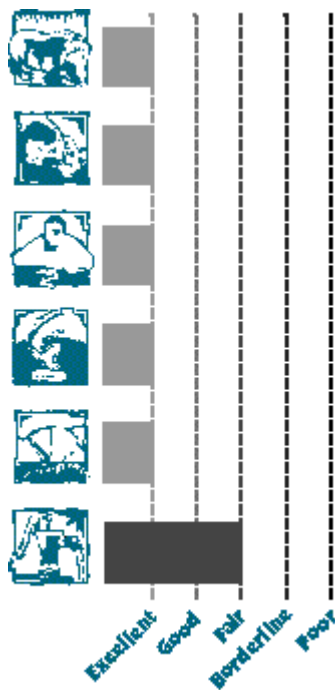
### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, the growth of algae, dissolved oxygen, and pH. The objectives were set for those characteristics that relate to agriculture.

### What are the main uses of the river?

Uses include those of aquatic life, wildlife, livestock watering, recreation such as swimming, irrigation, and drinking water that needs complete treatment before consumption. These uses are protected when the





objectives are met.

#### Which objectives were not met?

From 1990 to 1993, objectives for dissolved oxygen, turbidity, and fecal coliforms were usually not met.

#### What does it mean to not meet these objectives?

The objectives were usually not met by only a small amount. Low dissolved oxygen levels can on occasion impact fish. High turbidity interferes with aesthetics for recreation. Drinking water users should ensure that their treatment systems are working properly.

#### What will be done to improve matters?

The Ministry will continue to work with farmers in the area. This includes issuing pollution abatement orders and charging operators who do not follow their waste management plans.

## Alouette Lake

#### What is the general state of water quality?

Alouette Lake water quality is excellent (index = 3). The Ministry will continue to monitor the lake to ensure that this high quality water is maintained.

## Excellent

#### What are the main attributes of Alouette Lake?

Alouette Lake, which drains into the Alouette River, is important for spawning and rearing of salmonids.

#### What are the potential sources of contamination?

These include non-point sources such as agriculture.

#### Which objectives have been set?

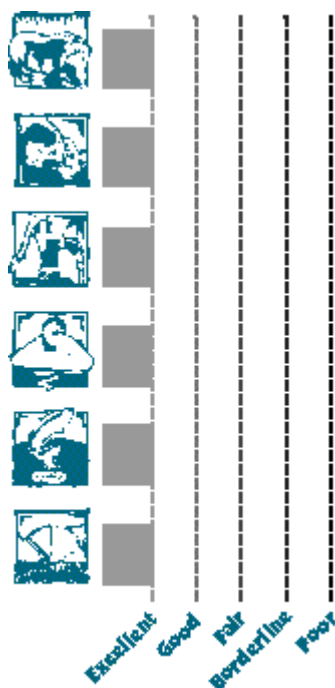
Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, and pH. The objectives were set for characteristics that relate to agriculture.

#### What are the main uses of the lake?

Uses include those of aquatic life, wildlife, livestock watering, recreation such as swimming, irrigation, and drinking water treated only with disinfection. These uses are protected when the objectives are met.

#### Which objectives were not met?

In 1991, the objective for a microbiological indicator was



not met by a small margin.

#### **What does it mean to not meet this objective?**

Drinking water users should ensure that their treatment systems are working properly.

#### **Does anything need to be done to improve matters?**

The Ministry should continue to monitor the lake to ensure that the high quality of the water is maintained. Residents near the lake should ensure that their septic tanks are working properly and should minimize the use of fertilizer and pesticide.

## **Coquitlam River**

#### **What is the general state of water quality?**

Coquitlam River water quality is fair (index = 34). The Ministry will require farms to treat contaminated runoff and will inspect forestry operations so as to prevent water quality degradation.

**Fair**

#### **What are the main attributes of the Coquitlam River?**

The Coquitlam River, a tributary to the Fraser River, is important for spawning and rearing of salmonids.

#### **What are the potential sources of contamination?**

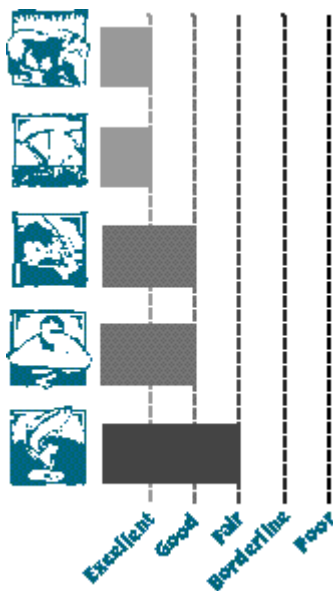
These include non-point sources such as agriculture and forestry and point sources such as gravel operations.

#### **Which objectives have been set?**

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, the growth of algae, dissolved oxygen, and pH. The objectives were set for those characteristics that relate to non-point sources and the gravel washing operations.

#### **What are the main uses of the river?**

Uses include those of aquatic life, wildlife, livestock watering, irrigation, and recreation such as swimming.



These uses are protected when the objectives are met.

### Which objectives were not met?

From 1990 to 1993, objectives for suspended solids, fecal coliforms, and dissolved oxygen were often not met.

### What does it mean to not meet these objectives?

High suspended solids and low dissolved oxygen can impact fish. High levels of fecal coliforms show that there are times when swimming will be impaired and livestock might be exposed to disease-causing organisms.

### What will be done to improve matters?

The Ministry will be requiring the treatment of contaminated runoff from intensively farmed areas and the covering of manure, woodwaste, and compost piles. The Ministry will also be using the provisions of the Forest Practices Code to increase inspections of forest activities and thereby prevent degradation of water quality. Some treatment of the effluent from gravel pits has occurred and the Ministry is working with other agencies to improve treatment levels.

## Or Creek

### What is the general state of water quality?

Or Creek water quality is good (index = 15). The Ministry will be inspecting forestry activities to ensure that these are not affecting water quality.

### Good

### What are the main attributes of Or Creek?

Or Creek, a tributary to the Coquitlam River just below Coquitlam Lake, is important for spawning and rearing of salmonids.

### What are the potential sources of contamination?

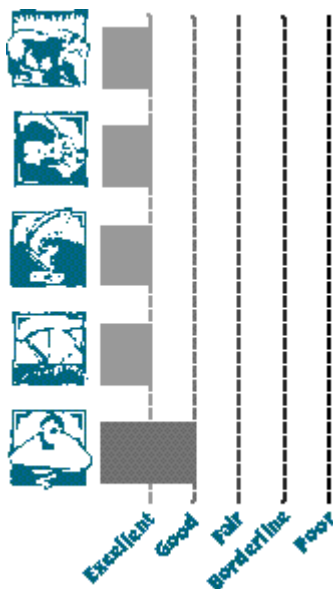
These include non-point sources such as forestry operations.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, the growth of algae, dissolved oxygen, and pH. The objectives were set for those characteristics that relate to forestry operations.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, irrigation, and recreation such as swimming. These uses are protected when the objectives are met.



### Which objectives were not met?

From 1990 to 1993, objectives for fecal coliforms and the growth of algae were not met on occasion.

### What does it mean to not meet these objectives?

Heavy growths of algae show that there are times when swimming and the aesthetic appearance of the creek may be affected.

### What will be done to improve matters?

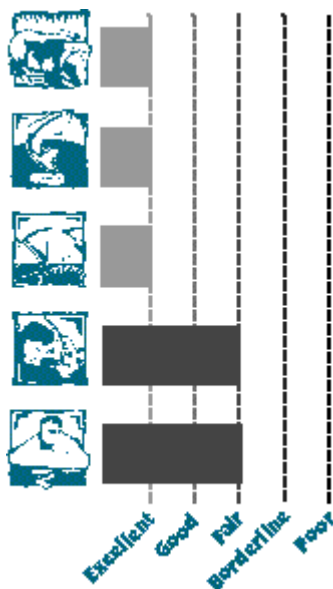
The Ministry will be using the provisions of the Forest Practices Code to increase inspections of forest activities and thereby prevent degradation of water quality.

## Scott Creek

### What is the general state of water quality?

Scott Creek water quality is fair (index = 34). Ways of dealing with stormwater runoff to the creek are under study. The restoration of the creek as salmon habitat is considered important.

### Fair



### What are the main attributes of Scott Creek?

Scott Creek, a tributary to the Coquitlam River near its mouth, is important for spawning and rearing of salmonids.

### What are the potential sources of contamination?

These include non-point sources such as urban stormwater runoff.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, the growth of algae, dissolved oxygen, and pH. The objectives were set for those characteristics that relate to urban stormwater runoff.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, irrigation, and recreation such as swimming. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1990 to 1993, objectives for fecal coliforms and

dissolved oxygen were not met on occasion.

### What does it mean to not meet these objectives?

High fecal coliform levels can be a concern for swimming and livestock watering because of disease-causing organisms. Occasionally low dissolved oxygen can impact aquatic life.

### What will be done to improve matters?

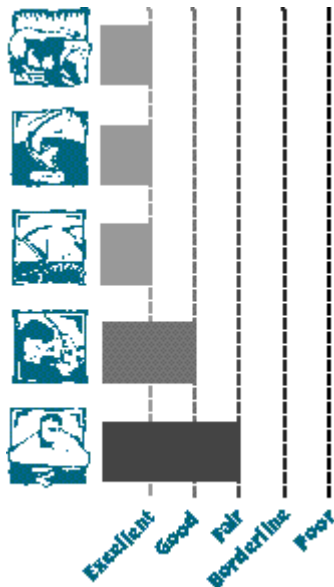
The Ministry and the GVRD are still studying ways of dealing with stormwater runoff. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Hoy Creek

### What is the general state of water quality?

Hoy Creek water quality is fair (index = 25), with the restoration of the creek as salmon habitat considered to be important. Ways of dealing with stormwater runoff to the creek are under study.

### Fair



### What are the main attributes of Hoy Creek?

Hoy Creek, a tributary of Scott Creek near the mouth of the Coquitlam River, is important for spawning and rearing of salmonids.

### What are the potential sources of contamination?

These include non-point sources such as urban stormwater runoff.

### Which objectives have been set?

Those for suspended solids, turbidity, ammonia, nitrite, the growth of algae, dissolved oxygen, and pH. The objectives were set for characteristics that relate to urban stormwater runoff.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, irrigation, and recreation such as swimming. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1991 to 1993, objectives for fecal coliforms and dissolved oxygen were often not met.

### What does it mean to not meet these objectives?

Low dissolved oxygen can impact fish. High levels of fecal coliforms show that there are times when swimming may not be recommended and livestock might be exposed to disease-causing organisms.

## What will be done to improve matters?

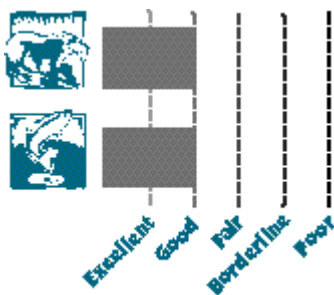
The Ministry and GVRD are studying ways of dealing with urban stormwater runoff. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Brunette River

### What is the general state of water quality?

Brunette River water quality is good (index = 14). The Ministry and the GVRD are examining ways of dealing with urban stormwater runoff.

### Good



### What are the main attributes of the Brunette River?

The Brunette River, a tributary of the Fraser River, is important for spawning and rearing of salmonids and provides opportunities to enhance fish populations.

### What are the potential sources of contamination?

These include non-point sources such as urban stormwater runoff and treated stormwater runoff from oil storage centres.

### Which objectives have been set?

Those for suspended solids, turbidity, ammonia, nitrite, the growth of algae, dissolved oxygen, metals, and pH. The objectives were set for those characteristics that relate to non-point sources.

### What are the main uses of the river?

Uses include those of aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1990 to 1993, objectives for dissolved oxygen, nitrite, the growth of algae, and mercury in fish were not met on occasion.

### What does it mean to not meet these objectives?

Low dissolved oxygen levels and high nitrite can on occasion impact fish. Heavy growths of algae can reduce spawning areas. High mercury levels in fish can be a concern for organisms higher in the food chain, such as humans and wildlife, which consume these fish. Finding the source of the mercury will require further research.

## What will be done to improve matters?

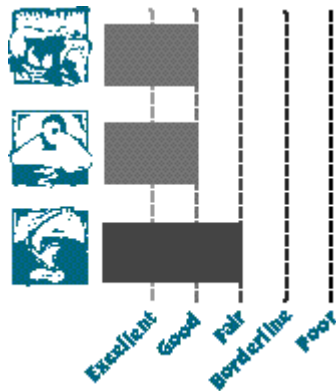
The Ministry is working with the GVRD to find a way to treat urban stormwater runoff. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Burnaby Lake

### What is the general state of water quality?

Burnaby Lake water quality is fair (index = 30). The Ministry and the GVRD are examining ways of dealing with urban stormwater runoff.

### Fair



### What are the main attributes of Burnaby Lake?

Burnaby Lake, which drains into the Brunette River, is important for recreational pursuits, rearing salmonids, and enhancing fish populations.

### What are the potential sources of contamination?

These include non-point sources such as urban stormwater runoff.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, the growth of algae, dissolved oxygen, metals, and pH. Objectives were set for those characteristics that relate to non-point sources.

### What are the main uses of the lake?

Uses include the protection of aquatic life and wildlife, with the goal of adding recreation such as swimming in the long-term. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1990 to 1993, objectives for dissolved oxygen, fecal coliforms, and mercury in fish were often not met.

### What does it mean to not meet these objectives?

Low dissolved oxygen levels can, on occasion, impact fish. High levels of fecal coliforms can detract from the long-term goal of recreation. High mercury levels in fish can be a concern for organisms higher in the food chain, such as humans and wildlife, which consume these fish. Finding the source of the mercury will require further research.

### What will be done to improve matters?

The Ministry is working with the GVRD to find a way to treat urban stormwater runoff. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains. Residents near the lake should minimize the use of fertilizers and pesticides.

## Still Creek

### What is the general state of water quality?

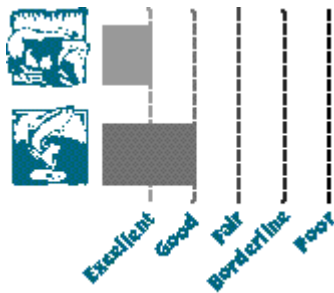
Still Creek water quality is good (index = 10). The Ministry and the GVRD are examining

### What are the main attributes of Still Creek?

Still Creek, which flows into Burnaby Lake, is important spawning and rearing habitat for salmonids and

ways of dealing with urban stormwater runoff.

## Good



provides opportunities to enhance fish populations.

### What are the potential sources of contamination?

These include non-point sources such as urban stormwater runoff.

### Which objectives have been set?

Those for suspended solids, turbidity, ammonia, nitrite, the growth of algae, dissolved oxygen, metals, and pH. The objectives were set for those characteristics that relate to non-point sources.

### What are the main uses of the creek?

Uses include those of aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1990 to 1993, objectives for dissolved oxygen and the growth of algae were not always met.

### What does it mean to not meet these objectives?

Low dissolved oxygen levels can impact fish. Heavy growths of algae can reduce spawning areas.

### What will be done to improve matters?

The Ministry is working with the GVRD to find a way to treat urban stormwater runoff. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Deer Lake

### What is the general state of water quality?

Deer Lake water quality is fair (index = 21). The Ministry and the GVRD are examining ways of dealing with urban stormwater runoff.

### What are the main attributes of Deer Lake?

Deer Lake, which flows into Burnaby Lake, is important for recreational pursuits, rearing salmonids, and enhancing fish populations.

## Fair

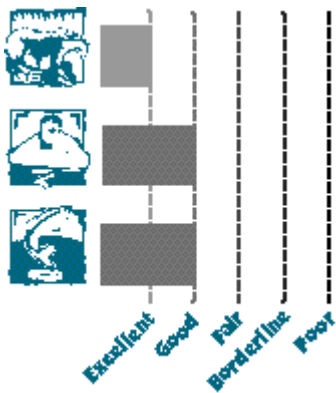
### What are the potential sources of contamination?

These include non-point sources such as urban stormwater runoff.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, the growth of algae, dissolved oxygen, metals, and pH. The objectives were set for those characteristics that relate to non-point sources.





### What are the main uses of the lake?

Uses include those of aquatic life and wildlife, with the goal of adding recreation such as swimming in the long-term. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1991 to 1993, objectives for dissolved oxygen and fecal coliforms were often not met.

### What does it mean to not meet these objectives?

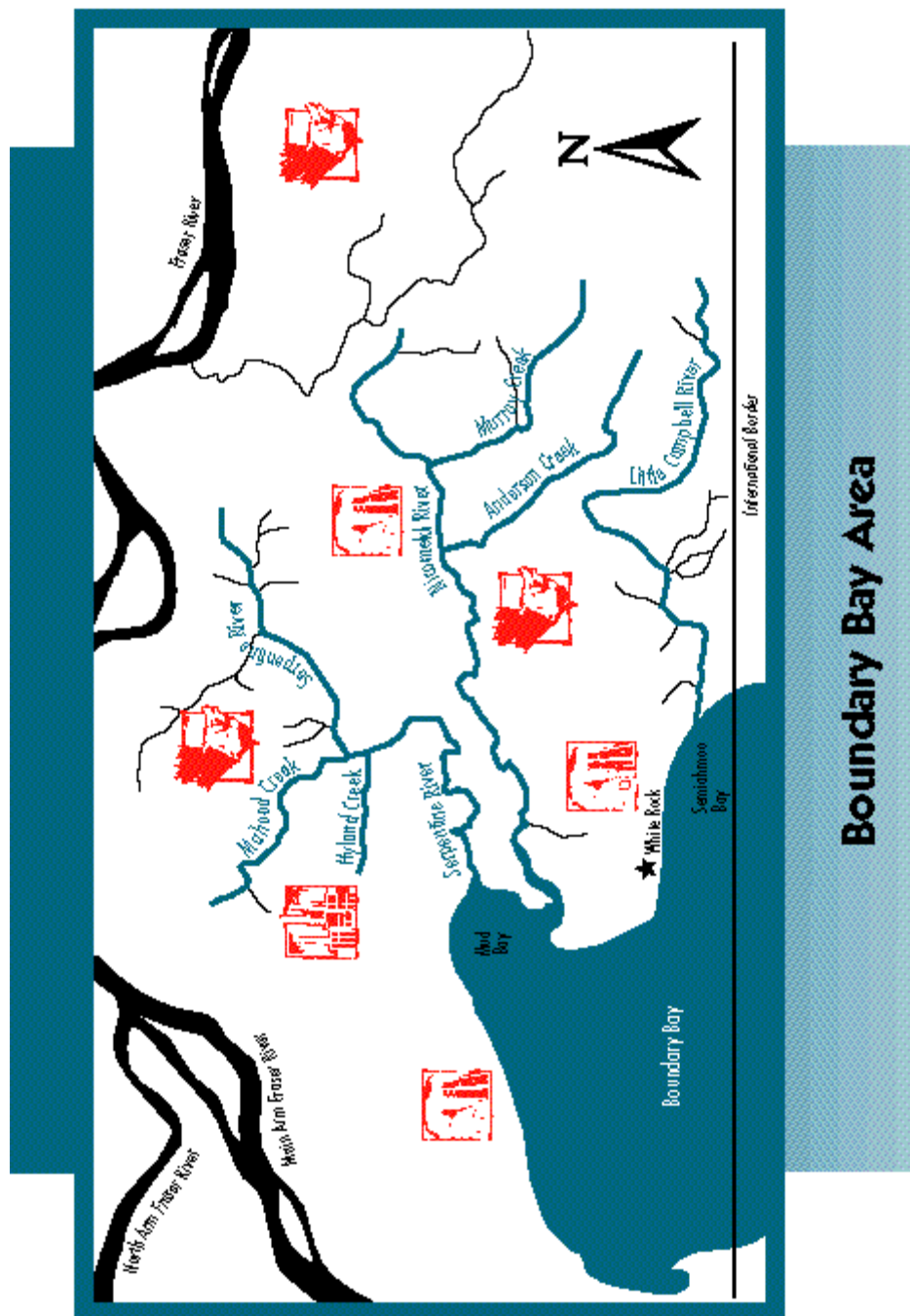
Low dissolved oxygen levels can, on occasion, impact fish. High levels of fecal coliforms can detract from the long-term goal of swimming.

### Why is the general state worse than any use rating?

The general state reflects the fact that more than one use of the water may be impacted.

### What will be done to improve matters?

The Ministry is working with the GVRD to find a way to treat urban stormwater runoff. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.



## Boundary Bay

### What is the general state of water quality?

Boundary Bay water quality is fair (index = 40). The Ministry will continue to work to improve agricultural practices in the area.

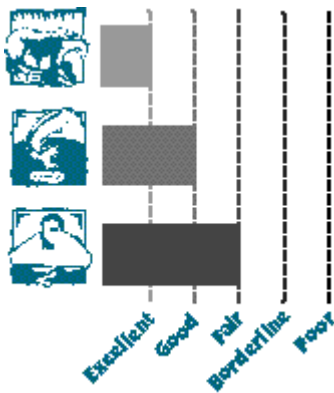
**Fair**

### What are the main attributes of Boundary Bay?

Boundary Bay is important for its recreational areas and as habitat for aquatic life.

### What are the potential sources of contamination?

These include upland point and non-point sources such as urban runoff and agriculture. Accidental releases from the City of Blaine sewage system in Washington



have resulted in beach closures.

#### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, PCBs, and dissolved oxygen. The objectives were set for those characteristics that relate to upland sources.

#### What are the main uses of the bay?

Uses include those of aquatic life, wildlife, and recreation such as swimming. These uses are protected when the objectives are met.

#### Which objectives were not met?

From 1988 to 1993, the objectives for fecal coliforms and dissolved oxygen were often not met, while the suspended solids objective was occasionally not met.

#### What does it mean to not meet these objectives?

Low dissolved oxygen concentrations and high suspended solids could result in some impact on fish. High fecal coliform levels mean that there may be times when swimming should not take place.

#### What will be done to improve matters?

The Ministry will work with farmers to ensure that manure, woodwaste, and compost piles are covered and that contaminated runoff from intensively farmed upland areas is treated. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Little Campbell River

#### What is the general state of water quality?

Little Campbell River water quality is fair (index = 34), but will be upgraded through efforts by the Ministry to improve agricultural practices in the area. The restoration of the creek as salmon habitat is considered important.

**Fair**

#### What are the main attributes of the Little Campbell River?

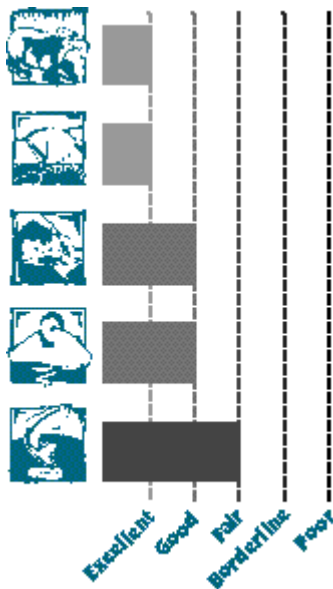
The Little Campbell River, which flows into Semiahmoo Bay, is important for spawning and rearing of salmonids.

#### What are the potential sources of contamination?

These include non-point sources such as agriculture.

#### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, nitrate, pH, the growth of algae, and dissolved oxygen. The objectives were set for those characteristics that relate to agriculture.



### What are the main uses of the river?

Uses include those of aquatic life, wildlife, livestock watering, irrigation, and recreation such as swimming near the mouth. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1988 to 1992, the objectives for dissolved oxygen and suspended solids were usually not met, while the fecal coliform and nitrite objectives were not met on occasion.

### What does it mean to not meet these objectives?

High suspended solids and nitrite and low dissolved oxygen concentrations can result in severe impairment to fish. Occasionally high fecal coliform levels mean that swimmers and livestock may have intermittent exposure to disease-causing organisms.

### What will be done to improve matters?

The Ministry is working with over 50 farm operations to improve agricultural practices. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Nicomekl River

### What is the general state of water quality?

Nicomekl River water quality is fair (index = 30), but will be upgraded through efforts by the Ministry to improve agricultural practices in the area. The restoration of the river as salmon habitat is considered important.

## Fair

### What are the main attributes of the Nicomekl River?

The Nicomekl River, which flows into Mud Bay, is important as spawning and rearing habitat for salmonids.

### What are the potential sources of contamination?

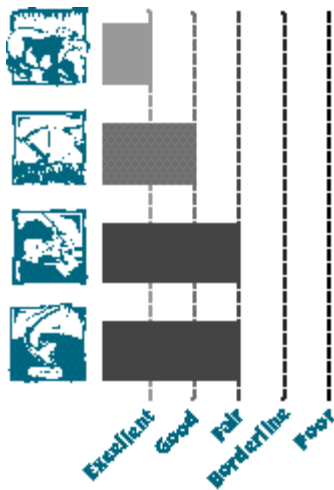
These include non-point sources such as urban runoff from the City of Langley and agricultural runoff.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, nitrate, pH, the growth of algae, lead, and dissolved oxygen. The objectives were set for those characteristics that relate to urban stormwater and agriculture.

### What are the main uses of the river?

Uses include those of aquatic life, wildlife, livestock watering, and irrigation. These uses are protected when



the objectives are met.

### Which objectives were not met?

From 1988 to 1992, the objectives for suspended solids, nitrite, and dissolved oxygen were usually not met, while the pH, fecal coliform, and turbidity objectives were not met on occasion.

### What does it mean to not meet these objectives?

High suspended solids, nitrite, and low dissolved oxygen concentrations could result in some impact on fish. High fecal coliform levels mean that livestock can be exposed to disease-causing organisms.

### What will be done to improve matters?

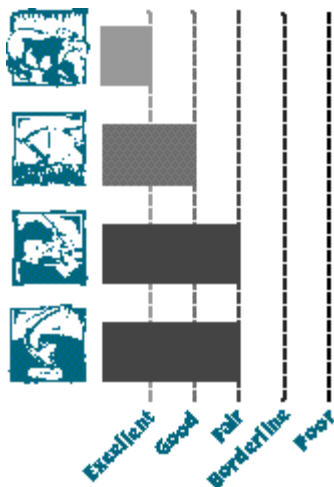
The Ministry is working with over 50 farm operations to improve agricultural practices. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Murray Creek

### What is the general state of water quality?

Murray Creek water quality is fair (index = 30), but will be upgraded through efforts by the Ministry to improve agricultural practices in the area. The restoration of the creek as salmon habitat is considered important.

### Fair



### What are the main attributes of Murray Creek?

Murray Creek, a tributary to the Nicomekl River, is an important spawning and rearing ground for salmonids.

### What are the potential sources of contamination?

These include non-point sources such as agriculture.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, nitrate, pH, the growth of algae, and dissolved oxygen. The objectives were set for characteristics that relate to agriculture.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

Between 1988 and 1992, the objectives for suspended solids and nitrite were usually not met, while the dissolved oxygen, ammonia, fecal coliform, and turbidity

objectives were not met on occasion.

#### What does it mean to not meet these objectives?

High suspended solids, ammonia, and nitrite and low dissolved oxygen concentrations could result in some impact on fish. High fecal coliform levels mean that livestock can be exposed to disease-causing organisms.

#### What will be done to improve matters?

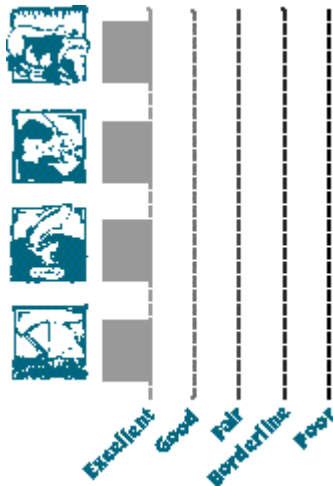
The Ministry has been working with four farm operations to improve agricultural practices. This type of work will continue.

### Anderson Creek

#### What is the general state of water quality?

Anderson Creek water quality is good (index = 6) and will be maintained through efforts by the Ministry to improve agricultural practices in the area. The restoration of the creek as salmon habitat is considered important.

#### Good



#### What are the main attributes of Anderson Creek?

Anderson Creek, a tributary to the Nicomekl River, is important as the major upstream water source for the river.

#### What are the potential sources of contamination?

These include non-point sources such as agriculture.

#### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, nitrate, the growth of algae, and dissolved oxygen. The objectives were set for those characteristics that relate to non-point sources.

#### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, and irrigation. These uses are protected when the objectives are met.

#### Which objectives were not met?

Between 1988 and 1992, the objective for dissolved oxygen was not met on occasion, while the nitrite objective was not met once.

#### What does it mean to not meet these objectives?

Low dissolved oxygen concentrations show that there could be a slight impact on fish. The higher nitrite levels would usually be quickly oxidized to harmless nitrate levels.

## Why is the general state worse than any use rating?

The general state reflects possible minor impacts on aquatic life.

## What will be done to improve matters?

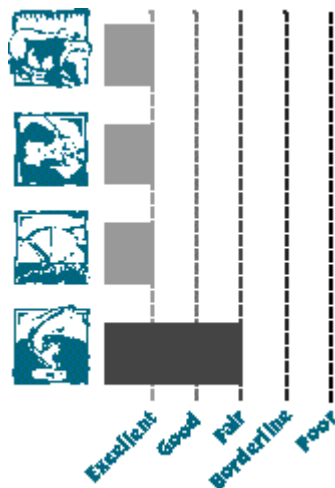
The Ministry has been working with five operations to improve agricultural practices in the area. This type of work will continue.

## Serpentine River

### What is the general state of water quality?

Serpentine River water quality is fair (index = 33), but will be upgraded through efforts by the Ministry to improve agricultural practices in the area. The restoration of the river as salmon habitat is considered important.

### Fair



### What are the main attributes of the Serpentine River?

The Serpentine River, which flows into Mud Bay, is important as spawning and rearing habitat for salmonids.

### What are the potential sources of contamination?

These include non-point sources such as urban runoff and agriculture.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, nitrate, pH, the growth of algae, PCBs, and dissolved oxygen. The objectives were set for those characteristics that relate to urban stormwater and agriculture.

### What are the main uses of the river?

Uses include those of aquatic life, wildlife, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1988 to 1992, the objectives for nitrite and dissolved oxygen were usually not met, while the pH, suspended solids, and turbidity objectives were not met on occasion.

### What does it mean to not meet these objectives?

High suspended solids and nitrite levels could result in some impairment to fish, and low dissolved oxygen levels have caused fish kills in the past.

## What will be done to improve matters?

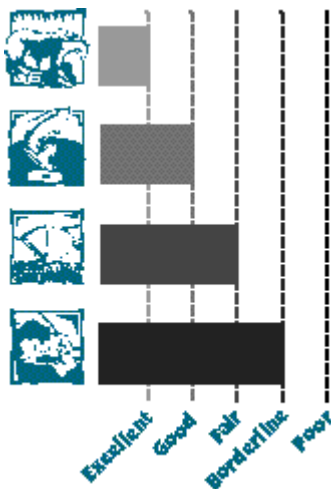
The Ministry has been working with 34 various farming operations to cover manure and mushroom compost, treat wastewater, and eliminate runoff. This work will continue. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Latimer Creek

### What is the general state of water quality?

Latimer Creek water quality is fair (index = 33). The Ministry will continue to work to improve agricultural practices in the area.

### Fair



### What are the main attributes of Latimer Creek?

Latimer Creek, a tributary to the Serpentine River, is the upstream water source for the river.

### What are the potential sources of contamination?

These include non-point sources such as agriculture.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, nitrate, pH, the growth of algae, PCBs, and dissolved oxygen. The objectives were set for those characteristics that relate to non-point sources.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1988 to 1992, the objectives for fecal coliforms and suspended solids were not usually met, while the dissolved oxygen, nitrite, and pH objectives were not met on occasion.

### What does it mean to not meet these objectives?

High fecal coliform levels mean that irrigation and livestock watering can be threatened. Low dissolved oxygen concentrations and high nitrite concentrations show that there could be an impact on fish. High suspended solids and turbidity levels can also impact fish.

### Why is livestock watering ranked worse than the general state?

This is because the objective for livestock watering was not met by a much greater margin than were objectives for all other uses of water.



## What will be done to improve matters?

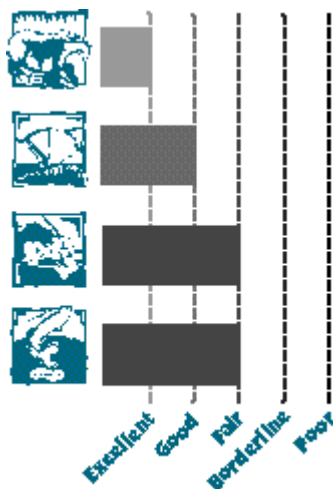
The Ministry is working with three farming operations to improve agricultural practices in the area.

## Mahood Creek

### What is the general state of water quality?

Mahood Creek water quality is fair (index = 20), but will be upgraded through efforts by the Ministry to improve agricultural practices in the area. Surrey is constructing stormwater ponds in new developments.

### Fair



### What are the main attributes of Mahood (Bear) Creek?

Mahood Creek, a tributary to the Serpentine River, is an important spawning and rearing ground for salmonids.

### What are the potential sources of contamination?

These include small industries and non-point sources such as urban runoff and agriculture.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, nitrate, pH, the growth of algae, PCBs, and dissolved oxygen. The objectives were set for characteristics that relate to agriculture and the industries in the area.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1988 to 1992, the objectives for fecal coliforms were not usually met, while the dissolved oxygen, pH, suspended solids, and turbidity objectives were not met on occasion.

### What does it mean to not meet these objectives?

High fecal coliform levels mean that livestock can be exposed to disease causing organisms. High suspended solids and low dissolved oxygen concentrations could result in some impact on fish.

## What will be done to improve matters?

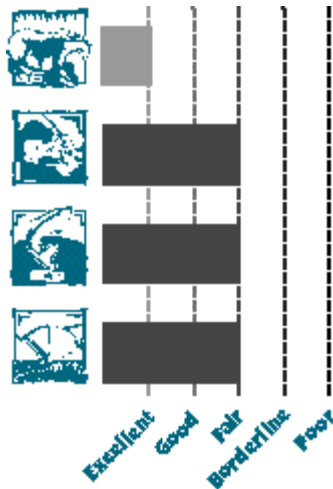
The Ministry has been working with three mushroom farms to improve agricultural practices, and Surrey is constructing stormwater detention ponds in new developments. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

# Hyland Creek

## What is the general state of water quality?

Hyland Creek water quality is fair (index = 32), but will be upgraded through efforts by the Ministry to improve agricultural practices in the area. The restoration of the creek as salmon habitat is considered important.

## Fair



## What are the main attributes of Hyland Creek?

Hyland Creek, a tributary to the Serpentine River, is important as the major upstream water source for the river.

## What are the potential sources of contamination?

These include non-point sources such as agriculture and stormwater runoff.

## Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, nitrate, pH, the growth of algae, PCBs, and dissolved oxygen. The objectives were set for those characteristics that relate to non-point sources.

## What are the main uses of the creek?

Uses include those of aquatic life, wildlife, livestock watering, and irrigation. These uses are protected when the objectives are met.

## Which objectives were not met?

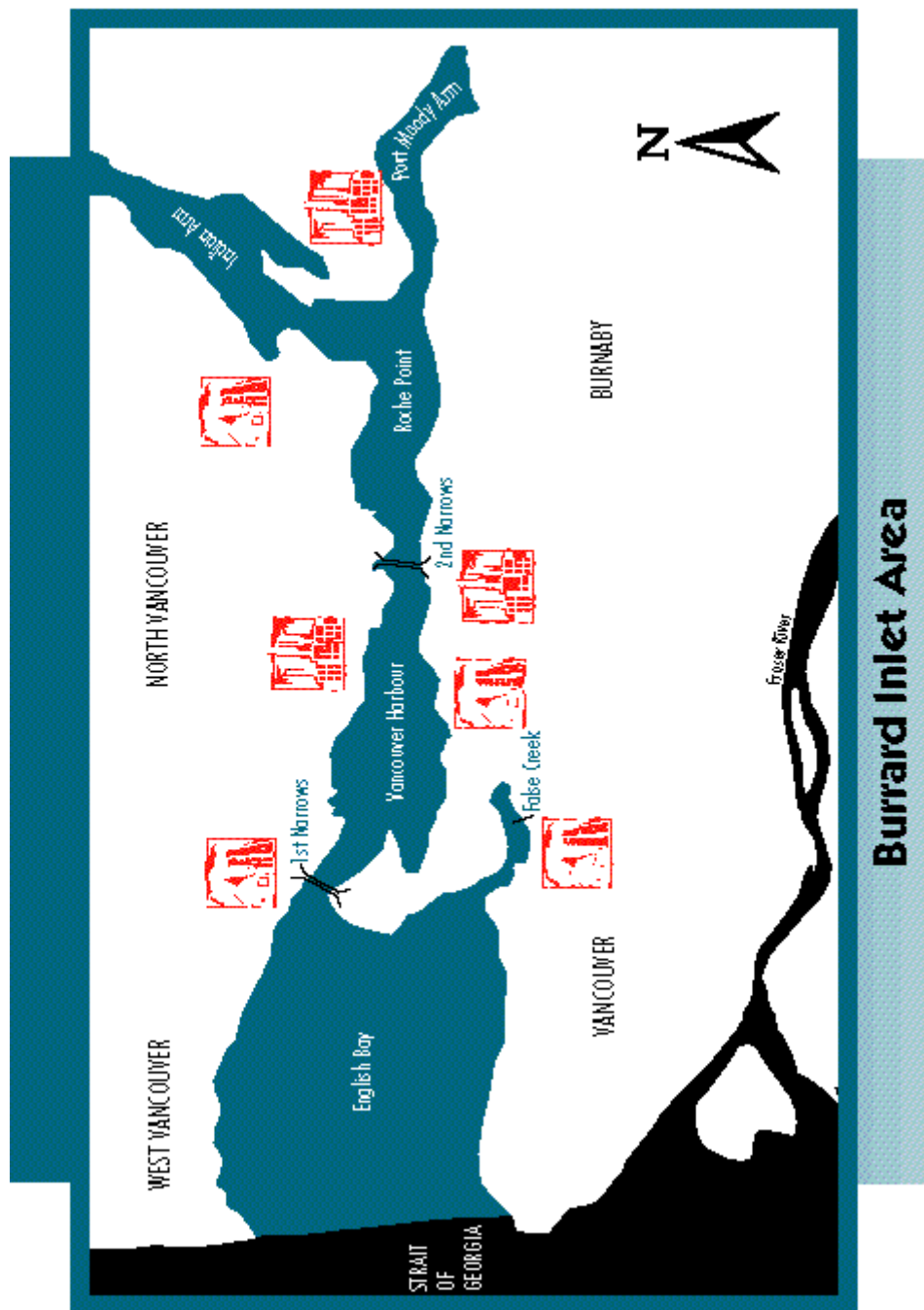
From 1988 to 1992, the objectives for suspended solids, fecal coliforms, and turbidity were usually not met, while the dissolved oxygen and pH objectives were not met on occasion.

## What does it mean to not meet these objectives?

High fecal coliform levels mean that irrigation and livestock watering can be threatened. Low dissolved oxygen concentrations show that there could be a slight impact on fish. High suspended solids and turbidity levels can also impact fish.

## What will be done to improve matters?

The Ministry will work with farmers to ensure that manure, woodwaste, and compost piles are covered and that contaminated runoff from intensively farmed areas is treated.



## Port Moody Arm

### What is the general state of water quality?

Port Moody Arm water quality is fair (index = 40). The separation of storm sewers from sanitary sewers will be needed in the long run in order to eliminate combined sewer overflows.

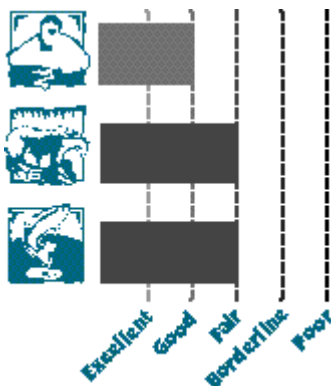
**Fair**

### What are the main attributes of Port Moody Arm?

Port Moody Arm, located at the head of Burrard Inlet, is important habitat for marine fish.

### What are the potential sources of contamination?

These include oil storage centres, shipping terminals, a thermal-electric generation plant, a sawmill, a chemical



plant, as well as urban runoff and combined sewer overflows.

#### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, cyanide, chlorine-produced oxidants, metals, PCBs, PAHs, styrene, dissolved oxygen, and phenols. The objectives were set for those characteristics that relate to contaminant sources.

#### What are the main uses of the arm?

Uses include those of aquatic life, wildlife, and recreation such as swimming. These uses are protected when the objectives are met.

#### Which objectives were not met?

From 1990 to 1993, objectives for metals, cyanide, PAHs and phenols were often not met, while those for dissolved oxygen, suspended solids, and chlorine-produced oxidants were not met on occasion.

#### What does it mean to not meet these objectives?

High turbidity values can be a concern for swimmers. Low dissolved oxygen and high suspended solids and cyanide can impact aquatic life. PAHs, phenols and metals can be toxic to fish and, if accumulated in their tissues, can be transferred to wildlife which consumes fish.

#### What will be done to improve matters?

Burnaby needs to undertake a sewer separation program, similar to Vancouver's, in order to eliminate combined sewer overflows in the long term. B.C. Hydro is assessing ways of reducing the impact of chlorinated cooling water from its thermal-electric generation plant. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Indian Arm

#### What is the general state of water quality?

Indian Arm water quality is fair (index = 18). A study is needed to determine the cause of fecal coliform contamination.

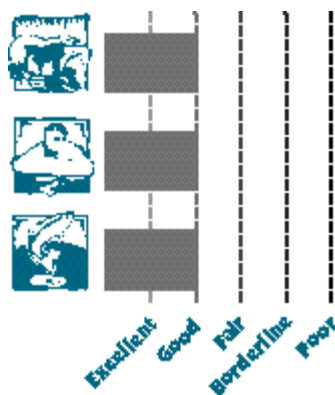
### Fair

#### What are the main attributes of Indian Arm?

Indian Arm, a deep fjord to the east of Burrard Inlet, is important as a rearing area for salmonids.

#### What are the potential sources of contamination?

They include non-point sources such as urban runoff and marinas.



### Which objectives have been set?

Those for fecal coliforms, dissolved oxygen, metals, and tributyl tin. The objectives were set for those characteristics that relate to non-point sources.

### What are the main uses of the arm?

Uses include those of aquatic life, wildlife, and recreation such as swimming. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1990 to 1993, objectives for fecal coliforms were often not met, while those for dissolved oxygen and zinc were not met on occasion.

### What does it mean to not meet these objectives?

High levels of fecal coliforms can cause concerns for swimmers while low dissolved oxygen can impact aquatic life. Metals can be toxic and can be transferred to wildlife which eats fish that have accumulated metals in their tissues.

### Why is the general state worse than any use rating?

The general state reflects the fact that several uses of the water can be impacted.

### What will be done to improve matters?

The Ministry will need a study to find the source of fecal coliforms in the Deep Cove area of Indian Arm. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Burrard Inlet - 2nd Narrows to Roche Point

### What is the general state of water quality?

Burrard Inlet water quality from Second Narrows to Roche Point is fair (index = 31). The separation of storm sewers from sanitary sewers will be needed in the long run in order to eliminate combined sewer overflows.

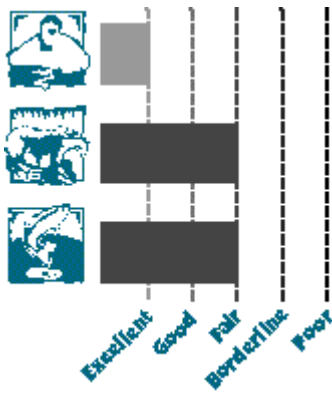
**Fair**

### What are the main attributes of Burrard Inlet from 2nd Narrows to Roche Point?

Burrard Inlet from Second Narrows to Roche Point at the entrance to Indian Arm is important habitat for marine fish.

### What are the potential sources of contamination?

These include manufacturing plants, a ready-mix concrete plant, oil storage and shipping terminals, as well as urban runoff and combined sewer overflows.



### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, metals, PCBs, PAHs, dissolved oxygen, and phenols. The objectives were set for those characteristics that relate to contaminant sources.

### What are the main uses from Second Narrows to Roche Point?

Uses include those of aquatic life, wildlife, and recreation such as swimming. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1990 to 1993, objectives for PAHs and phenols were often not met, while those for fecal coliforms, suspended solids, and zinc were not met on occasion.

### What does it mean to not meet these objectives?

High fecal coliform values can be a concern for swimmers. High suspended solids can impact aquatic life while PAHs, phenols and zinc can be toxic to fish and, if accumulated in their tissues, can be transferred to wildlife which consumes fish.

### What will be done to improve matters?

Burnaby needs to undertake a sewer separation program, similar to Vancouver's, in order to eliminate combined sewer overflows in the long term. Ways of dealing with stormwater are still under study. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Burrard Inlet - 1st to 2nd Narrows

### What is the general state of water quality?

Burrard Inlet water quality from First to Second Narrows is fair (index = 42). A program now underway to separate storm sewers from sanitary sewers will eventually eliminate combined sewer overflows.

**Fair**

### What are the main attributes of Burrard Inlet from First to Second Narrows?

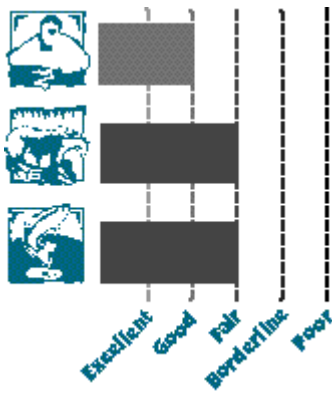
Burrard Inlet from First to Second Narrows is important habitat for marine fish.

### What are the potential sources of contamination?

These include three bulk loading facilities, a sugar refinery, and the public aquarium, as well as urban runoff and combined sewer overflows.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, metals, chlorophenols, PCBs, tributyl tin, ethylene dichloride, PAHs, dissolved oxygen, and



sulphide. The objectives were set for those characteristics that relate to contaminant sources.

### What are the main uses from First to Second Narrows?

Uses include those of aquatic life, wildlife, and recreation such as swimming. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1990 to 1993, objectives for fecal coliforms, metals, PAHs and PCBs were often not met, while those for chlorophenols, suspended solids, and turbidity were not met on occasion.

### What does it mean to not meet these objectives?

High fecal coliform and turbidity levels can be a concern for swimmers. High suspended solids can impact aquatic life while metals, PAHs, PCBs, and chlorophenols can be toxic to fish and, if accumulated in their tissues, can be transferred to wildlife which consumes fish.

### What will be done to improve matters?

The combined sewer overflows will be eliminated eventually by Vancouver's long-term sewer separation program. Ways of dealing with stormwater are still under study. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Outer Burrard Inlet

### What is the general state of water quality?

Outer Burrard Inlet water quality is fair (index = 20). The discharge of sewage sludge has been eliminated and a program now underway to separate storm sewers from sanitary sewers will eventually eliminate combined sewer overflows.

### Fair

### What are the main attributes of Outer Burrard Inlet?

Outer Burrard Inlet, which extends from Lions Gate to the Strait of Georgia, is important habitat for marine fish.

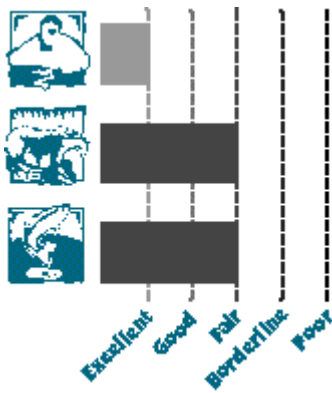
### What are the potential sources of contamination?

These include the Lions Gate sewage treatment plant as well as urban runoff and combined sewer overflows.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, dissolved oxygen, metals, PCBs, and PAHs. The objectives were set for those characteristics that relate to contaminant sources.

### What are the main uses of the outer inlet?



Uses include those of aquatic life, wildlife, and recreation such as swimming. These uses are protected when the objectives are met.

#### Which objectives were not met?

From 1990 to 1993, objectives for PAHs, metals and dissolved oxygen were often not met, while those for suspended solids were not met on occasion.

#### What does it mean to not meet these objectives?

Low dissolved oxygen and high suspended solids can impact aquatic life. Metals and PAHs can be toxic to fish and, if accumulated in their tissues, can be transferred to wildlife which consumes fish.

#### What will be done to improve matters?

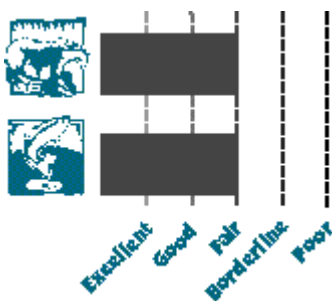
The discharge of sludge from the Lions Gate sewage treatment plant has been eliminated. The combined sewer overflows will be eliminated eventually by Vancouver's long-term sewer separation program. Ways of dealing with stormwater are still under study. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## False Creek

#### What is the general state of water quality?

False Creek water quality is border-line (index = 44). Programs now underway will eventually eliminate combined sewer overflows and contaminated soils in the area.

#### Borderline



#### What are the main attributes of False Creek?

False Creek, a small inlet into English Bay, is an important rearing area for salmonids.

#### What are the potential sources of contamination?

These include two cooling water discharges as well as urban runoff, combined sewer overflows, and drainage from contaminated soil.

#### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, dissolved oxygen, metals, PCBs, and PAHs. The objectives were set for those characteristics that relate to contaminant sources.

#### What are the main uses of False Creek?

Uses include those of aquatic life and wildlife. These uses are protected when the objectives are met.

#### Which objectives were not met?

From 1990 to 1993, objectives for metals, PAHs, PCBs, and dissolved oxygen were often not met, while those



for suspended solids were not met on occasion.

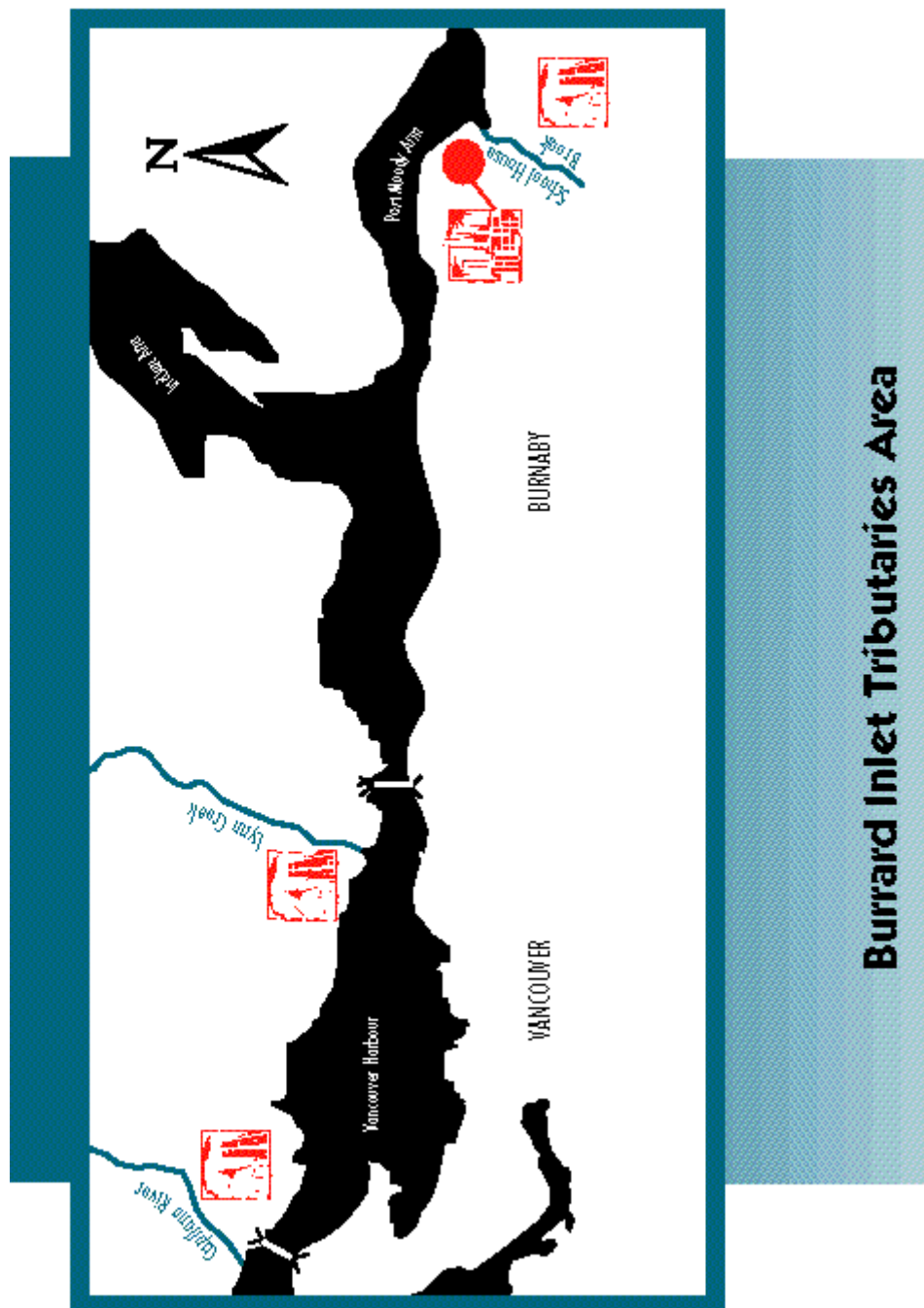
**What does it mean to not meet these objectives?**

Low dissolved oxygen and high suspended solids can impact aquatic life. Metals, PAHs and PCBs can be toxic to fish and, if accumulated in their tissues, can be transferred to wildlife which consumes fish. **Why is the general state worse than any use rating?**

The general state reflects the fact that both uses of the water can be impacted.

**What will be done to improve matters?**

The combined sewer overflows will be eliminated eventually by Vancouver's long-term sewer separation program. Ways of dealing with stormwater are still under study. Contaminated soil in the area is being rehabilitated under a 20-year plan. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.



## Burrard Inlet Tributaries Area

### School House Brook

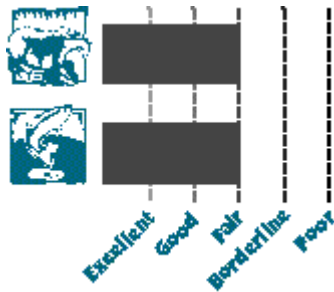
#### What is the general state of water quality?

School House Brook water quality is fair (index = 38), with some impact from the runoff from construction sites. The restoration of the brook as salmon habitat is considered important.

#### What are the main attributes of School House Brook?

School House Brook, a tributary to Burrard Inlet, is important as a spawning and rearing area for salmonids.

## Fair



### What are the potential sources of contamination?

These include a cooling water discharge from a chemical plant and non-point sources such as urban runoff.

### Which objectives have been set?

Those for temperature, pH, and metals. The objectives were set for those characteristics that relate to the cooling water discharge and urban runoff.

### What are the main uses of the brook?

Uses include those of aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1991 to 1993, objectives for phenols, copper, iron, and zinc were not met on occasion.

### What does it mean to not meet these objectives?

Metals and phenols can potentially impact the survival of aquatic life and can be transferred to wildlife which consumes fish.

## Lynn Creek

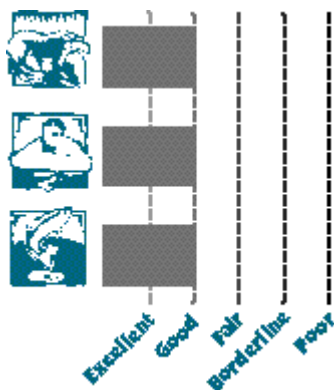
### What is the general state of water quality?

Lynn Creek water quality is good (index = 12). Drainage from a nearby landfill is now treated.

### What are the main attributes of Lynn Creek?

Lynn Creek, a tributary to Burrard Inlet, is important as a spawning and rearing area for salmonids.

## Good



### What are the potential sources of contamination?

The major sources are a closed landfill and stormwater runoff.

### Which objectives have been set?

Those for fecal coliforms, ammonia, nitrite, the growth of algae, dissolved oxygen, phenols, metals, chlorophenols, and PCBs. The objectives were set for those characteristics that relate to the landfill.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, and recreation such as swimming. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1991 to 1993, objectives for fecal coliforms, phenols, chromium, and the growth of algae were not met on occasion.

### What does it mean to not meet these objectives?

High levels of fecal coliforms and the growth of algae can cause concerns for recreation users. Chromium and phenols can potentially affect the survival of aquatic life and can be transferred to wildlife which consumes fish.

### What will be done to improve matters?

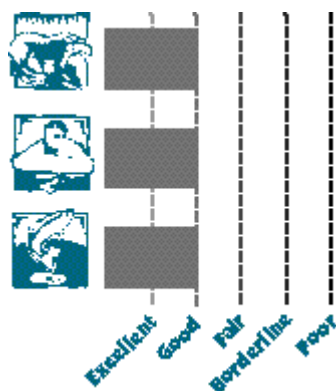
Drainage from the landfill is now intercepted and treated at the Lion's Gate sewage treatment plant. Further study will be needed to find out why certain objectives are not met on occasion. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Capilano River

### What is the general state of water quality?

Capilano River water quality is good (index = 16). Drainage from a nearby landfill needs to be diverted to the sanitary sewer.

### Good



### What are the main attributes of the Capilano River?

The Capilano River, a tributary to Burrard Inlet, is important as a spawning and rearing area for salmonids.

### What are the potential sources of contamination?

The main sources are a closed landfill and stormwater runoff.

### Which objectives have been set?

Those for fecal coliforms, ammonia, nitrite, the growth of algae, dissolved oxygen, phenols, metals, chlorophenols, and PCBs. The objectives were set for those characteristics that relate to the landfill.

### What are the main uses of the river?

Uses include those of aquatic life, wildlife, and recreation such as swimming. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1991 to 1993, objectives for fecal coliforms were often not met, while those for phenols, metals, and the amount of algae present were not met on occasion.

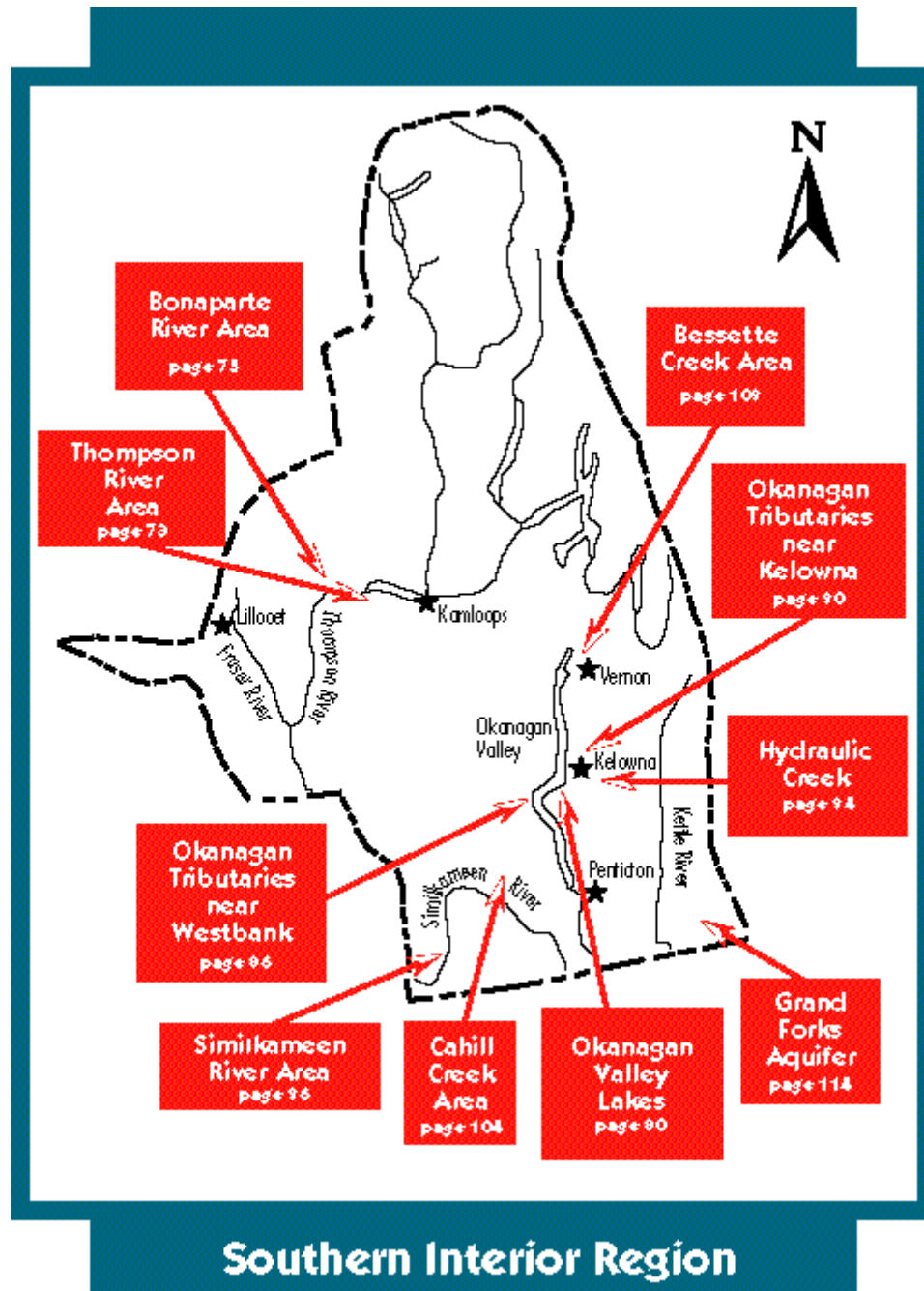
**What does it mean to not meet these objectives?**

High levels of fecal coliforms and the growth of algae can cause concerns for swimmers. Metals can potentially impact the survival of aquatic life and can be transferred to wildlife which consumes fish.

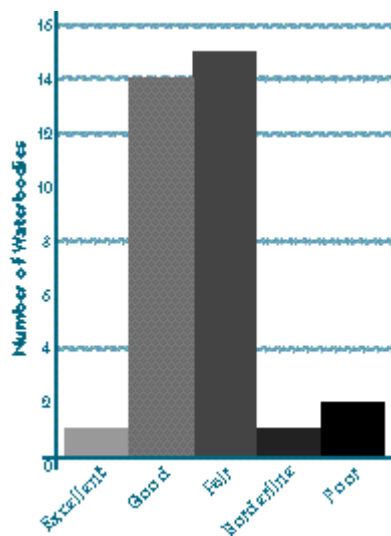
**What will be done to improve matters?**

West Vancouver will need to collect drainage from the closed landfill and divert it to the sanitary sewer for treatment at the Lions Gate sewage treatment plant. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.

## Southern Interior Region



## Southern Interior Region Summary



The Southern Interior Region is located in the middle south part of the Province bordering Washington State. It extends from the Kettle River in the east to Lillooet in the west, as shown on the attached map. The main regional offices of the Ministry are located in Kamloops and Penticton.

There are 33 status reports for this Region covering 9 lakes, 23 reaches of streams, and 1 ground water aquifer. The bar-graph on this page shows that 46 percent of these waterbodies are ranked as having fair water quality, 42 percent are ranked as good, and 6 percent as poor. The remainder are equally divided between the excellent and borderline categories.

If you have any questions on the status reports or would like more information on other waterbodies in the Region, please contact:

#### **For areas north of the Okanagan**

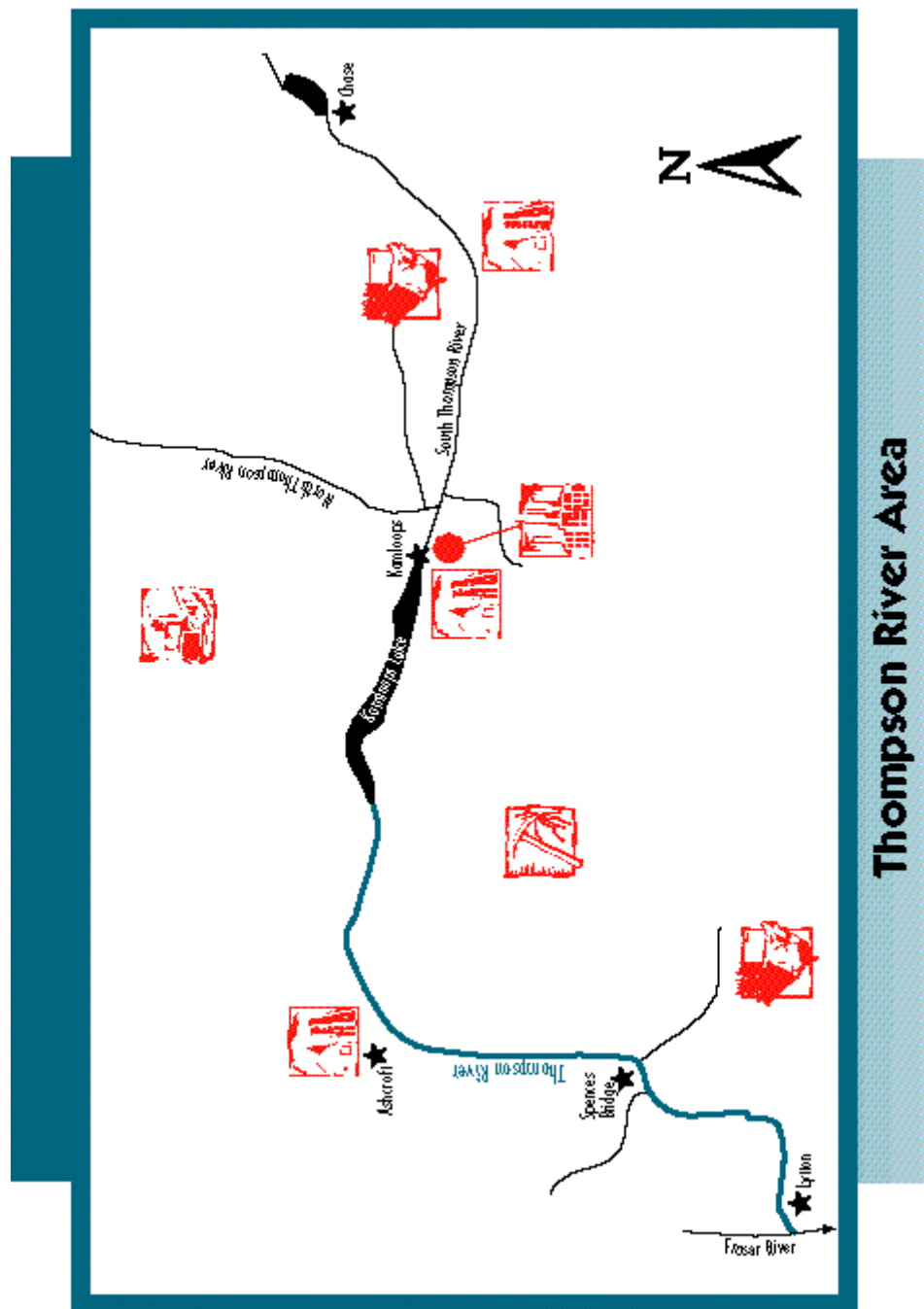
Bob Grace  
Ministry of Environment, Lands and Parks  
1259 Dalhousie Drive  
Kamloops, B.C.  
V2C 5Z5

Telephone: 371-6289  
Fax: 828-4000  
E-mail: [bgrace@kamloops.env.gov.bc.ca](mailto:bgrace@kamloops.env.gov.bc.ca)

#### **For the Okanagan east to Grand Forks**

Jim Bryan  
Ministry of Environment, Lands and Parks  
201, 3547 Skaha Lake Road  
Penticton, B.C.  
V2A 7K2

Telephone: 490-8248  
Fax: 492-1314



## Lower Thompson River

**What is the general state of water quality?**

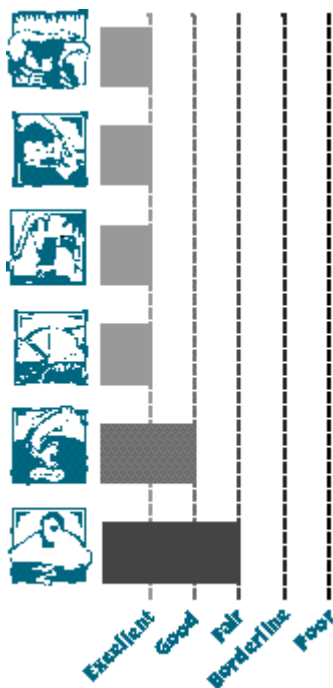
Lower Thompson River water quality is fair (index = 31). The main problem is an aesthetic one caused by excessive growths of algae.

**Fair**

**What are the main attributes of the Lower Thompson River?**

The lower Thompson River, a major tributary to the Fraser River, runs from Kamloops Lake to the Fraser River at Lytton. The river is important for fish spawning and rearing, for migrating salmon, and for irrigation and drinking water.





### What are the potential sources of contamination?

These include treated discharges from a bleached kraft mill and from the City of Kamloops upstream from Kamloops Lake. There are also non-point source discharges from agriculture, urban development, forestry, and streambank erosion.

### Which objectives have been set?

Those for fecal coliforms, colour, the growth of algae, resin acids, and chlorinated dioxins and furans in water, fish tissue, and sediments. The objectives were set for characteristics that relate to the main discharges.

### What are the main uses of the river?

Uses include recreation such as swimming, irrigation, drinking water (assuming the water is disinfected), livestock watering, and use by fish and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

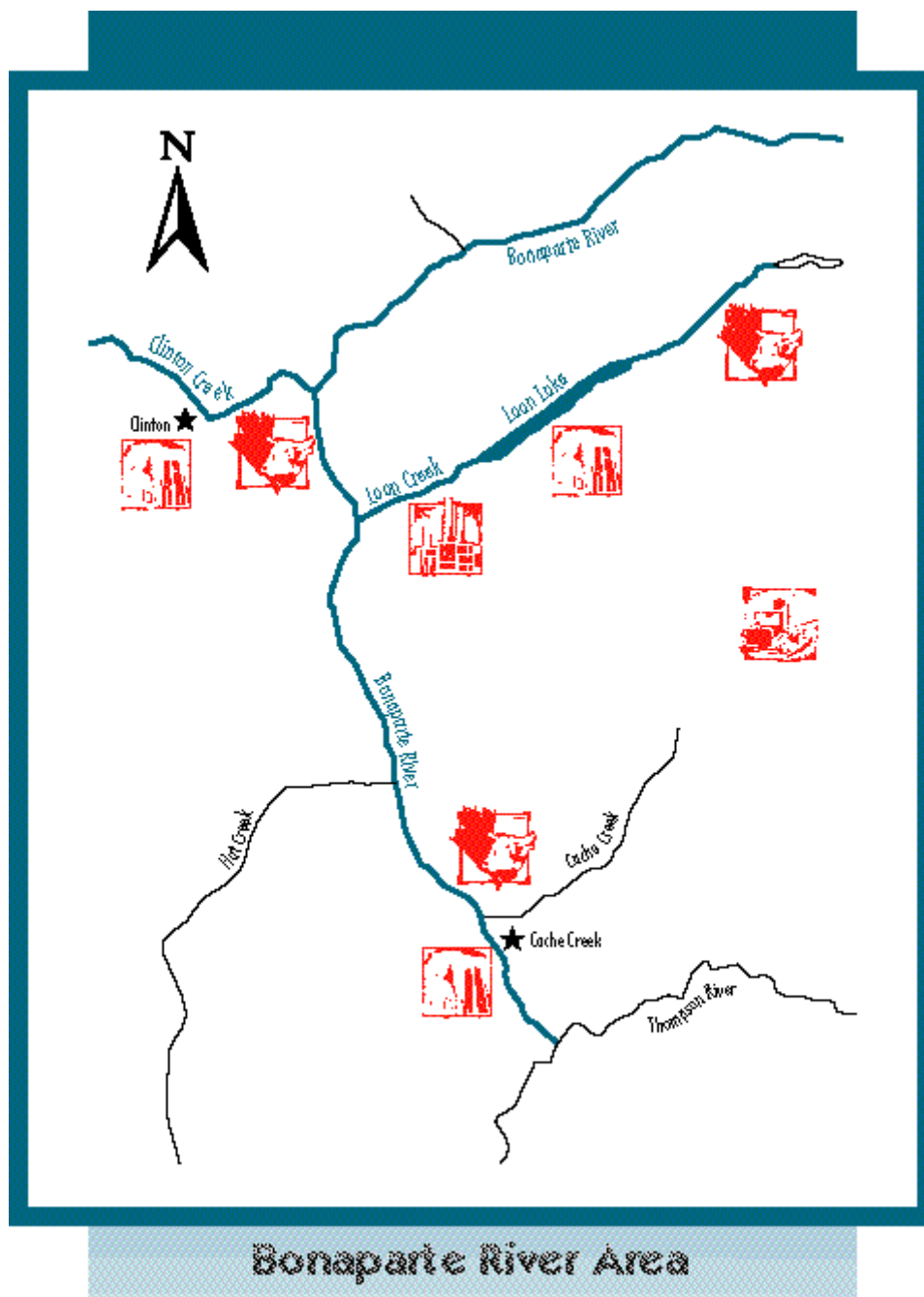
The objectives not met in 1992 to 1993 included those for the growth of algae and, on one occasion, resin acids in water.

### What does it mean to not meet these objectives?

Excessive growth of algae is mainly an aesthetic problem. Although the growth may be caused by nutrients from the main discharges upstream, the mechanism involved is not well understood. The higher resin acid value is not believed to be significant. Dioxin and furan levels in fish are such that the fish can be eaten, although the much stricter objective to protect fish health may sometimes not be met. Note that the water is excellent for drinking (after disinfection), irrigation, wildlife, and livestock watering.

### What will be done to improve matters?

Recent major changes at the pulp mill have virtually eliminated the discharge of dioxins and furans and reduced substantially all other contaminants. Scientists will continue work to understand the process causing the growth of algae in the lower Thompson River, a key to controlling it in the future. Work is proceeding under the Fraser River Action Plan to identify and control sources of sediment and to improve livestock operations.



## Bonaparte River

### What is the general state of water quality?

Bonaparte River water quality is fair (index = 31). Fecal coliforms, turbidity, suspended solids, and the growth of algae at times do not meet acceptable levels. The Ministry is working with farmers and ranchers to prevent water pollution.

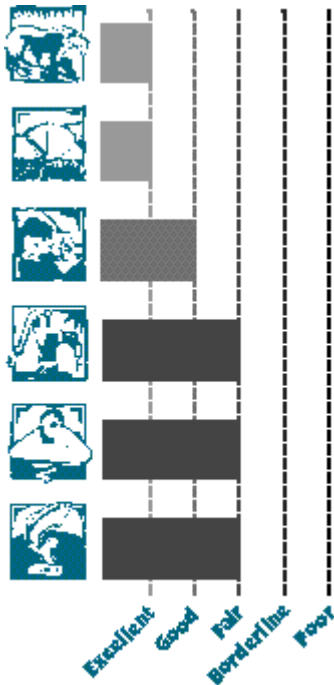
### What are the main attributes of the Bonaparte River?

The Bonaparte River, a tributary to the Thompson River, is important salmonid habitat and a major source of irrigation water.

### What are the potential sources of contamination?

These include agricultural operations and treated

## Fair



municipal sewage from Cache Creek and Clinton.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, the growth of algae, dissolved oxygen, and pH. The objectives were set for characteristics that relate to agriculture and treated municipal sewage.

### What are the main uses of the river?

Uses include recreation such as swimming, drinking (assuming water is filtered and disinfected), irrigation, livestock watering, and use by aquatic life and wildlife. The uses are protected when the objectives are met.

### Which objectives were not met?

The objectives for turbidity, suspended solids, and fecal coliforms were regularly not met from Cache Creek downstream between 1987 and 1993. The objective for growth of algae near the mouth was also not regularly met.

### What does it mean to not meet these objectives?

High fecal coliform levels mean that drinking water users should ensure that their treatment systems are working properly. The results for suspended solids, turbidity, and growth of algae show possible impairment of habitat for fish in downstream river sections.

### What will be done to improve matters?

Livestock feeding requirements and access to watercourses are being changed to conform to the Code of Agricultural Practice for Waste Management. Through education, livestock producers are encouraged to become active stream stewards. The idea is to rehabilitate streamside vegetation and banks to prevent erosion and provide shade.

## Clinton Creek

### What is the general state of water quality?

Clinton Creek water quality is fair (index = 26), with fecal coliforms at times not meeting acceptable levels. The Ministry is working with farmers and ranchers to prevent water pollution.

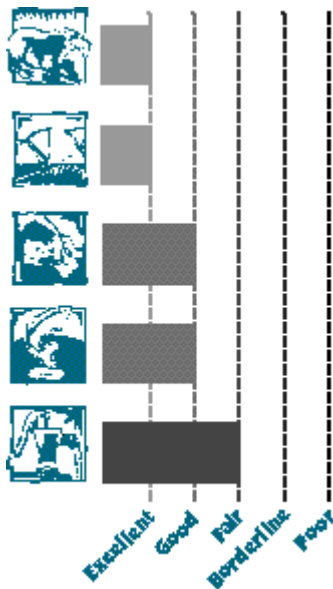
## Fair

### What are the main attributes of Clinton Creek?

Clinton Creek, a tributary to the Bonaparte River, is important trout habitat and a major source of irrigation water.

### What are the potential sources of contamination?

These include treated municipal sewage from Clinton and non-point sources from agricultural operations.



### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, dissolved solids, ammonia, nitrite, the growth of algae, dissolved oxygen, and pH. The objectives were set for characteristics that relate to agriculture and treated municipal sewage.

### What are the main uses of the creek?

Uses include drinking (assuming complete treatment), irrigation, livestock watering, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

Between 1987 and 1993, the objectives for fecal coliforms, suspended solids, turbidity, and growth of algae were often not met.

### What does it mean to not meet these objectives?

High fecal coliform levels mean that drinking water users should ensure that their treatment systems are working properly. The results for suspended solids, turbidity, and growth of algae show possible impairment of fish habitat in the creek.

### What will be done to improve matters?

Livestock feeding requirements and access to watercourses are being changed to conform to the Code of Agricultural Practice for Waste Management. Through education, livestock producers are encouraged to become active stream stewards. The idea is to rehabilitate streamside vegetation and banks to prevent erosion and provide shade.

## Loon Creek

### What is the general state of water quality?

Loon Creek water quality is good (index = 13), with fecal coliforms at times not meeting acceptable levels. The Ministry is working with farmers and ranchers to reduce the impact of their operations on water quality.

### Good

### What are the main attributes of Loon Creek?

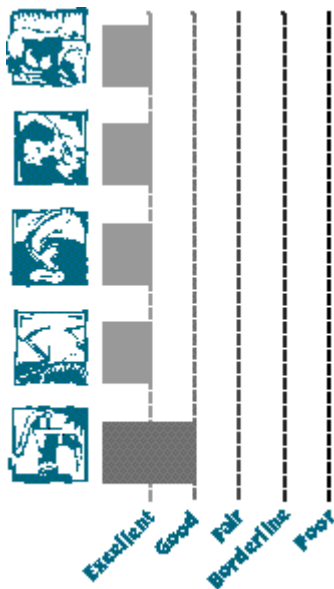
Loon Creek is a tributary of the Bonaparte River from the east below Clinton Creek. It is an important habitat for trout.

### What are the potential sources of contamination?

These include septic tanks at Loon Lake, discharges from a fish hatchery, and agricultural sources in its lower reaches.

### Which objectives have been set?

Those for fecal coliforms, ammonia, dissolved oxygen, and pH. The objectives were set for characteristics that



relate to agriculture and discharges from the fish hatchery.

#### **What are the main uses of the creek?**

Uses include drinking water (assuming at least disinfection), aquatic life, irrigation, wildlife, and livestock watering. These uses are protected when the objectives are met.

#### **Which objectives were not met?**

Between 1987 and 1993, the objectives for fecal coliforms in drinking water supplies were regularly not met. The objective for suspended solids was also not met on occasion.

#### **What does it mean to not meet these objectives?**

High fecal coliform levels mean that drinking water users should ensure that their treatment systems are working properly. Suspended solids mean that fish habitat in the lower reaches may be threatened on occasion.

#### **What will be done to improve matters?**

A feedlot operation affecting Loon Lake has been improved, receiving an environmental stewardship award in 1995. Livestock feeding requirements and access to water courses were changed in the lower reaches to conform to the Code of Agricultural Practice. Through education, livestock producers are encouraged to become active stream stewards. The idea is to rehabilitate streamside vegetation and banks to prevent erosion and provide shade.

## **Loon Lake**

#### **What is the general state of water quality?**

Loon Lake water quality is border-line (index = 58) due to the regularity with which dissolved oxygen did not meet acceptable levels. A feedlot previously affecting the lake has recently made major improvements to its operation.

### **Borderline**

#### **What are the main attributes of Loon Lake?**

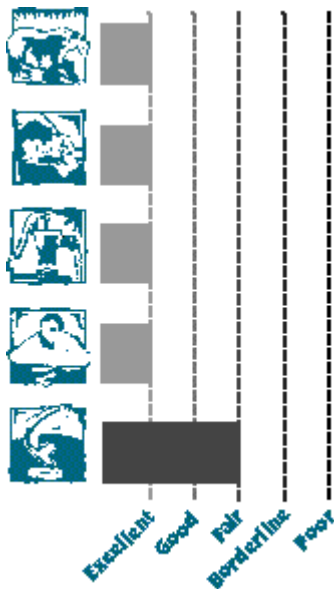
Loon Lake is located near the headwaters of Loon Creek which is a tributary to the Bonaparte River. It is an important recreational area with over 250 cottages, 5 resorts, and a Provincial campground located on its shores.

#### **What are the potential sources of contamination?**

These include agricultural operations located upstream from Loon Lake, the sediments on the bottom of the lake which can release phosphorus, and possibly leaking septic tanks.

#### **Which objectives have been set?**

Those for fecal coliforms and dissolved oxygen. The objectives were set for characteristics that relate to



agriculture and residential development.

### What are the main uses of Loon Lake?

Uses include drinking water (assuming at least disinfection), aquatic life, wildlife, and recreation such as swimming. These uses are protected when the objectives are met.

### Which objectives were not met?

Between 1987 and 1993, the objective for dissolved oxygen was not met regularly.

### What does it mean to not meet this objective?

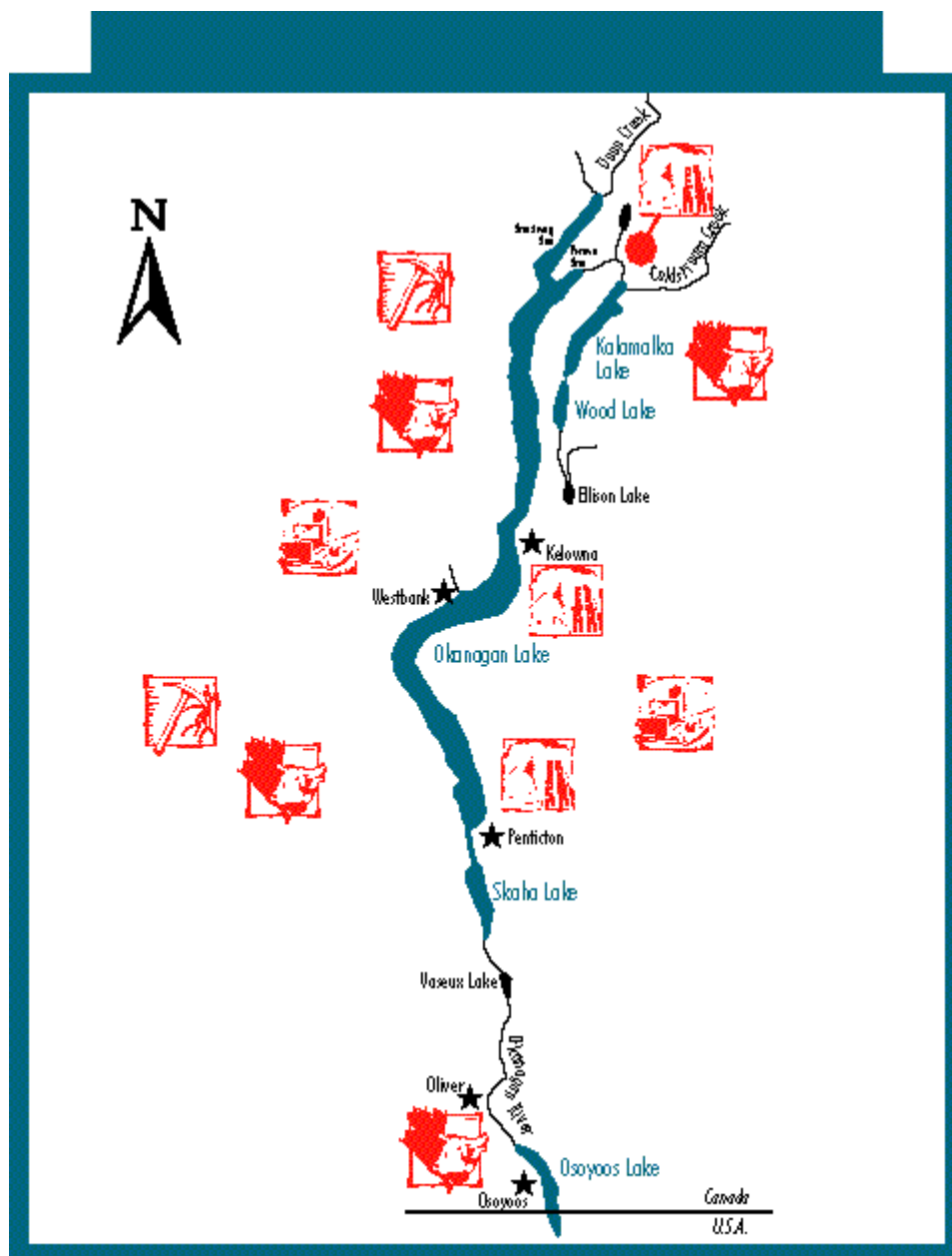
Low dissolved oxygen levels at depth means that fish habitat near the centre of the lake is limited at certain times during the summer.

### Why is the general state worse than any use rating?

The general state reflects the fact that the objective for dissolved oxygen is never met in the summer.

### What will be done to improve matters?

A ranch with a feedlot affecting the lake has collected runoff and removed its operation away from the lake, for which it received an Environmental Stewardship Award in 1995. Other sources of contaminants to the lake, such as septic tanks, will have to be investigated if dissolved oxygen levels do not improve. Residents around the lake should ensure their septic tanks are working properly and should minimize the use of fertilizer and pesticide.



## Okanagan Valley Lakes

### Wood Lake

#### What is the general state of water quality?

Wood Lake water quality is fair (index = 38). Phosphorus levels tend to be high and cause undesirable growths of algae. The Ministry will continue to work with farmers, industries, and municipalities to reduce phosphorus input to

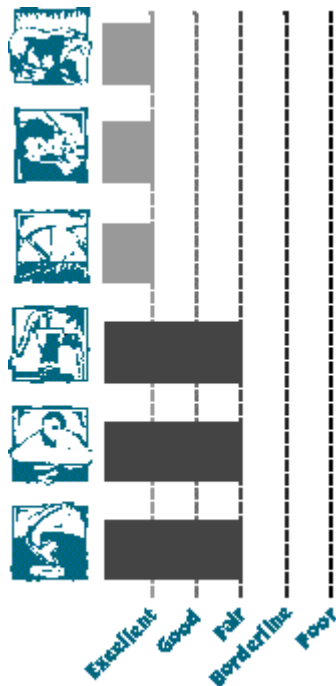
#### What are the main attributes of Wood Lake?

Wood Lake, which is at the head of the chain of Okanagan Valley Lakes, is important as a major recreational lake.

#### What are the potential sources of contamination?

the lake.

## Fair



These include agricultural wastes, forestry, and phosphorus released from sediments on the bottom of the lake.

### Which objectives have been set?

So far, only the objective for phosphorus which is the characteristic of concern related to agricultural wastes and lake sediments.

### What are the main uses of the lake?

Uses include those of recreation such as swimming, aquatic life, wildlife, drinking water, livestock watering, and irrigation.

### When was the objective not met?

In monitoring carried out from 1987 to 1993, the short-term phosphorus objective was not met from 1987 to 1989. Water quality is better now than at any time measured since the 1970's. The more restrictive long-term objective for phosphorus has never been met.

### What does it mean to not meet this objective?

High phosphorus levels cause heavy growths of algae which can detract from aesthetics, impart tastes and odours to drinking water supplies, and deplete oxygen. Low oxygen concentrations can impact fish survival.

### What will be done to improve matters?

The Ministry will continue to monitor phosphorus concentrations and work with local industries and municipalities to reduce phosphorus from agriculture, forest operations, and unsewered areas of the Okanagan Valley. Residents near the lake should maintain their septic tanks and should minimize the use of fertilizer and pesticide.

## Kalamalka Lake

### What is the general state of water quality?

Kalamalka Lake water quality is good (index = 5), with phosphorus usually meeting acceptable levels. The Ministry will continue to work with municipalities, industries, and farmers to reduce the input of phosphorus from these sources.

## Good

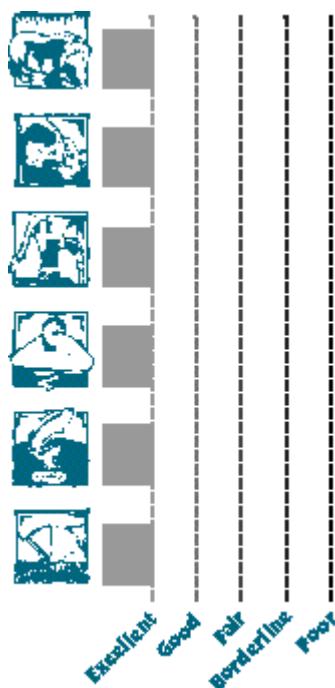
### What are the main attributes of Kalamalka Lake?

Kalamalka Lake, which receives the water from Wood Lake and drains into Okanagan Lake, is important as a water supply and for recreation and fishing.

### What are the potential sources of contamination?

These include agricultural wastes, storm water drainage, forestry, and inputs from Wood Lake.





### Which objectives have been set?

So far, only the objective for phosphorus which is the characteristic of concern related to agricultural waste water and to inputs from Wood Lake.

### What are the main uses of the lake?

Uses include those of recreation such as swimming, aquatic life, wildlife, drinking water, livestock watering, and irrigation.

### When was the objective not met?

Between 1987 and 1993, the phosphorus objective was not met only in 1993. The water quality seems to be getting worse during the past twenty years.

### What does it mean to not meet this objective?

High phosphorus levels cause growths of algae which can detract from aesthetics and impart tastes and odours to drinking water supplies.

### Why is the general state worse than any use rating?

The general state reflects minor departures from ideal conditions.

### What will be done to improve matters?

The Ministry will continue to inspect livestock operations so as to reduce animal wastes entering the lake. It will also work with municipalities to ensure that reductions of phosphorus in their discharges continue. The Ministry will increase inspections through the Forest Practices Code to reduce contaminants from logging. Residents near the lake should ensure that their septic tanks are working properly and should minimize the use of fertilizer and pesticide.

## Okanagan Lake

### What is the general state of water quality?

Okanagan Lake water quality is good (index = 12), with phosphorus usually meeting acceptable levels. The Ministry will continue to work with municipalities, industries and farmers to reduce the input of phosphorus from these sources.

**Good**

### What are the main attributes of Okanagan Lake?

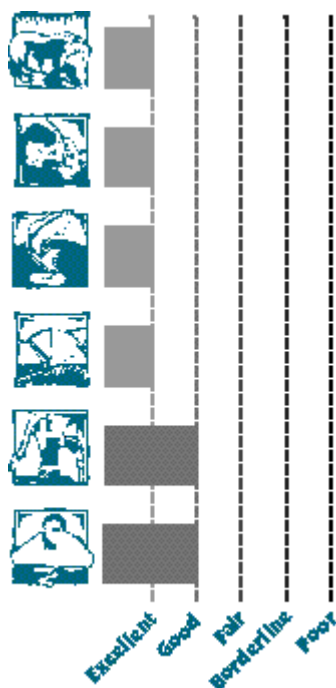
Okanagan Lake, the major lake in the Okanagan Valley Lake chain, is important as a water supply and for recreation and fishing.

### What are the potential sources of contamination?

These include agriculture, municipal waste, storm water discharges, forestry, and inputs from upstream lakes.

### Which objectives have been set?

So far, only the objective for phosphorus, which is the characteristic of concern related to agriculture and



treated municipal waste water.

#### What are the main uses of the lake?

Uses include those of recreation such as swimming, aquatic life, wildlife, drinking water, livestock watering, and irrigation water.

#### When was the objective not met?

In monitoring carried out from 1987 to 1993, the phosphorus objective was not met in Armstrong Arm, but met elsewhere.

#### What does it mean to not meet this objective?

High phosphorus levels cause heavy growths of algae which can detract from aesthetics and impart tastes and odours to drinking water supplies.

#### What will be done to improve matters?

The Ministry will continue to inspect livestock operations so as to reduce animal wastes entering the lake. It will also work with industries and municipalities to ensure that reductions of phosphorus in their discharges continue. The Ministry will increase inspections through the Forest Practices Code to reduce contaminants from logging. Residents near the lake should ensure that their septic tanks are working properly and should minimize the use of fertilizer and pesticide.

## Skaha Lake

#### What is the general state of water quality?

Skaha Lake water quality is fair (index = 39). Phosphorus occasionally does not meet acceptable levels but the situation is improving. The Ministry will continue monitoring so that early action against phosphorus inputs can be taken if needed.

**Fair**

#### What are the main attributes of Skaha Lake?

Skaha Lake, which receives the water from Okanagan Lake, is important for recreation and as a fisheries habitat.

#### What are the potential sources of contamination?

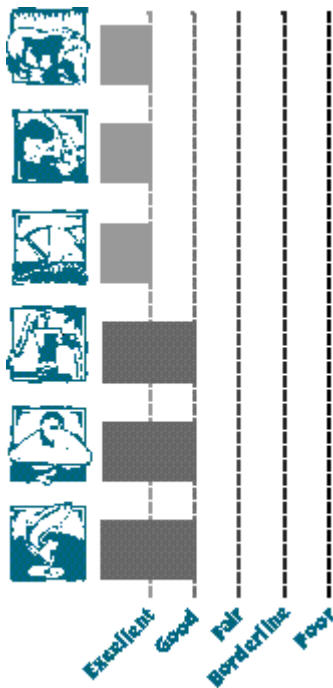
These include municipal waste water discharges and inputs from upstream lakes.

#### Which objectives have been set?

So far, only the objective for phosphorus which is the characteristic of concern related to agriculture and treated municipal waste water.

#### What are the main uses of the lake?

Uses include those of recreation such as swimming, aquatic life, wildlife, drinking water, livestock watering,



and irrigation.

#### When was the objective not met?

The phosphorus objective was not met between 1987 and 1990. Water quality is getting better since the treatment at the Penticton sewage treatment plant was improved.

#### What does it mean to not meet this objective?

High phosphorus levels cause heavy growths of algae which can detract from aesthetics, impart tastes and odours to drinking water supplies, and cause problems in spawning areas.

#### Why is the general state worse than any use rating?

The general state reflects the fact that several uses of the water can be impacted.

#### What will be done to improve matters?

The Ministry will continue to monitor phosphorus levels to see whether further measures will be needed to control sewage discharges. The Ministry will also be working with the City of Penticton on waste management planning and with forest companies to improve water quality under the forest practices code. Residents near the lake should ensure that their septic tanks are working properly and should minimize the use of fertilizer and pesticide.

## Osoyoos Lake

#### What is the general state of water quality?

Osoyoos Lake water quality is poor (index = 70), with high levels of phosphorus causing excessive growths of algae. The Ministry will continue to work with loggers, farmers, and municipalities to reduce phosphorus inputs from these sources.

### Poor

#### What are the main attributes of Osoyoos Lake?

Osoyoos Lake, which is at the end of the chain of Okanagan Valley Lakes, is important for recreation and fisheries habitat.

#### What are the potential sources of contamination?

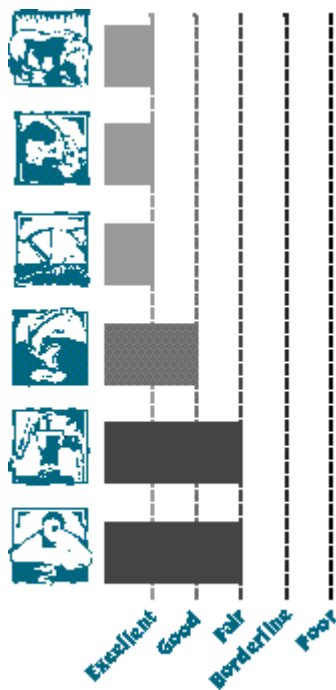
These include agricultural wastes, municipal waste water discharges, forestry, nutrients in bottom lake sediments, and inputs from upstream lakes.

#### Which objectives have been set?

So far, only the objective for phosphorus which is the characteristic of concern related to agriculture and treated municipal waste water.

#### What are the main uses of the lake?

Uses include those of recreation such as swimming, aquatic life, wildlife, drinking water, livestock watering,



and irrigation.

### When was the objective not met?

In monitoring carried out from 1987 to 1993, the phosphorus objective was never met. Water quality varies from year to year, but no trends have been apparent.

### What does it mean to not meet this objective?

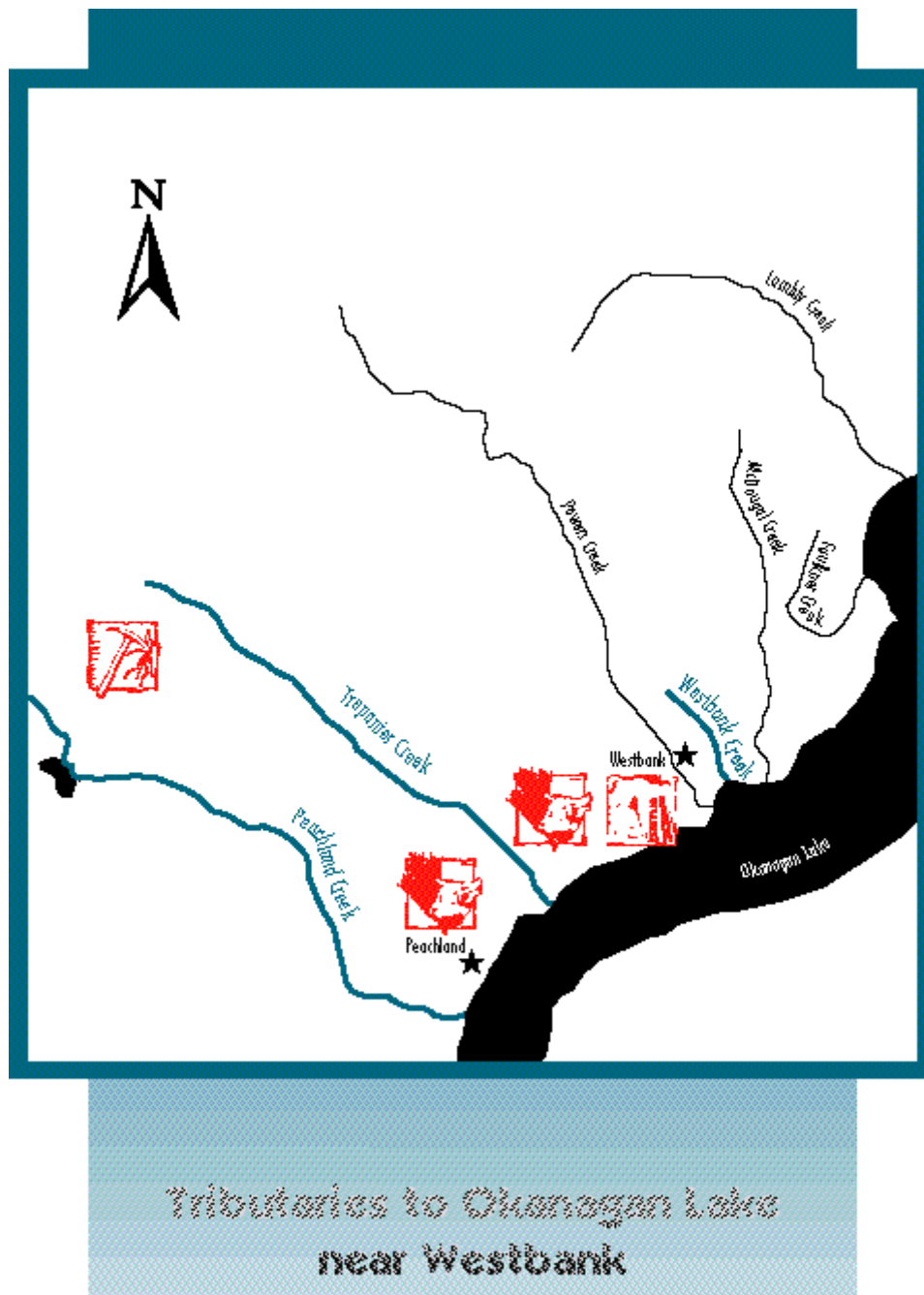
Very high phosphorus levels cause excessive growths of attached algae and large populations of free-floating algae. These can detract from aesthetics, impart tastes and odours to drinking water supplies, and deplete oxygen. Low oxygen concentrations can impact fish survival.

### Why is the general state worse than any use rating?

The general state reflects the fact that the objective for phosphorus has never been met.

### What will be done to improve matters?

The Ministry will continue to work with local municipalities to reduce phosphorus from sewage treatment plants and unsewered areas of the Okanagan Valley. It will also inspect livestock facilities to reduce animal wastes entering the lake. The Ministry will increase inspections under the Forest Practices Code to reduce contaminants generated from logging. Residents near the lake should ensure their septic tanks are working properly and should minimize the use of fertilizer and pesticide.



## Westbank Creek

### What is the general state of water quality?

Westbank Creek water quality is fair (index = 29). Until 1987, the creek was affected by treated wastewater from Westbank. Now, the main impacts are from urban runoff and

### What are the main attributes of Westbank Creek?

Westbank Creek, a tributary to Okanagan Lake near Westbank, is important as an irrigation water supply.

agriculture.

## Fair



### What are the potential sources of contamination?

These include urban storm water, runoff from agriculture and, in the past, the Westbank sewage treatment plant discharge.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, metals, ammonia, nitrite, nitrate, and dissolved oxygen. The objectives were set for those characteristics that relate to contaminant sources.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, drinking water with complete treatment, livestock watering, irrigation, and recreation such as swimming at the mouth of the creek. These uses are protected when the objectives are met.

### Which objectives were not met?

Between 1991 and 1993, the objectives not met included those for iron, aluminum, fecal coliforms, and the growth of algae.

### What does it mean to not meet these objectives?

High fecal coliform concentrations can be a concern for swimmers, drinking water consumers, and livestock. High aluminum and iron levels can be toxic to fish. Drinking water users should ensure that their treatment systems are working properly.

### What will be done to improve matters?

The Municipality of Westbank now disposes of highly treated wastewater through a deep water discharge into Okanagan Lake which should alleviate water quality problems in the creek with only a slight effect on the lake. Residents near the creek should minimize the use of fertilizer and pesticide and not dump any wastes into storm sewers.

## Trepanier Creek

### What is the general state of water quality?

Trepanier Creek water quality is good (index = 7). A plan to abandon a closed molybdenum mine is being developed to ensure that water quality will be protected.

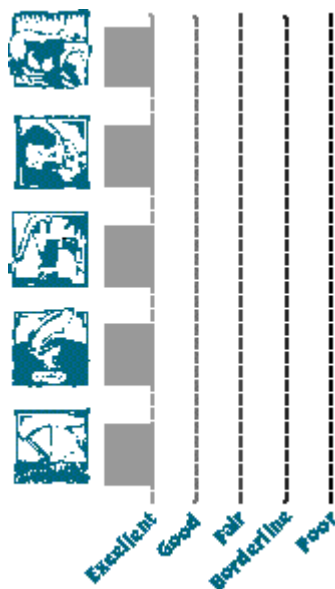
## Good

### What are the main attributes of Trepanier Creek?

Trepanier Creek, near Westbank, is important as one of the top five Okanagan Lake tributaries for spawning kokanee and rainbow trout.

### What are the potential sources of contamination?

These include a closed copper-molybdenum mine and



mill, highway runoff, and agricultural wastes.

#### Which objectives have been set?

Those for metals, dissolved solids, and pH. The objectives were set for those characteristics that relate to contaminant sources.

#### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, drinking water with complete treatment, livestock watering, and irrigation in the lower reaches. These uses are protected when the objectives are met.

#### Which objectives were not met?

The objective for aluminum was not met on occasion in 1991, while the dissolved solids objective was not met in 1990.

#### What does it mean to not meet these objectives?

High dissolved solids concentrations can accumulate in soil from irrigation water and eventually render it sterile, and occasionally high aluminum levels could impact fish.

#### Why is the general state worse than any use rating?

The general state reflects the fact that more than one use of the water can be impacted.

#### What will be done to improve matters?

The Ministry is working with the mining company and the public to develop an abandonment plan for the mine which will ensure that water quality is protected.

## Peachland Creek

#### What is the general state of water quality?

Peachland Creek water quality is good (index = 7). A plan to abandon a closed molybdenum mine is being developed to ensure that water quality will be protected.

### Good

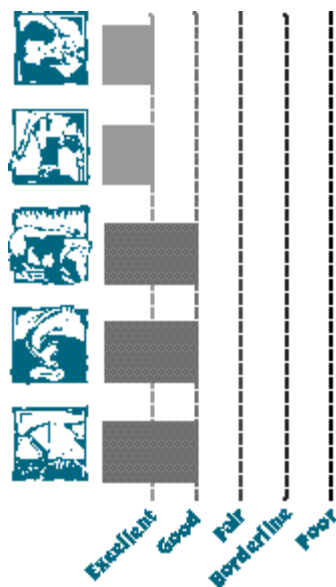
#### What are the main attributes of Peachland Creek?

Peachland Creek, near Westbank, is important as one of the top three Okanagan Lake tributaries for spawning kokanee and rainbow trout.

#### What are the potential sources of contamination?

These include a closed copper-molybdenum mine and mill, agricultural wastes, and leachate from a refuse site.

#### Which objectives have been set?



Those for metals, dissolved solids, ammonia, nitrite, nitrate, the growth of algae, and pH. The objectives were set for those characteristics that relate to contaminant sources.

### What are the main uses of the creek?

Uses include those of aquatic life, wildlife, drinking water with complete treatment, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

Between 1991 and 1993, the objectives for aluminum and molybdenum were occasionally not met.

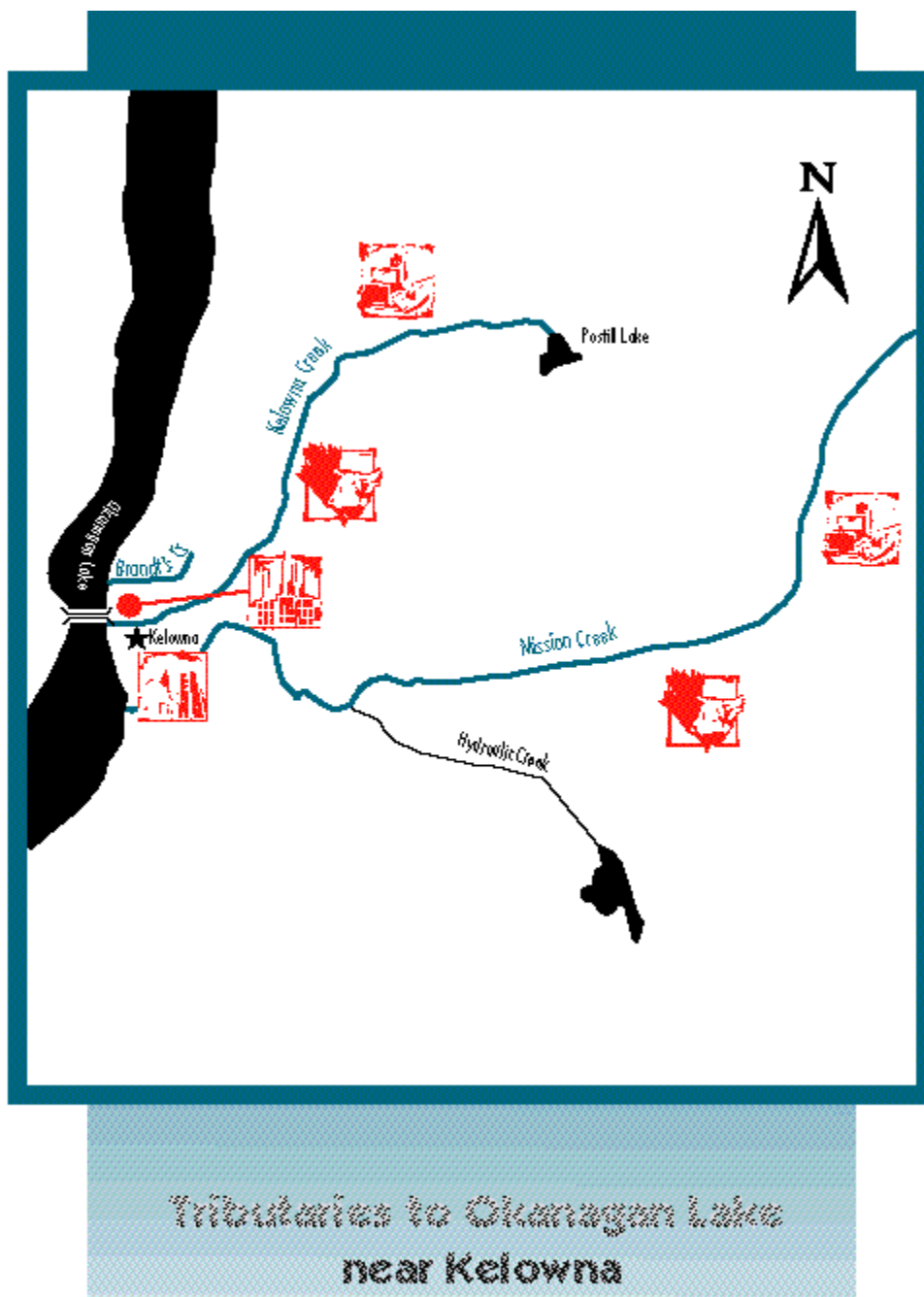
### What does it mean to not meet these objectives?

High molybdenum concentrations can accumulate in forage crops via irrigation water and cause molybdenosis in cattle, while high aluminum levels can impact fish.

### What will be done to improve matters?

The Ministry is working with the mining company and the public to develop an abandonment plan for the mine which ensures that water quality will be protected.





## Mission Creek

### What is the general state of water quality?

Mission Creek water quality is fair (index = 28), the main problem being with fecal coliforms. The Ministry will work with farmers and loggers to reduce their impacts on water quality.

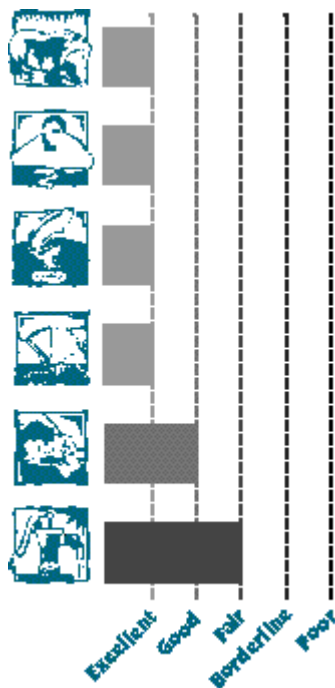
**Fair**

### What are the main attributes of Mission Creek?

Mission Creek, near Kelowna, is the most important tributary to Okanagan Lake for spawning kokanee and rainbow trout.

### What are the potential sources of contamination?

These include clear-cut logging and associated road



construction, agricultural activities, and storm water discharges in the lower reaches.

#### Which objectives have been set?

Those for fecal coliforms, ammonia, nitrite, the growth of algae, suspended solids, turbidity, dissolved oxygen, and pH. The objectives were set for those characteristics that relate to forestry and agricultural operations.

#### What are the main uses of the creek?

Uses include those of aquatic life and wildlife, drinking water with partial treatment, livestock watering, and irrigation. Recreation such as swimming is to be protected near the mouth. Uses are protected when the objectives are met.

#### Which objectives were not met?

From 1990 to 1993, fecal coliform objectives were usually not met, while the objective for the growth of algae was not met occasionally.

#### What does it mean to not meet these objectives?

High fecal coliform levels can be a problem for drinking water and livestock watering, while heavy growths of algae can smother fish habitat. Drinking water users should ensure that treatment systems are working properly.

#### What will be done to improve matters?

The Ministry will increase inspections of logging operations through the Forest Practices Code and will work with farmers and ranchers to reduce wastes from agriculture. The Ministry will also work with the City of Kelowna and the Regional District of Central Okanagan to minimize the effects of storm drainage and urban runoff. Residents near the creek should minimize use of fertilizer and pesticide and not discharge any wastes into the storm drains.

## Kelowna Creek

#### What is the general state of water quality?

Kelowna Creek water quality is fair (index = 28), the main problem being with fecal coliforms. The City of Kelowna is controlling storm sewer discharges and the Ministry will work with farmers and loggers to reduce their impacts on water quality.

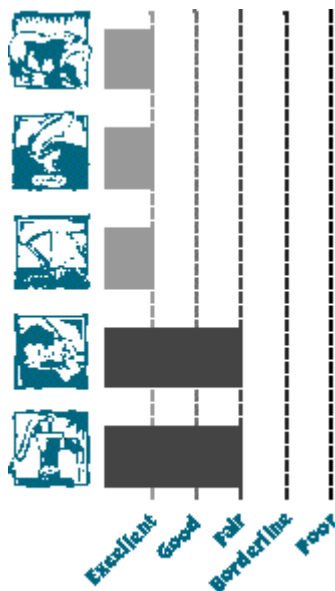
### Fair

#### What are the main attributes of Kelowna (Mill) Creek?

Kelowna Creek, a tributary to Okanagan Lake at Kelowna, is important habitat for spawning kokanee and rainbow trout.

#### What are the potential sources of contamination?

These include non-point sources such as urban stormwater discharges in the lower reaches and logging



and agricultural activities elsewhere.

#### Which objectives have been set?

Those for fecal coliforms, ammonia, nitrite, the growth of algae, suspended solids, turbidity, dissolved oxygen, metals, and pH. The objectives were set for those characteristics that relate to the non-point sources.

#### What are the main uses of the creek?

Uses include those of aquatic life and wildlife, drinking water with partial treatment, livestock watering, and irrigation. These uses are protected when the objectives are met.

#### Which objectives were not met?

From 1990 to 1993, fecal coliform objectives were not met and the dissolved oxygen objective was not met on occasion.

#### What does it mean to not meet these objectives?

High fecal coliform levels can be a problem in drinking water and users should ensure that treatment systems are working properly. The dissolved oxygen values were not low enough to impact fish.

#### What will be done to improve matters?

The City of Kelowna has developed a stormwater by-law to improve discharges to the creek. The Ministry will increase inspections of logging operations through the Forest Practices Code and will work with farmers and ranchers to reduce wastes from agriculture. Residents near the creek should minimize use of fertilizer and pesticide and not discharge any wastes into the storm drains.

## Brandt's Creek

#### What is the general state of water quality?

Brandt's Creek water quality is fair (index = 34), with high dissolved solids being the main problem. The City of Kelowna is improving urban stormwater management practices in the watershed.

**Fair**

#### What are the main attributes of Brandt's Creek?

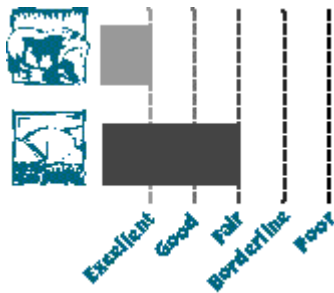
Brandt's Creek, a tributary to Okanagan Lake near Kelowna, is important for wildlife and irrigation.

#### What are the potential sources of contamination?

These include urban stormwater discharges in the lower reaches, agriculture, and treated waste water from the Kelowna Tradewaste Treatment Plant.

#### Which objectives have been set?

Only the objective for conductivity, a measure of dissolved solids. This protects irrigation users from



inputs of stormwater.

#### **What are the main uses of the creek?**

Uses include those of wildlife and irrigation water. These are protected when the objective is met.

#### **When is the objective not met?**

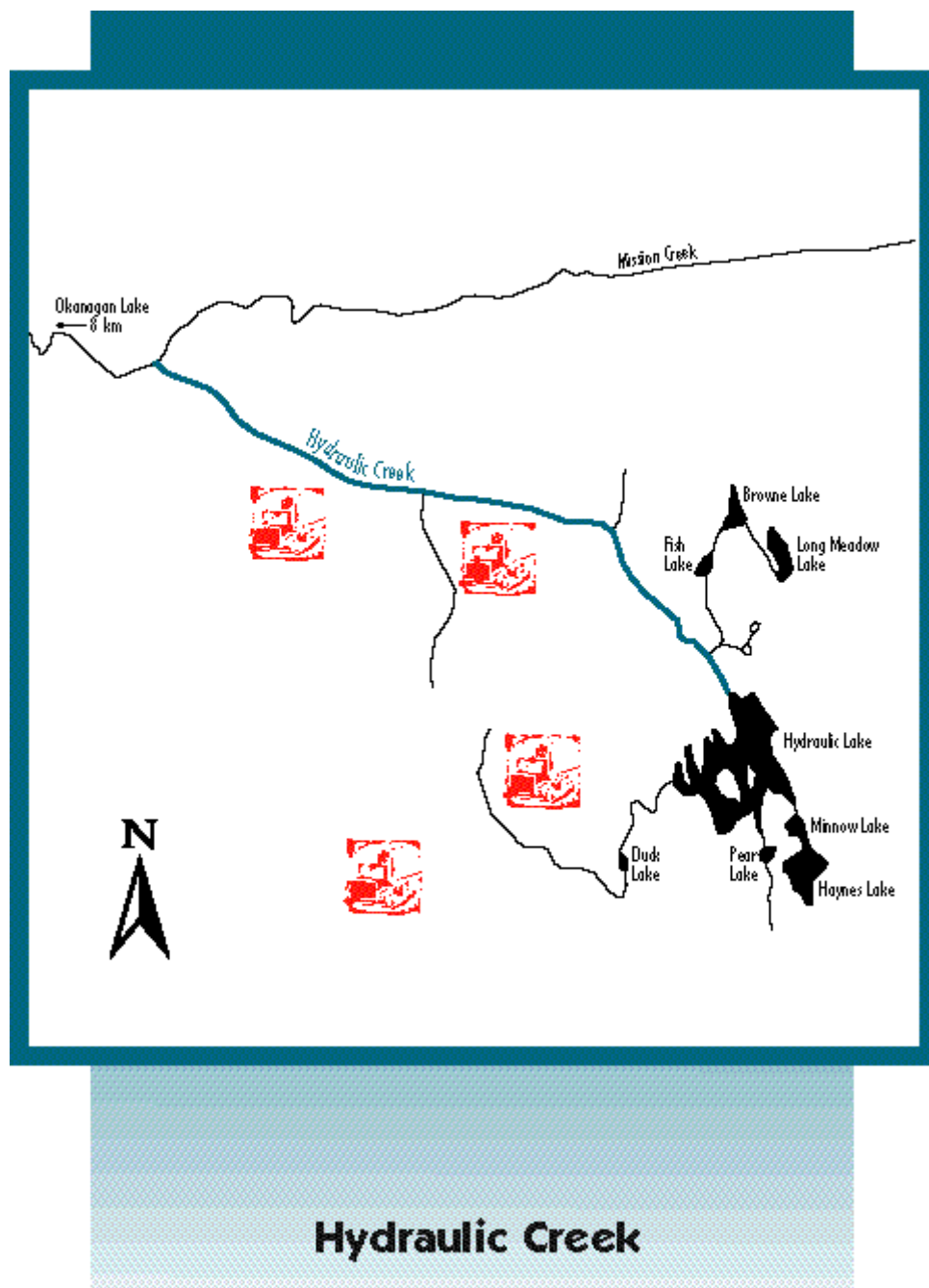
Between 1990 and 1993, the conductivity objective was usually not met.

#### **What does it mean to not meet this objective?**

High dissolved solids can be a problem in irrigation water by increasing the concentration of "salts" that remain in the soil after evaporation.

#### **What will be done to improve matters?**

The City of Kelowna has developed a stormwater by-law to control discharges to the creek. Residents near the creek should minimize use of fertilizer and pesticide and not discharge any wastes into the storm drains.



## Hydraulic Creek

### Hydraulic Creek

#### What is the general state of water quality?

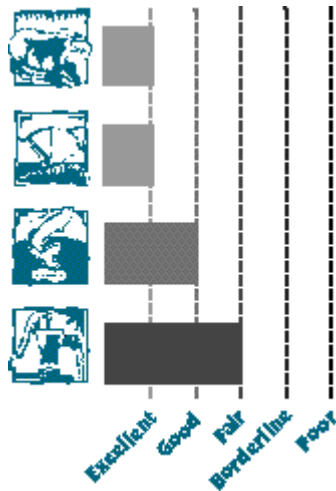
Hydraulic Creek water quality is fair (index = 35), with fecal coliforms being the main problem. The Ministry will be working through the Forest Practices Code to improve conditions in the watershed.

#### What are the main attributes of Hydraulic Creek?

Hydraulic Creek, a tributary to Mission Creek, is important for fish habitat and as an irrigation and drinking water supply.

#### What are the potential sources of contamination?

## Fair



These include clear-cut logging and associated road construction.

### Which objectives have been set?

Those for suspended solids, turbidity, temperature, and fecal coliforms. The objectives were set for those characteristics that relate to forestry operations.

### What are the main uses of the creek?

Uses include those of aquatic life and wildlife, drinking water with only disinfection, and irrigation. These are protected when the objectives are met.

### Which objectives were not met?

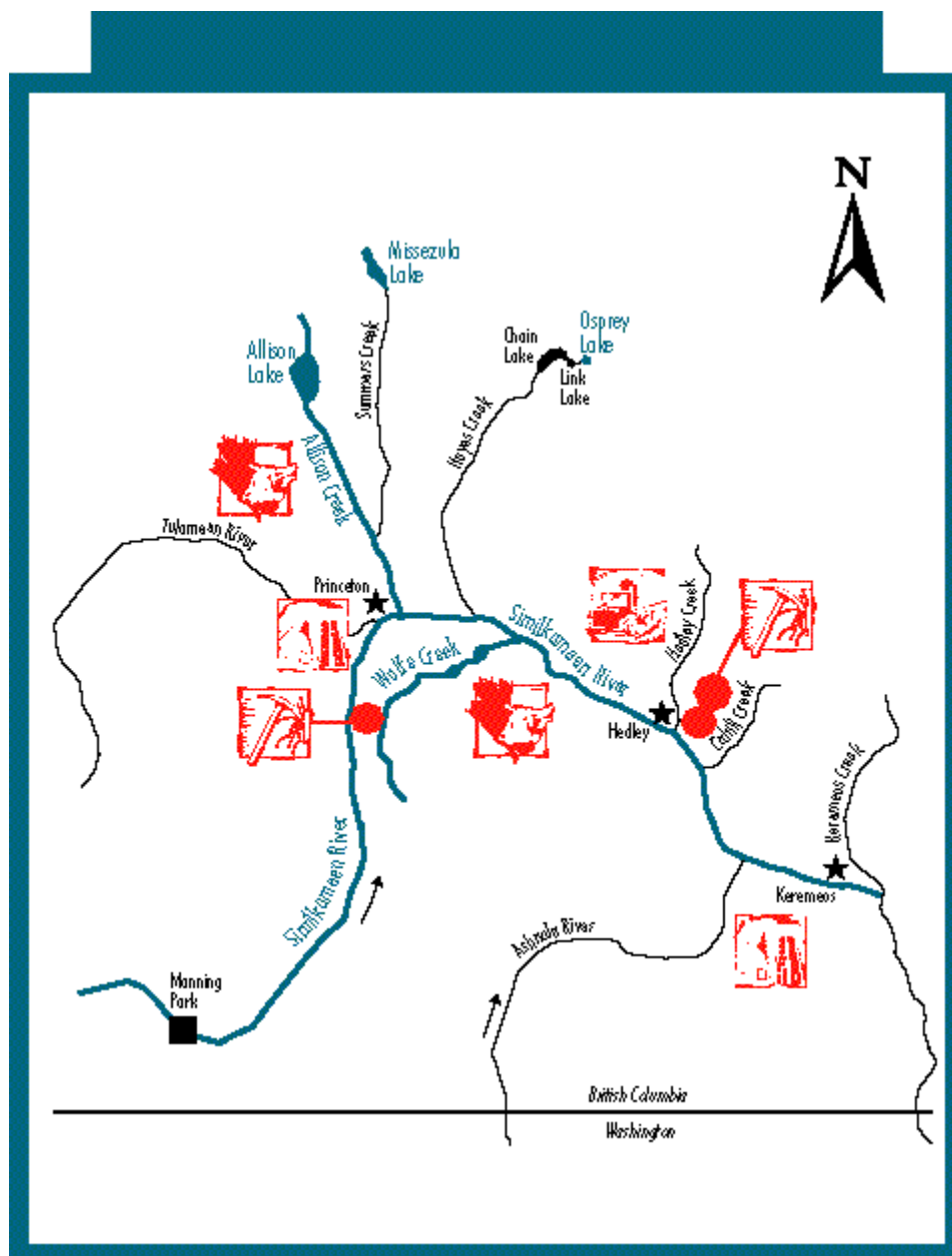
Between 1991 and 1993, all the objectives were not met at one time or other, most frequently those for fecal coliforms.

### What does it mean to not meet these objectives?

High fecal coliform levels can be a problem in drinking water, while high suspended solids can impact fish. Drinking water distributors and users should ensure that treatment systems are working properly.

### What will be done to improve matters?

The Ministry will increase inspections of logging operations through the Forest Practices Code to ensure that contamination of the watershed is prevented.



Similkameen River Area

## Similkameen River

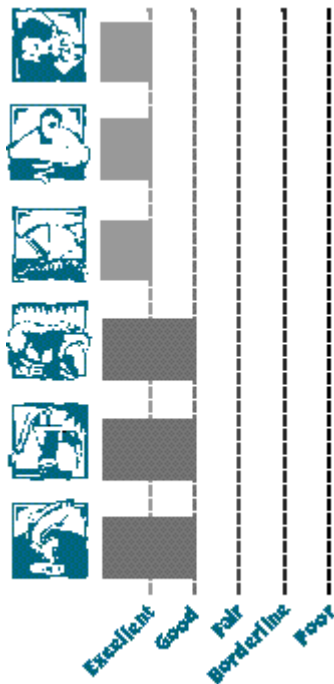
### What is the general state of water quality?

Similkameen River water quality is good (index = 14), although fecal coliforms at times do not meet acceptable levels. Studies would be needed to assess the impact of cattle that are probably causing the coliform problem.

### What are the main attributes of the Similkameen River?

The Similkameen River is a major transboundary river, flowing from Manning Park through Princeton and into the United States. It is important for fisheries and recreation.

## Good



### What are the potential sources of contamination?

These include treated sewage from Princeton and Keremeos, agriculture, and mining operations near Princeton and Hedley.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, cyanide, cyanates, metals, ammonia, the growth of algae, dissolved oxygen, and pH. The objectives were set for characteristics that relate to potential sources of contamination.

### What are the main uses of the river?

Uses include drinking water that is disinfected only, use by aquatic life and wildlife, recreation such as swimming, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

The objectives for fecal coliforms were regularly not met. The objectives for chromium, copper, iron, manganese and zinc were occasionally not met between 1987 and 1993.

### What does it mean to not meet these objectives?

High fecal coliform levels, probably coming from cattle, mean that drinking water users should ensure that their treatment systems are working properly. Swimmers and other users would not be affected. Occasionally high metal and suspended solids levels could theoretically pose intermittent threats to aquatic life.

### Does anything need to be done to improve matters?

Studies would be needed to reduce the impact of cattle on water quality and to clarify the potential threat of occasionally high metals to aquatic life.

## Allison Creek

### What is the general state of water quality?

Allison Creek water quality is fair (index = 24), with fecal coliforms at times not meeting acceptable levels. While there is no cause for immediate concern, studies are needed to determine the impact of cattle in the watershed.

## Fair

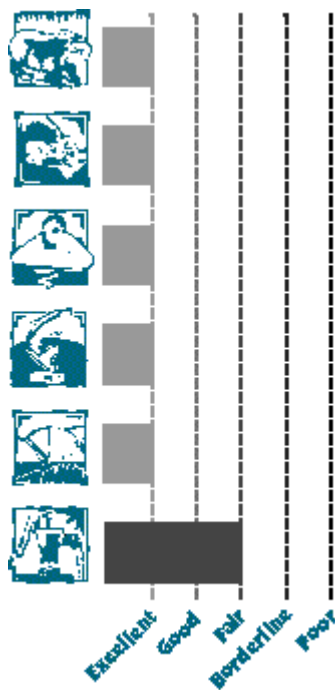
### What are the main attributes of Allison Creek?

Allison Creek is a tributary to the Similkameen River just downstream from Princeton. It is important fish habitat.

### What are the potential sources of contamination?

These include non-point discharges from agriculture.





### Which objectives have been set?

Those for fecal coliforms and dissolved oxygen, set for characteristics that relate to agriculture.

### What are the main uses of the creek?

Uses include drinking water that is disinfected only, aquatic life and wildlife, recreation such as swimming, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

The objectives for fecal coliforms were regularly not met between 1988 and 1993.

### What does it mean to not meet these objectives?

High fecal coliform levels mean that drinking water users should ensure that their treatment systems are working properly. Swimmers and other users would not be affected at the levels that were encountered.

### What will be done to improve matters?

The fecal coliform problem in Allison Creek does not show a serious situation at this time. Studies on reducing the impact of cattle on water quality would be needed to correct the problem.

## Allison Lake

### What is the general state of water quality?

Allison Lake water quality is excellent (index = 0), with fecal coliforms and phosphorus concentrations meeting acceptable levels.

### Excellent

### What are the main attributes of Allison Lake?

Allison Lake is the headwaters for Allison Creek. It is important as fish habitat and for recreation.

### What are the potential sources of contamination?

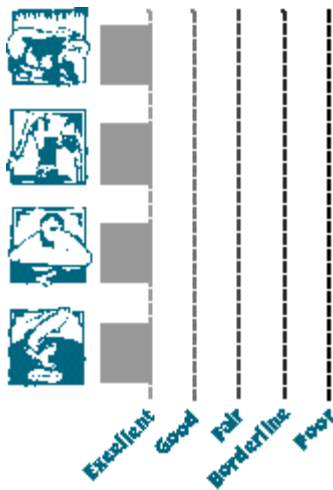
These include non-point discharges from agriculture, septic tanks, and forestry operations.

### Which objectives have been set?

Those for fecal coliforms and phosphorus, set for characteristics that relate to agriculture.

### What are the main uses of the lake?

Uses include drinking water that is disinfected only, use by aquatic life and wildlife, and recreation such as swimming. These uses are protected when the objectives are met.



### Which objectives were not met?

All objectives were met regularly in 1987 and 1993.

### What does it mean to meet these objectives?

Drinking water users should continue to ensure that their treatment systems are working properly, even with low fecal coliform concentrations. Swimmers and other users would not be affected.

### Does anything need to be done to improve matters?

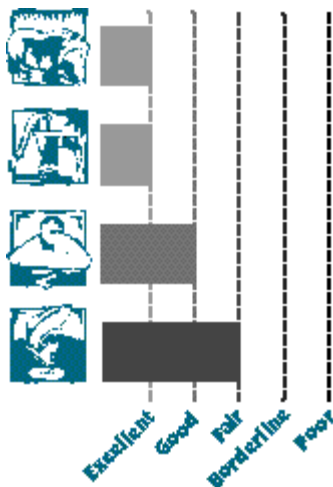
Since water quality objectives are met in Allison Lake, there is no water quality problem at this time. Residents near the lake should ensure that their septic tanks are working properly and should minimize the use of fertilizer and pesticide.

## Missezula Lake

### What is the general state of water quality?

Missezula Lake water quality is poor (index = 69) because the phosphorus objective was not met. There are no plans to address this problem which is believed to be caused naturally.

### Poor



### What are the main attributes of Missezula Lake?

Missezula Lake is the headwaters for Summers Creek, a tributary to Allison Creek which it joins from the east just north from Princeton. Missezula Lake provides a habitat for kokanee and rainbow trout.

### What are the potential sources of contamination?

These include small amounts of development near the lake and phosphorus from sediments in the bottom of the lake.

### Which objectives have been set?

Those for fecal coliforms and the growth of algae, set for characteristics that relate to potential sources of contamination.

### What are the main uses of the lake?

Uses include drinking water that is disinfected only, use by aquatic life and wildlife, and recreation such as swimming. These uses are protected when the objectives are met.

### Which objectives were not met?

Between 1988 and 1993, the objective for phosphorus was not met.

#### What does it mean to not meet this objective?

The high phosphorus level means the lake produces excessive growths of algae. Such growths can affect drinking water taste and, at times, deplete oxygen for fish. Although fecal coliform levels appeared to be low, drinking water users should ensure that treatment systems are working properly. Swimmers and aquatic life would not be affected by coliforms but could be affected by algae.

#### Why is the general state worse than any use rating?

The general state reflects the fact that the phosphorus objective has never been met.

#### What can be done to improve matters?

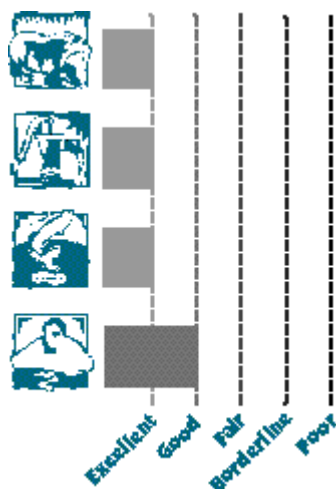
Phosphorus concentrations in the lake could be reduced by providing aeration to reduce phosphorus coming from sediments in the bottom of the lake. This would eliminate any problems with algae which might be encountered by swimmers. Residents around the lake should ensure that their septic tanks are working properly and should minimize the use of fertilizer and pesticide.

## Osprey Lake

#### What is the general state of water quality?

Osprey Lake water quality is good (index = 17), although the phosphorus objective is not met at times. There are no plans to address this problem which is believed to be caused naturally.

#### Good



#### What are the main attributes of Osprey Lake?

Osprey Lake is the first of three headwater lakes (Link and Chain lakes) which flow into Hayes Creek, a tributary of the Similkameen River downstream from the Allison Creek confluence. Osprey Lake is used for habitat by rainbow trout and for recreation.

#### What are the potential sources of contamination?

These include small amounts of development near the lake and phosphorus from sediments on the bottom of the lake.

#### Which objectives have been set?

Those for fecal coliforms and the growth of algae, set for characteristics that relate to potential sources of contamination.

#### What are the main uses of the lake?

Uses include drinking water that is disinfected only, use by aquatic life and wildlife, and recreation such as swimming. These uses are protected when the objectives are met.

### Which objectives were not met?

The objective for phosphorus was not met regularly during the spring.

### What does it mean to not meet this objective?

The high phosphorus level means the lake produces excessive growths of algae. Such growths can affect drinking water taste and, at times, deplete oxygen for fish. Although fecal coliform levels appeared to be low, drinking water users should ensure that treatment systems are working properly. Swimmers would not be affected unless they encountered algae.

### What can be done to improve matters?

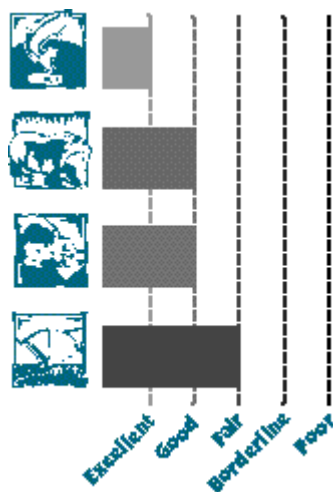
Phosphorus concentrations could be reduced by providing aeration to reduce phosphorus entering the water column from sediments in the bottom of the lake. This could eliminate problems with algae. Residents around the lake should ensure that their septic tanks are working properly and should minimize the use of fertilizer and pesticide.

## Wolfe Creek

### What is the general state of water quality?

Wolfe Creek water quality is good (index = 10), although molybdenum concentrations at times do not meet acceptable levels. While there is no cause for immediate concern, studies are needed to ensure irrigation waters are not affecting forage crops.

### Good



### What are the main attributes of Wolfe Creek?

Wolfe Creek is a tributary to the Similkameen River, mid-way between Princeton and Hedley. It is important fish habitat for rainbow trout and the rare northern mountain sucker and chiselmouth.

### What are the potential sources of contamination?

These include tailings from a copper mine located south of Princeton and non-point sources such as forestry and agriculture.

### Which objectives have been set?

Those for dissolved solids, metals, and pH, set for characteristics that relate to the mining operation.

### What are the main uses of the creek?

Uses include livestock watering, irrigation, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

Between 1987 and 1993, the objectives for molybdenum were not met at times.

### What does it mean to not meet these objectives?

High molybdenum concentrations in some years mean that forage crops for cattle may accumulate high molybdenum concentrations. Cattle fed this forage should receive copper supplements when forage concentrations are high.

### Does anything need to be done to improve matters?

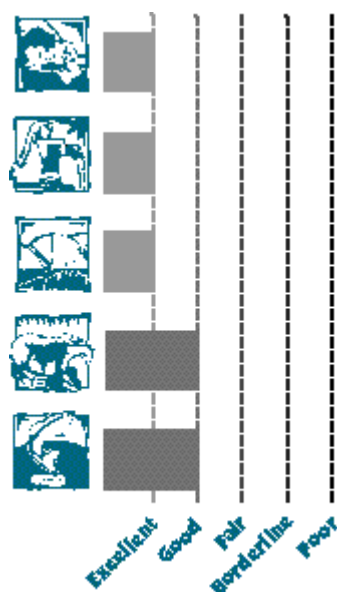
Studies are needed to find out whether forage crops are at risk from irrigation water.

## Hedley Creek

### What is the general state of water quality?

Hedley Creek water quality is good (index = 13), although aluminum, copper, zinc, and suspended solids at times do not meet objective levels. Studies would be needed to find out whether the higher metal values could affect aquatic life.

### Good



### What are the main attributes of Hedley Creek?

Hedley Creek is a tributary to the Similkameen River at Hedley. It is important for fisheries and recreation.

### What are the potential sources of contamination?

These include tailings from old mining operations near Hedley, adjacent to the creek, waste rock from recent mining, and non-point sources such as road runoff and forestry operations.

### Which objectives have been set?

Those for suspended solids, substrate sedimentation, turbidity, cyanide, cyanates, metals, ammonia, the growth of algae, and pH. Objectives were set for characteristics that relate to the tailings piles.

### What are the main uses of the creek?

Uses include drinking water with complete treatment, use by aquatic life and wildlife, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

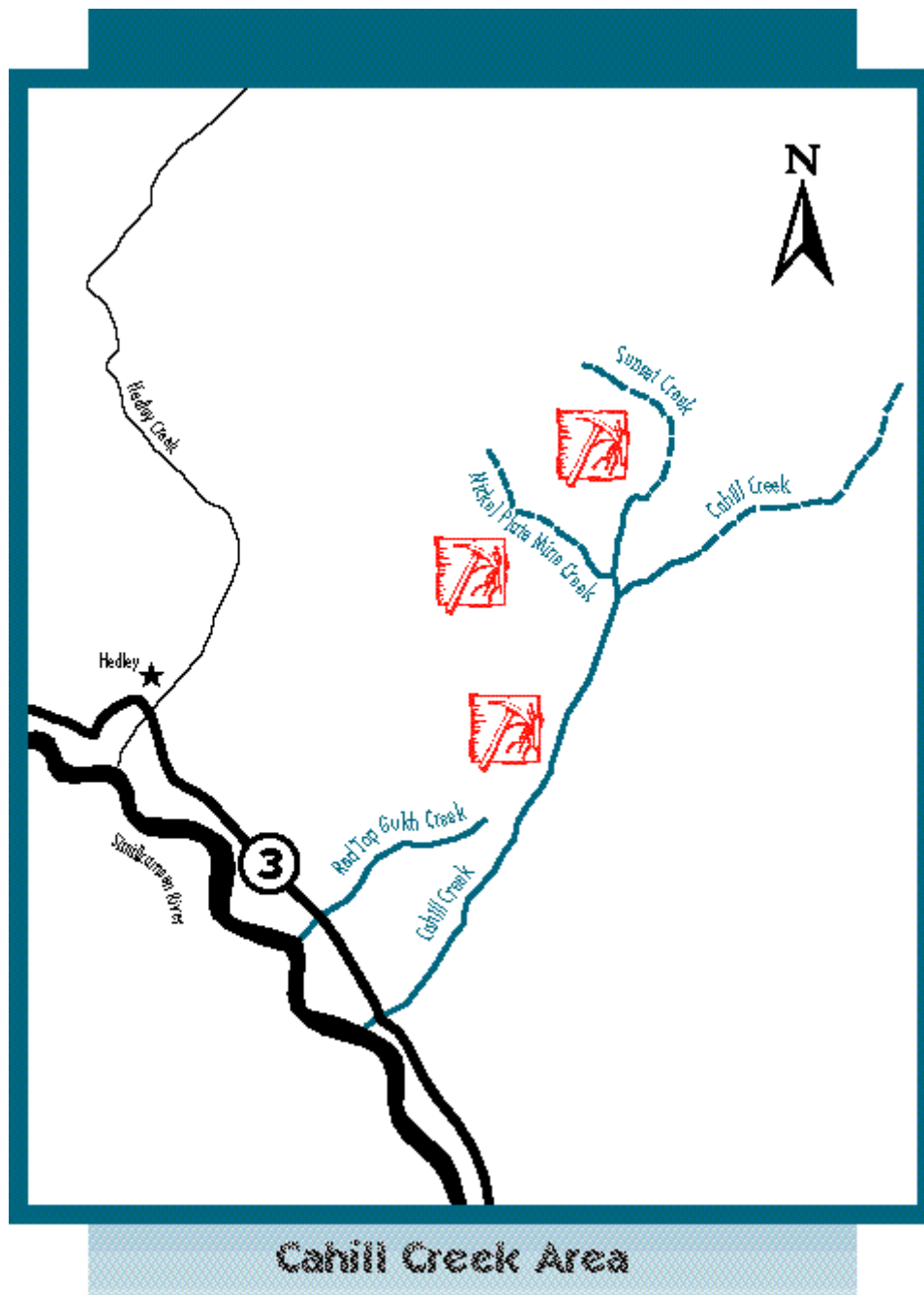
The objectives for aluminum, copper, and zinc were not met on occasion in 1990 and 1993 when samples were collected.

### What does it mean to not meet these objectives?

Higher levels of metals and suspended solids which occur occasionally could theoretically pose intermittent threats to aquatic life.

### Does anything have to be done to improve matters?

The degree to which objectives were not met in Hedley Creek does not show a serious situation at this time. Studies to clarify the potential threat to aquatic life of occasionally high metal values would be the next step.



## Cahill Creek

### What is the general state of water quality?

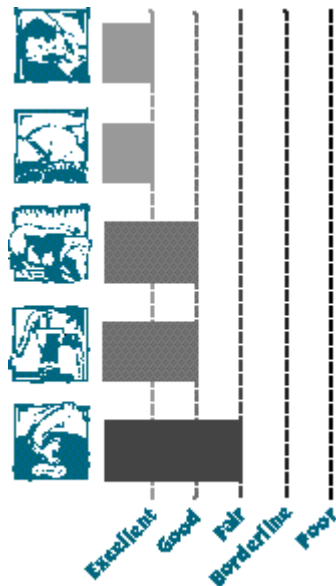
Cahill Creek water quality is good (index = 13), although certain substances at times exceed acceptable levels. Collection and treatment of seepage and runoff from a gold-mining operation is underway to correct these

### What are the main attributes of Cahill Creek?

Cahill Creek (about four km south from Hedley) is a tributary to the Similkameen River. Fish spawn at the confluence of the creek with the Similkameen River.

problems.

## Good



### What are the potential sources of contamination?

These include surface runoff from a gold-mining operation near the headwaters and possible drainage from the tailings pond.

### Which objectives have been set?

Those for suspended and dissolved solids, turbidity, sulphate, cyanide, cyanate, ammonia, nitrite, nitrate, metals, and pH. The objectives were set for those characteristics that relate to the mining operation.

### What are the main uses of the creek?

Uses through its entire length include wildlife, irrigation, drinking water with partial treatment, livestock watering and, near its mouth, aquatic life. These uses are protected when the objectives are met.

### Which objectives were not met?

Between 1987 and 1993, objectives not met in two or more years were those for cyanide, cadmium, and pH. Objectives for selenium, mercury, zinc, and sulphate were not met in only one year.

### What does it mean to not meet these objectives?

The amount by which several of the objectives were not met was small, so that the impact on most water uses would be minimal. High levels of cyanide are fatal to aquatic life.

### What will be done to improve matters?

The Ministry is working with the mining company to ensure that runoff from disturbed areas and seepage from the tailings pond are collected and treated. When this is successful, the objectives should be met at all times.

## Sunset Creek

### What is the general state of water quality?

Sunset Creek water quality is good (index = 17), although suspended solids and turbidity at times do not meet acceptable levels. Proper rehabilitation of mined areas is underway to solve this problem.

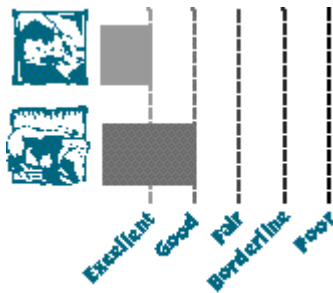
## Good

### What are the main attributes of Sunset Creek?

Sunset Creek (about four km south from Hedley) is one of three headwater creeks which are tributary to Cahill Creek, itself a tributary to the Similkameen River. Sunset Creek provides water for wildlife and livestock, and enhances the flow of Cahill Creek in its lower reaches for fish habitat.

### What are the potential sources of contamination?

These include surface runoff from an adjacent gold-



mining operation.

#### Which objectives have been set?

Those for suspended solids and turbidity, which are characteristics that relate to surface runoff.

#### What are the main uses of the creek?

Uses include those by wildlife and livestock watering. These uses are protected when the objectives are met.

#### Which objectives were not met?

Between 1987 and 1993, objectives for suspended solids and turbidity were sometimes not met.

#### What does it mean to not meet these objectives?

High turbidity and suspended solids mean that there could be interferences with aquatic plant growth and the production of other aquatic food items on which wildlife depends. The data from recent years indicate that water quality may be deteriorating.

#### What will be done to improve matters?

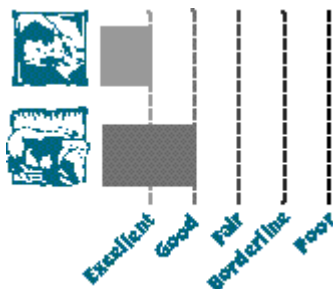
The Ministry is working with the mining company to ensure that waste rock reclamation continues and that open pit mining areas are properly rehabilitated.

### Nickel Plate Mine Creek

#### What is the general state of water quality?

Nickel Plate Mine Creek water quality is good (index = 17), although dissolved solids and sulphate at times do not meet acceptable levels. The flow of creek water is being managed to prevent adverse effects in Cahill Creek downstream.

#### Good



#### What are the main attributes of Nickel Plate Mine Creek?

Nickel Plate Mine Creek (about four km south from Hedley ) is one of three headwater creeks for Cahill Creek, a tributary to the Similkameen River. Nickel Plate Mine Creek provides water for wildlife and livestock and enhances the flow of Cahill Creek in its lower reaches for fish habitat.

#### What are the potential sources of contamination?

These include waste rock runoff from an adjacent gold-mining operation.

#### Which objectives have been set?

Those for suspended and dissolved solids, turbidity, sulphate, nitrite, nitrate, metals, and pH. The objectives were set for those characteristics that relate to the mine and were meant to protect water quality in Nickel Plate



Mine Creek and downstream in Cahill Creek.

**What are the main uses of the creek?**

These include livestock watering and use by wildlife.

**Which objectives were not met?**

Between 1989 and 1993, objectives not met included those for dissolved solids, sulphate, pH, nitrite, and zinc. No problems were noted in 1987 or 1988.

**What does it mean to not meet these objectives?**

High sulphate can cause growth of sulphur bacteria which can smother aquatic insects living on the creek bed. Recent measurements suggest some problems with such aquatic insect life, which in turn can affect wildlife that is dependent on aquatic food items. High dissolved solids can potentially affect irrigation in Cahill Creek.

**What will be done to improve matters?**

The Ministry has required the mining company to ensure that the creek does not impact water quality in Cahill Creek by managing the flows of Nickel Plate Mine Creek.

## **Red Top Gulch Creek**

**What is the general state of water quality?**

Red Top Gulch Creek water quality is good (index = 17), although several variables at times exceed acceptable levels. Collection and treatment of seepage and runoff from a gold-mining operation are underway to correct these problems.

**Good**

**What are the main attributes of Red Top Gulch Creek?**

Red Top Gulch Creek (about four km south from Hedley) is a tributary to the Similkameen River.

**What are the potential sources of contamination?**

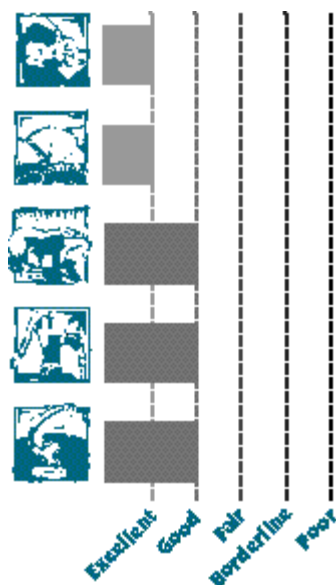
These include surface runoff from a gold-mining operation and seepage from a tailings pond.

**Which objectives have been set?**

Those for suspended and dissolved solids, turbidity, sulphate, cyanide, cyanate, ammonia, nitrite, pH, nitrate and metals. The objectives were set for those characteristics that relate to the mine.

**What are the main uses of the creek?**

Uses include those by aquatic life and wildlife, irrigation, drinking water with partial treatment, and livestock watering. These uses are protected when the objectives are met.



### Which objectives were not met?

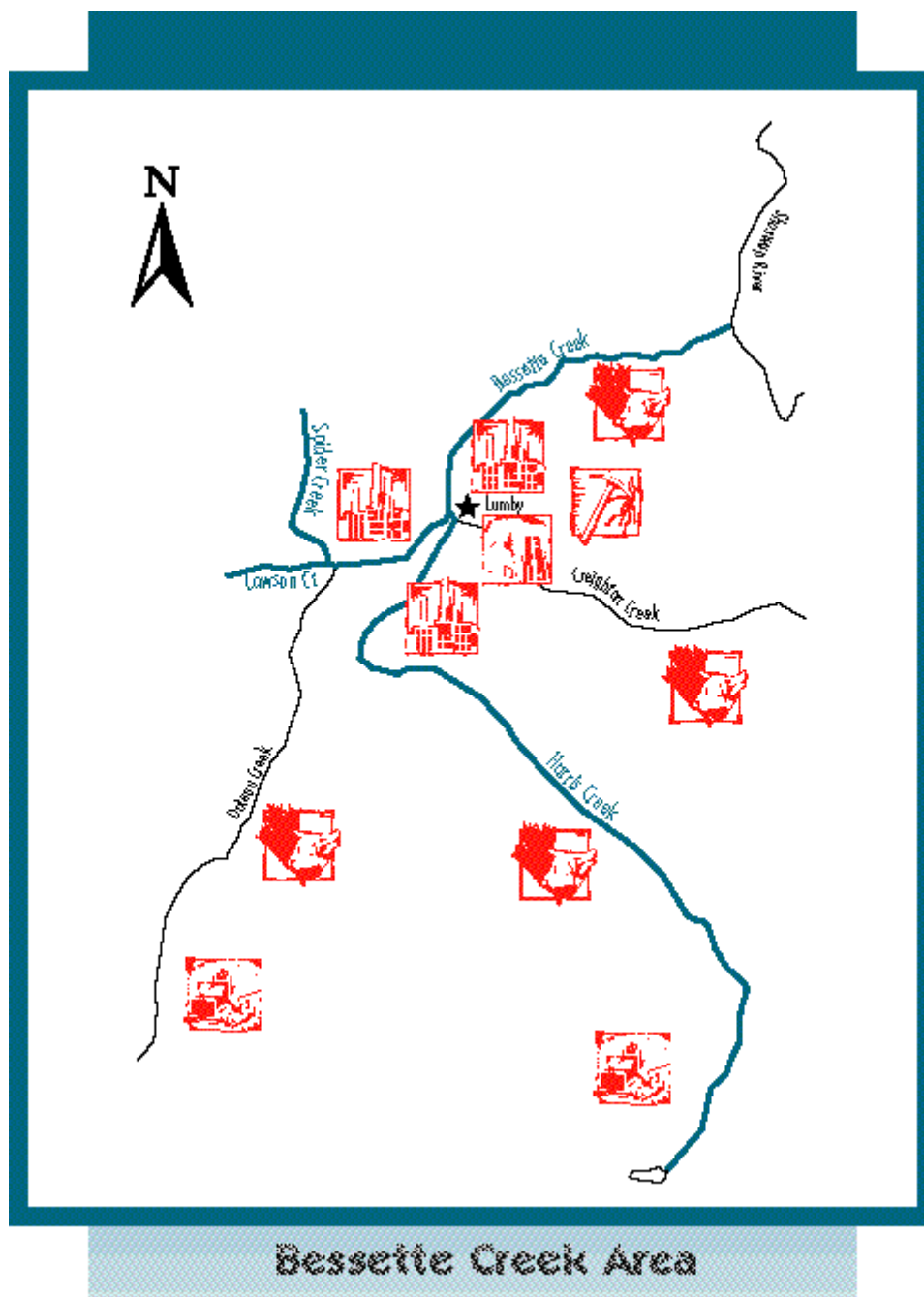
From 1987 to 1993, objectives not met in two or more years included those for cyanide, sulphate, mercury, copper, and pH. Objectives for nitrite, molybdenum, aluminum, and dissolved solids were not met in only one year.

### What does it mean to not meet these objectives?

Several objectives were not met by only a small amount so that the impact on water uses would be small. High sulphate can promote the growth of sulphur bacteria which smother bottom insect life, a food source for fish. High levels of cyanide are fatal to aquatic life. The data from recent years indicate that water quality may be deteriorating.

### What will be done to improve matters?

The Ministry is working with the mining company to ensure that runoff from disturbed areas and seepage from the tailings pond are collected for treatment. When this is successful, the water quality objectives should be met at all times.



## Bessette Creek

### What is the general state of water quality?

Bessette Creek water quality is fair (index = 33), with fecal coliforms at times not meeting acceptable levels. A study is needed to find the cause of the high fecal coliform levels and to remedy the situation.

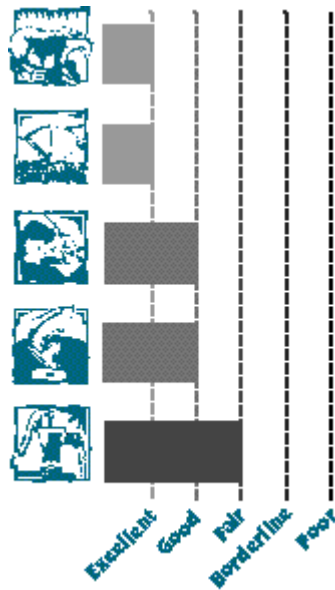
### What are the main attributes of Bessette Creek?

Bessette Creek is an important fisheries habitat for several salmonid species from the Shuswap River and Mabel Lake.

### What are the potential sources of contamination?

These include forestry in the headwaters, agriculture

## Good



along its lower reaches, a chlorophenol-contaminated site, a gold-silver mine, urban runoff, and treated sewage from Lumby.

### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, ammonia, nitrite, nitrate, the growth of algae, pH, and dissolved oxygen. The objectives were set for those characteristics that relate to potential sources of contamination.

### What are the main uses of the creek?

Uses include those of aquatic life and wildlife, drinking water with partial treatment, livestock watering, and irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1990 to 1993, fecal coliforms and suspended solids objectives were usually not met while pH was not met in 1992.

### What does it mean to not meet these objectives?

High fecal coliform levels can be a problem for drinking water and livestock watering, while high suspended solids can impact fish.

### What will be done to improve matters?

A study is needed to find the cause of the high fecal coliforms levels before the problem can be solved.

## Lawson Creek

### What is the general state of water quality?

Lawson Creek water quality is fair (index = 40), with fecal coliforms and dissolved oxygen not meeting acceptable levels. The Ministry needs to trace the causes for objectives not being met.

## Fair

### What are the main attributes of Lawson Creek?

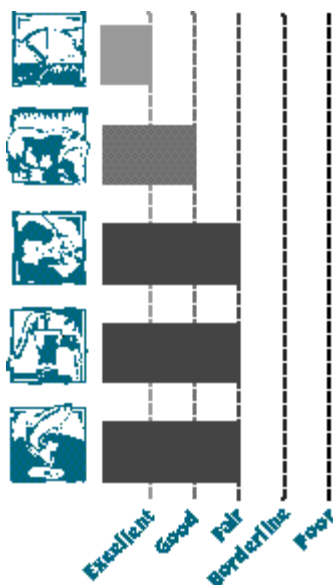
Lawson Creek is a tributary to Duteau Creek just upstream from its confluence with Bessette Creek and is important fisheries habitat.

### What are the potential sources of contamination?

These include a woodwaste landfill operated by a sawmill and veneer plant and agriculture.

### Which objectives have been set?

Those for fecal coliforms, dissolved and suspended solids, turbidity, ammonia, nitrite, nitrate, the growth of algae, pH, dissolved oxygen, resin acids, and colour. The objectives were set for those characteristics that



relate to woodwaste landfills and agriculture.

#### What are the main uses of the creek?

Uses include those of aquatic life and wildlife, drinking water with partial treatment, livestock watering, and irrigation. These uses are protected when the objectives are met.

#### Which objectives were not met?

Between 1990 and 1993, objectives for fecal coliforms, suspended solids, turbidity, and dissolved oxygen were often not met, while objectives for resin acids were occasionally not met.

#### What does it mean to not meet these objectives?

High fecal coliform levels can be a problem for drinking water and livestock watering, while high suspended solids can impact fish. Dissolved oxygen values dropped on occasion to slight impairment levels for fish, indicating that long-term impacts on fish may be a concern. Resin acids can accumulate in fish.

#### What will be done to improve matters?

The Ministry needs to trace the exact causes for the objectives not being met so that the situation can be remedied.

## Spider Creek

#### What is the general state of water quality?

Spider Creek water quality is fair (index = 40), with fecal coliforms not meeting acceptable levels. A study will be needed to trace the cause of objectives not being met.

### Fair

#### What are the main attributes of Spider Creek?

Spider Creek, a tributary to Lawson Creek, is important for fisheries habitat.

#### What are the potential sources of contamination?

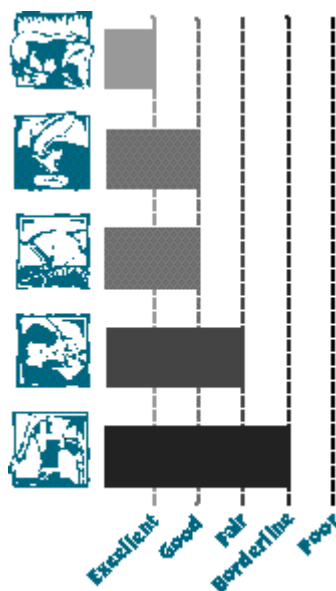
These include a woodwaste landfill operated by a sawmill and veneer plant and agriculture.

#### Which objectives have been set?

Those for fecal coliforms, dissolved and suspended solids, turbidity, ammonia, nitrite, nitrate, the growth of algae, pH, dissolved oxygen, resin acids, and colour. The objectives were set for those characteristics that relate to woodwaste landfills and agriculture.

#### What are the main uses of the creek?

Uses include those of aquatic life and wildlife, drinking water with partial treatment, livestock watering, and



irrigation. These uses are protected when the objectives are met.

### Which objectives were not met?

Between 1991 and 1993, objectives not met included those for fecal coliforms, suspended solids, pH, and dissolved oxygen.

### What does it mean to not meet these objectives?

High fecal coliform levels can be a problem for drinking water and livestock watering, while high suspended solids and low dissolved oxygen can impact fish.

### What will be done to improve matters?

Spider Creek has low flows which lowers its overall priority for rehabilitation. A study is needed to find the cause for objectives not being met so that problems can eventually be remedied.

## Harris Creek

### What is the general state of water quality?

Harris Creek water quality is good (index = 17), with chlorophenols not always meeting acceptable levels. A telephone pole plant in the area is collecting and treating chlorophenol-contaminated ground water to improve the creek.

### Good

### What are the main attributes of Harris Creek?

Harris Creek, one of the headwaters for Bessette Creek, is an important fisheries habitat for several salmonid species from the Shuswap River.

### What are the potential sources of contamination?

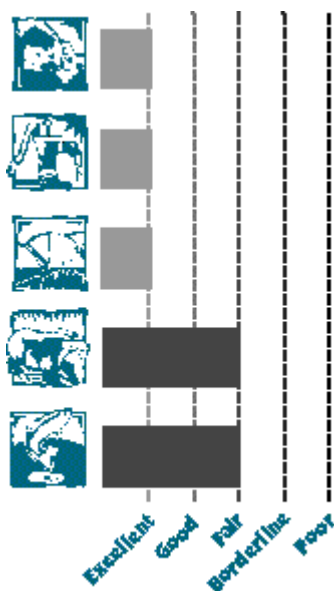
These include forestry in the headwaters, agriculture along its lower reaches, an old woodfill site, and a telephone pole treatment plant.

### Which objectives have been set?

Those for suspended solids, turbidity, ammonia, nitrite, nitrate, the growth of algae, pH, dissolved oxygen, and chlorophenols. The objectives were set for those characteristics that relate to potential sources of contamination.

### What are the main uses of the creek?

Uses include those of aquatic life and wildlife, drinking water with partial treatment, livestock watering, and irrigation. These uses are protected when the objectives are met.



### Which objectives were not met?

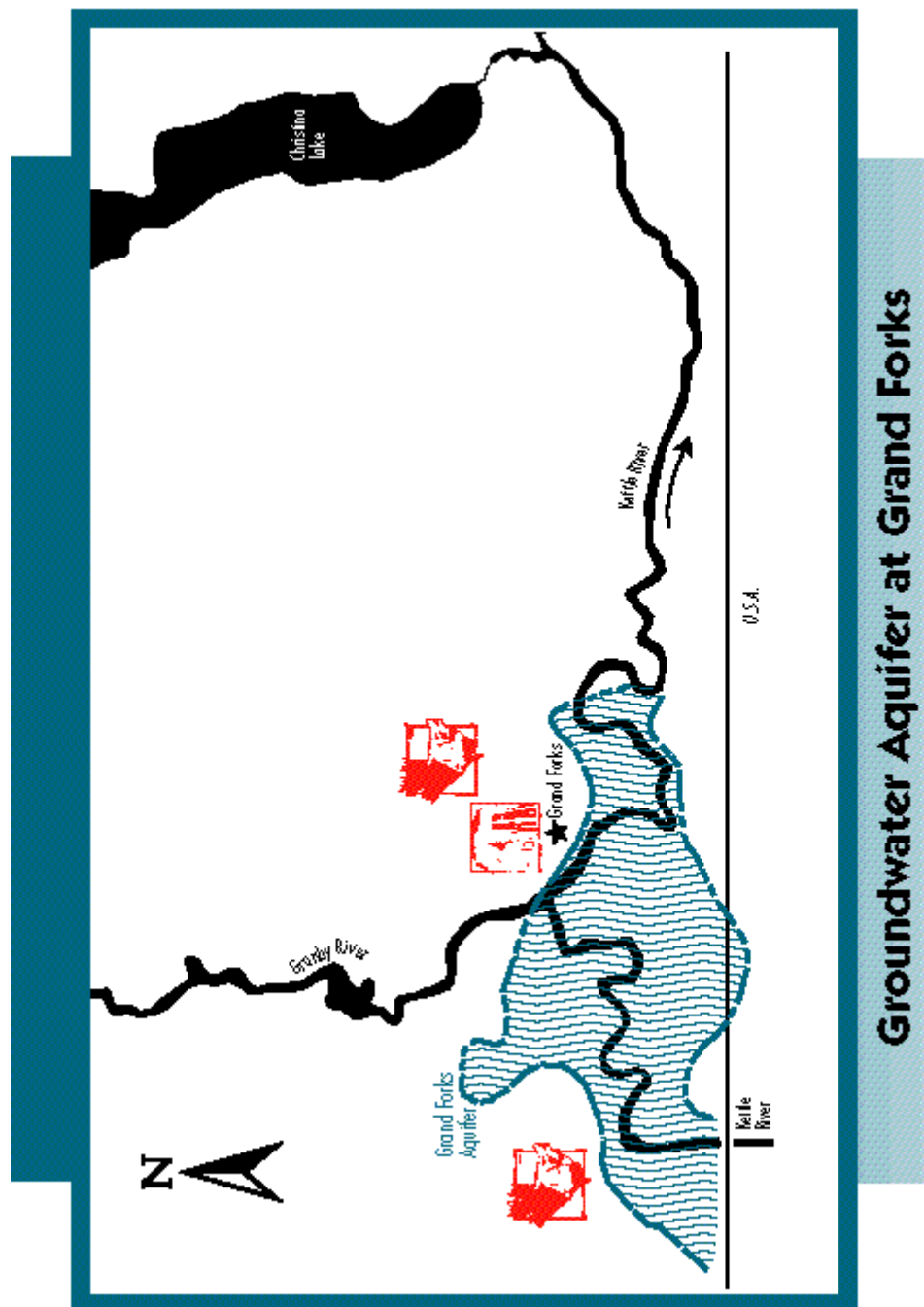
Between 1990 and 1993, objectives not met included those for chlorophenols in water to protect fish and those for chlorophenols in fish.

### What does it mean to not meet these objectives?

Chlorophenols can be toxic to fish and, at lower levels, can accumulate in fish and wildlife.

### What will be done to improve matters?

The telephone pole plant is presently collecting and treating contaminated ground water from the site. Since ground water interceptor trenches were installed in 1990, chlorophenols have rarely been detected in the water and concentrations in fish and aquatic insects have steadily declined.



## Groundwater Aquifer at Grand Forks

### Grand Forks Aquifer

#### What is the general state of water quality?

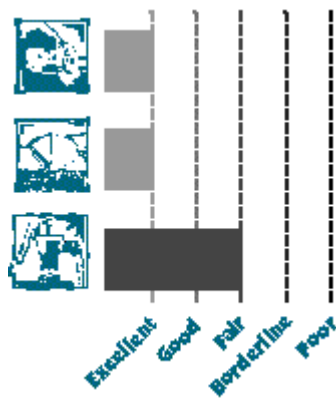
The water quality of the Grand Forks Aquifer is fair (index = 20) with nitrate-nitrogen concentrations not meeting acceptable levels in certain areas of the aquifer. Better control of agricultural wastes being applied to farmland will help improve water quality.

#### What are the main attributes of the Grand Forks Aquifer?

The Grand Forks Aquifer, located in the Kettle River Valley at Grand Forks, is highly productive but highly vulnerable to contamination. It is the main source of water supply for the area.



## Fair



### What are the potential sources of contamination?

These include nitrate from agricultural activities (chemical fertilizers) and septic systems. There are also manufactured materials, such as gasoline or pesticides, which can enter ground water in trace amounts.

### Which objectives have been set?

Although no water quality objectives have been set for this aquifer yet, the index ranking is based on the drinking water guideline for nitrate-nitrogen.

### What are the main uses of the aquifer?

Uses include drinking water, irrigation, and livestock watering.

### Which objectives were not met?

From 1989 to 1994, the drinking water guideline for nitrate-nitrogen was not met in certain areas of the aquifer.

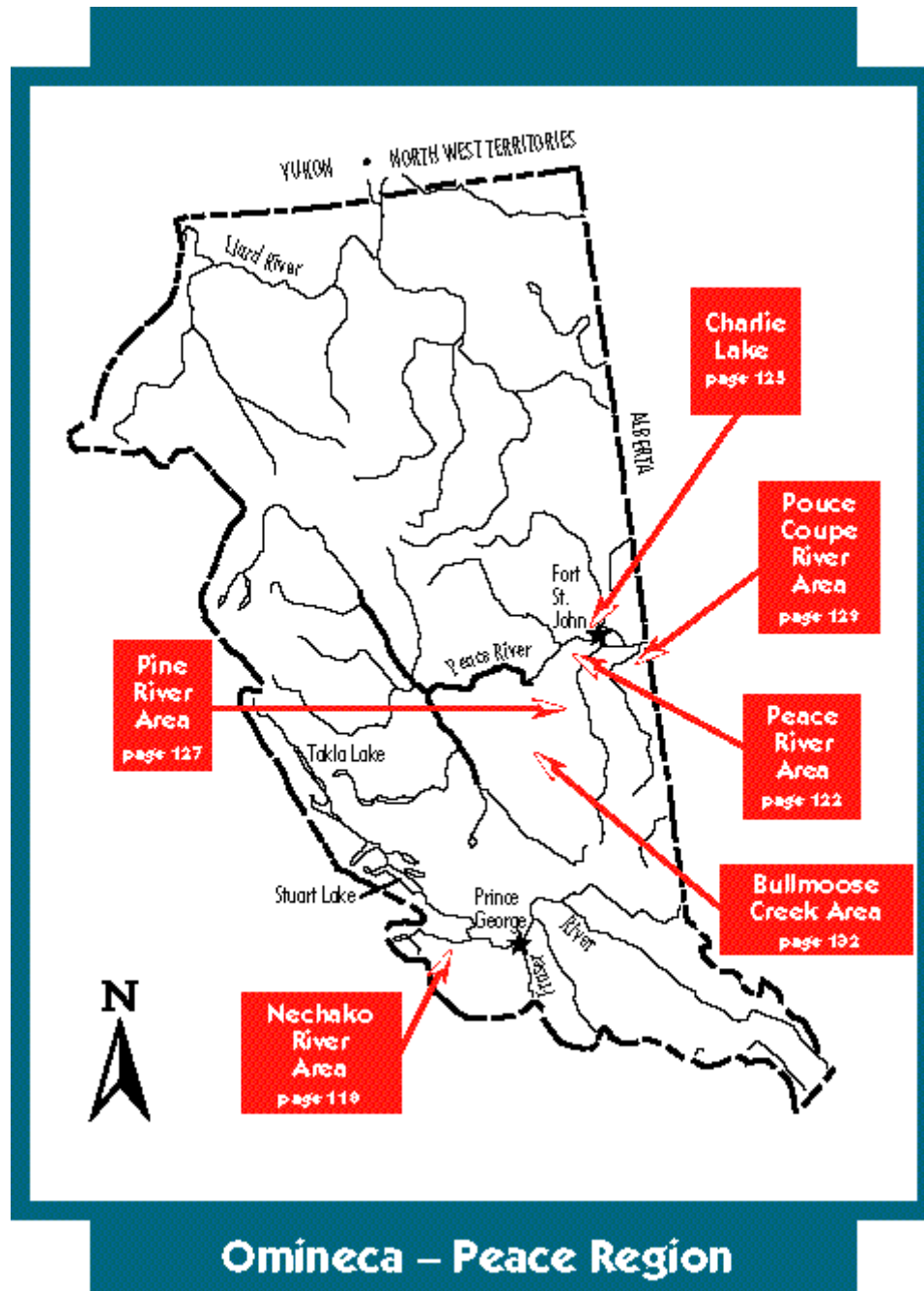
### What does it mean to not meet this guideline?

High nitrate-nitrogen concentrations above the drinking water guideline can cause methaemoglobinaemia (blue baby syndrome) when consumed by young infants.

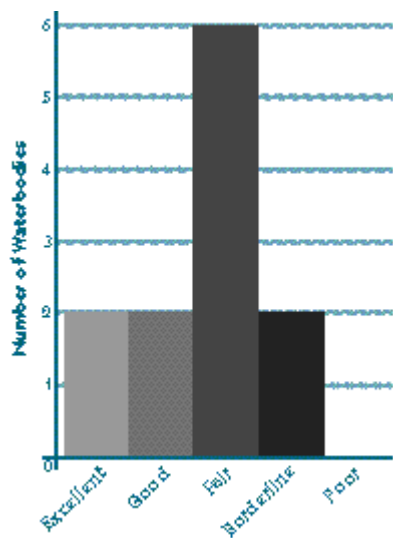
### What will be done to improve matters?

The Ministry will continue to monitor ground water quality of the aquifer and encourage development of well and aquifer protection plans at the local level. The main remedy will be a reduction in fertilizer applications. The Regional District of Kootenay-Boundary is undertaking a study to determine appropriate lot sizes for development to minimize nitrate loading to the aquifer from septic systems. Local residents can help by minimizing their use of fertilizers and pesticides and by ensuring their septic tanks are working properly.

## Omineca-Peace Region



## Omineca-Peace Region Summary



The Omineca-Peace Region is located in the north-eastern part of the Province bordering the Yukon and the Northwest Territories. It extends from Alberta in the east to Takla and Stuart lakes in the west, as shown on the attached map. The main regional office of the Ministry is located in Prince George.

There are 12 status reports for this Region covering 1 lake and 11 reaches of streams. The bar-graph on this page shows that 50 percent of these waterbodies are ranked as having fair water quality, with the remainder being equally divided among the excellent, good, and borderline categories.

If you have any questions on the status reports or would like more information on other waterbodies in the Region, please contact:

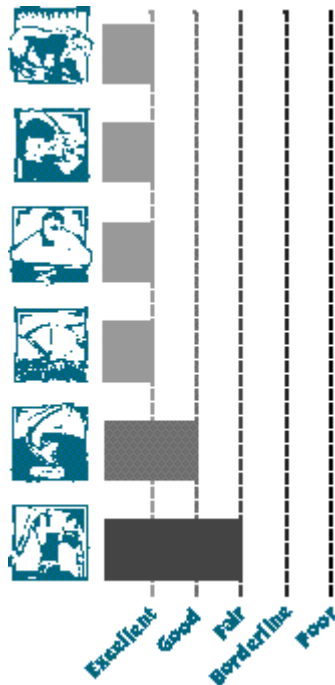
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help solve these problems.

## Fair



These include sewage treatment plants at Vanderhoof and Fort Fraser, agriculture, and logging. The biggest environmental influence has been the construction of the Nechako Reservoir in the 1950's which diverted water and reduced Nechako River flows significantly.

### Which objectives have been set?

Those for fecal coliforms, ammonia, nitrite, the growth of algae, dissolved oxygen, temperature, total gas pressure, and pH. The objectives were set for those characteristics that relate to the potential sources.

### What are the main uses of the river?

Uses include protection of aquatic life and wildlife, livestock watering, recreation such as swimming, irrigation, and drinking water with partial treatment.

### Which objectives were not met?

Objectives for temperature and fecal coliforms were frequently not met between 1987 and 1993, while ammonia concentrations near Vanderhoof at times approached the objective.

### What does it mean to not meet these objectives?

High fecal coliform levels in the Vanderhoof area mean that drinking water users should ensure that their treatment systems are working properly. Occasional high temperatures mean that the success of migrating salmon returning to spawning beds can be affected.

### What will be done to improve matters?

Nutrient removal and improved disinfection will be undertaken at the Vanderhoof sewage treatment plant. The installation of a cold water release structure at the Kenney Dam, as recommended under the Kemano Completion project, should be considered to help control river temperatures.

## Stuart River

### What is the general state of water quality?

Stuart River water quality is excellent (index = 3). Monitoring will continue to ensure that water quality is maintained.

## Excellent

### What are the main attributes of the Stuart River?

The Stuart River, a tributary to the Nechako River, is a major spawning, rearing, and migratory route for juvenile and adult salmon.

### What are the potential sources of contamination?

These include the sewage treatment plant from Fort St. James, which discharges to the Necoslie River just upstream from the Stuart River, and non-point sources



such as forestry and agriculture.

#### Which objectives have been set?

Those for fecal coliforms, ammonia, nitrite, the growth of algae, dissolved oxygen, and pH. The objectives were set for those characteristics that relate to the sewage treatment plant and non-point sources.

#### What are the main uses of the river?

Uses include protection of aquatic life and wildlife, livestock watering, recreation such as swimming, irrigation, and drinking water with only disinfection. These uses are protected when the objectives are met.

#### Which objectives were not met?

The objective for the growth of algae was not met in 1988; all other objectives were met between 1987 and 1993.

#### What does it mean to not meet this objective?

Heavy growths of algae mean that the river could be aesthetically displeasing to swimmers, boaters, and other users. However, this is not a problem at present.

#### Does anything need to be done to improve matters?

Monitoring should continue to ensure that water quality is maintained. A specific assessment of the water quality of the Necoslie River, a tributary to the Stuart River, is underway.

### Chilako River

#### What is the general state of water quality?

Chilako River water quality is excellent (index = 0). Monitoring should be designed to ensure that agricultural, residential, and forestry developments do not impact water quality in the future.

**Excellent**

#### What are the main attributes of the Chilako River?

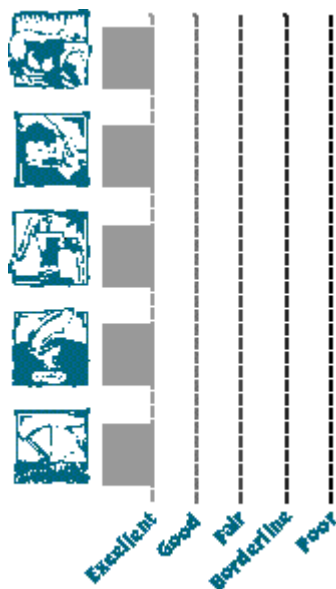
The Chilako River is important as the major tributary to the Nechako River downstream from Isle Pierre.

#### What are the potential sources of contamination?

These include agriculture, forestry, and residential developments.

#### Which objectives have been set?

Those for fecal coliforms, ammonia, nitrite, the growth of algae, dissolved oxygen, and pH. The objectives were set for those characteristics that relate to the non-point sources.



### What are the main uses of the river?

Uses include those of aquatic life and wildlife, irrigation, livestock watering, and drinking water with partial treatment. These uses are protected when the objectives are met.

### Were any objectives not met?

All the objectives were met between 1989 and 1993.

### What does it mean to meet these objectives?

Drinking water users should ensure that their treatment systems are working properly.

### What will be done in the future?

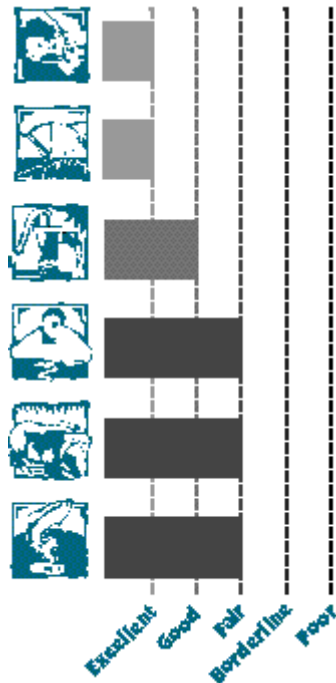
Monitoring should be designed to ensure that non-point sources do not become a water quality problem.





concern.

## Fair



### What are the potential sources of contamination?

These include a gas processing plant at Taylor, a pulp mill further downstream, a portion (65%) of the treated sewage from Fort St. John, and non-point sources such as forestry, agriculture, oil production, and the impoundment of Williston Lake.

### Which objectives have been set?

Those for fecal coliforms, turbidity, suspended solids, ammonia, nitrite, the growth of algae, dissolved oxygen, metals, chlorophenols, phenol, hydrogen sulphide, pH, total dissolved gases, and 2,4-D. The objectives were set for those characteristics that relate to the sewage, petroleum industry, and non-point sources.

### What are the main uses of the river?

Uses include those of aquatic life and wildlife, livestock watering, recreation such as swimming, irrigation, and drinking water with partial treatment. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1988 to 1993, objectives for fecal coliforms, suspended solids, turbidity, the growth of algae, and metals were sometimes not met.

### What does it mean to not meet these objectives?

High turbidity and algae growth can cause aesthetic concerns for recreation and drinking water users. High metals and suspended solids can be a concern for aquatic life. The environmental significance of objectives not being met is currently being assessed by the Ministry.

### What is being done to improve matters?

The causes of the high suspended solids and metal values need investigating to decide if a remedy is needed. More detailed monitoring will also show whether the higher metal values that have been recorded are, in fact, environmentally significant.

## Beatton River

### What is the general state of water quality?

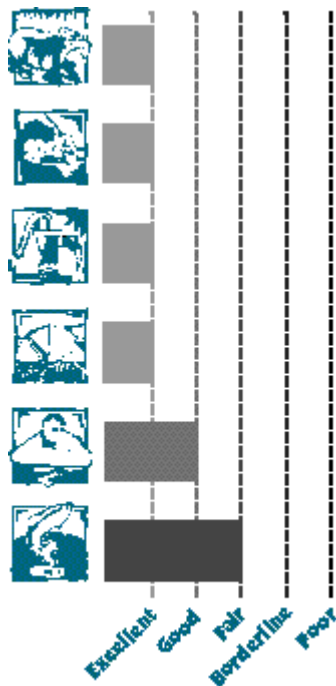
Beatton River water quality is fair (index = 21). High suspended solids concentrations may be impacting aquatic life, although this

### What are the main attributes of the Beatton River?

The Beatton River is a major tributary to the Peace River just upstream from the Alberta-B.C. border. It provides valuable habitat for several fish species.

may be largely a natural phenomenon.

## Fair



## What are the potential sources of contamination?

These include the sewage treatment plant discharge from the City of Fort St. John and non-point sources such as forestry, agriculture, and oil production.

## Which objectives have been set?

Those for fecal coliforms, turbidity, suspended solids, ammonia, nitrite, the growth of algae, dissolved oxygen, and pH. The objectives were set for those characteristics that relate to the discharge from the sewage treatment plant and non-point sources.

## What are the main uses of the river?

Uses include those of aquatic life and wildlife, livestock watering, recreation such as swimming, irrigation, and drinking water with complete treatment. These uses are protected when the objectives are met.

## Which objectives were not met?

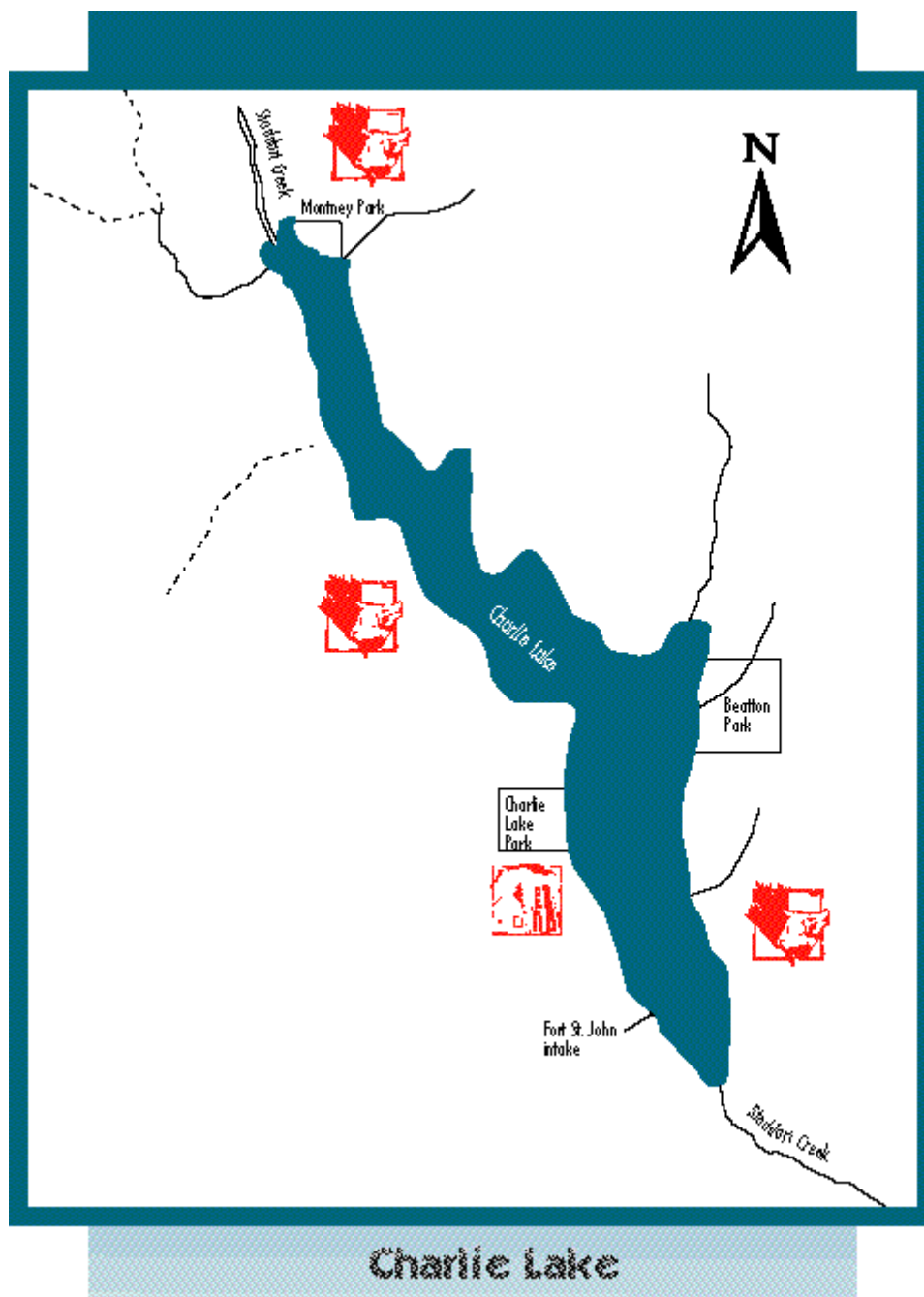
Between 1988 and 1990, the objectives for suspended solids and turbidity were often not met.

## What does it mean to not meet these objectives?

High turbidity values can cause aesthetic concerns for recreation such as swimming. High suspended solids concentrations can be a concern for aquatic life, although suspended solids are believed to be naturally high in this river.

## What is being done to improve matters?

The cause of the high suspended solids concentrations will need investigating before a remedy can be found, although this is not a priority considering the naturally high levels.



## Charlie Lake

### What is the general state of water quality?

Charlie Lake water quality is border- line (index = 46). Algae can affect recreational use and possibly also drinking water use and aquatic life. Studies are underway to determine what action is needed to reduce nutrient inputs to the lake.

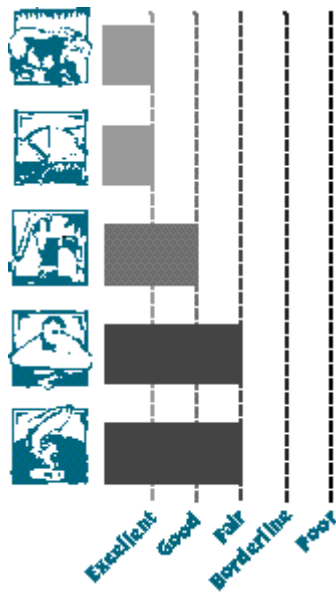
### What are the main attributes of Charlie Lake?

Charlie Lake is important as the water supply for the City of Fort St. John and for local sports fishing.

### What are the potential sources of contamination?

These include agriculture and septic tanks. The sediments on the bottom of the lake are a major source of

## Borderline



nutrients to the lake.

### Which objectives have been set?

Those for fecal coliforms at bathing beaches and at water intakes, phosphorus, and the growth of algae. The objectives were set for those characteristics that relate to the non-point sources.

### What are the main uses of the lake?

Uses include those of aquatic life and wildlife, recreation such as swimming, irrigation water for a golf course, and drinking water with only disinfection as treatment. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1987 to 1993, the objectives for phosphorus were not met, while fecal coliforms were occasionally high for recreation and drinking water.

### What does it mean to not meet these objectives?

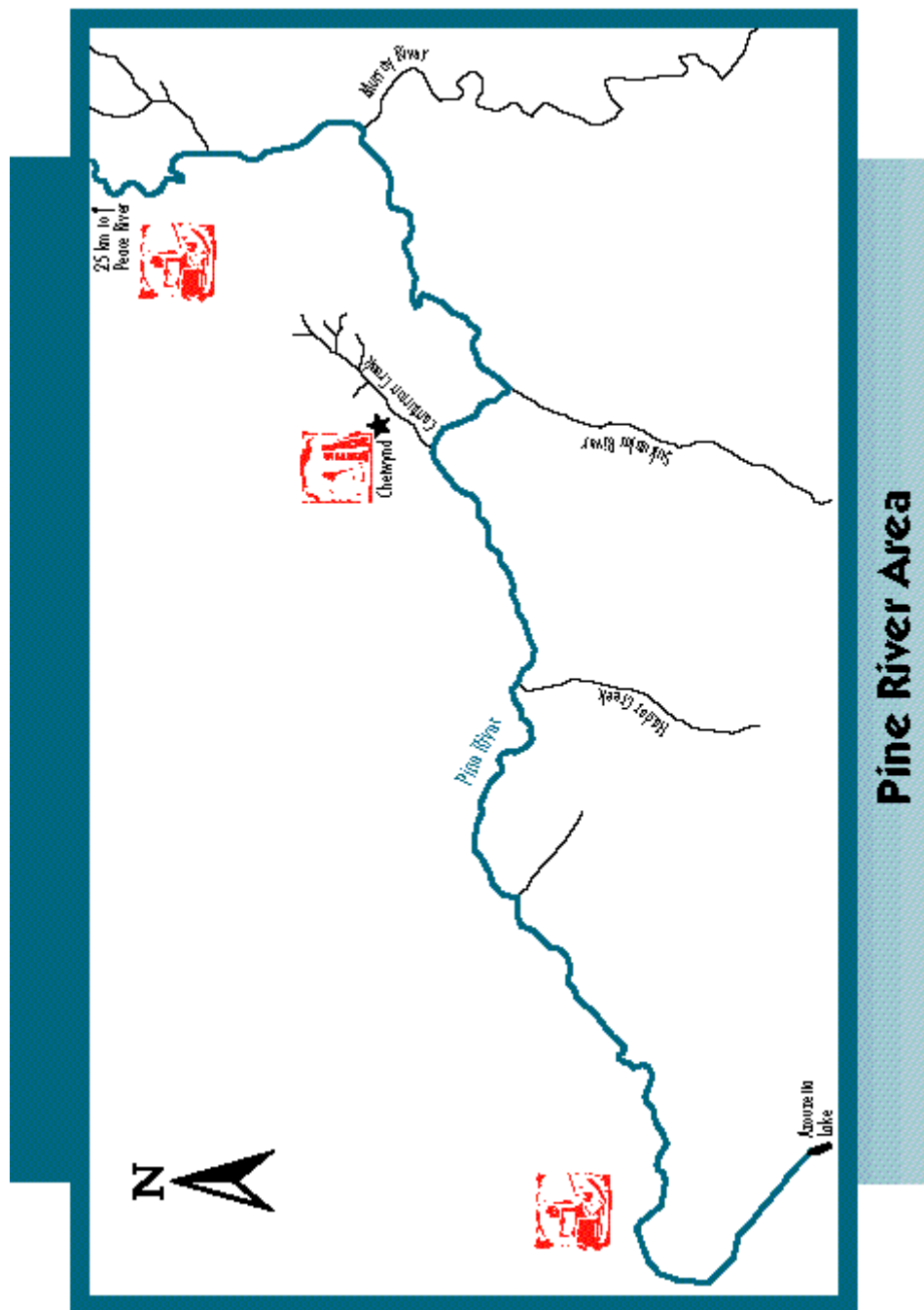
High fecal coliform values show that drinking water users and purveyors should ensure their treatment systems are working properly. High phosphorus values mean that the growth of algae is a concern year-round. The algae could affect dissolved oxygen available for aquatic life or may be toxic to fish as well as to drinking water users.

### Why is the general state worse than any use rating?

The general state reflects the fact that the objective for phosphorus has never been met.

### What will be done to improve matters?

Studies are underway to determine the sources of the nutrients and bacteria to the lake so that corrective actions can be undertaken. The public are encouraged to adopt the Lakeshore Development Guidelines and to read lake-care educational material.



## Pine River

### What is the general state of water quality?

Pine River water quality is good (index = 5) and no real concerns exist. Monitoring should be conducted every few years to ensure that good water quality continues.

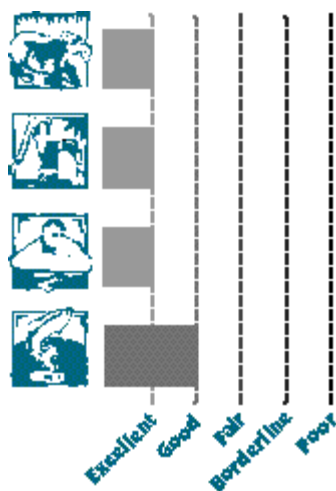
### Good

### What are the main attributes of the Pine River?

The Pine River is a major tributary to the Peace River at Taylor, just upstream from the Alberta-B.C. border. It provides recreation and valuable habitat for several fish species.

### What are the potential sources of contamination?

These include the sewage treatment plant discharge from



Chetwynd and recent timber harvesting which may increase non-point source pollution.

### Which objectives have been set?

Those for fecal coliforms, turbidity, suspended solids, ammonia, nitrite, the growth of algae, and dissolved oxygen. The objectives were set for those characteristics that relate to the sewage treatment plant discharge and non-point sources.

### What are the main uses of the river?

Uses include those of aquatic life, wildlife, and recreation (such as swimming) along its entire length, as well as drinking water with only disinfection upstream from Chetwynd. These uses are protected when the objectives are met.

### Which objectives were not met?

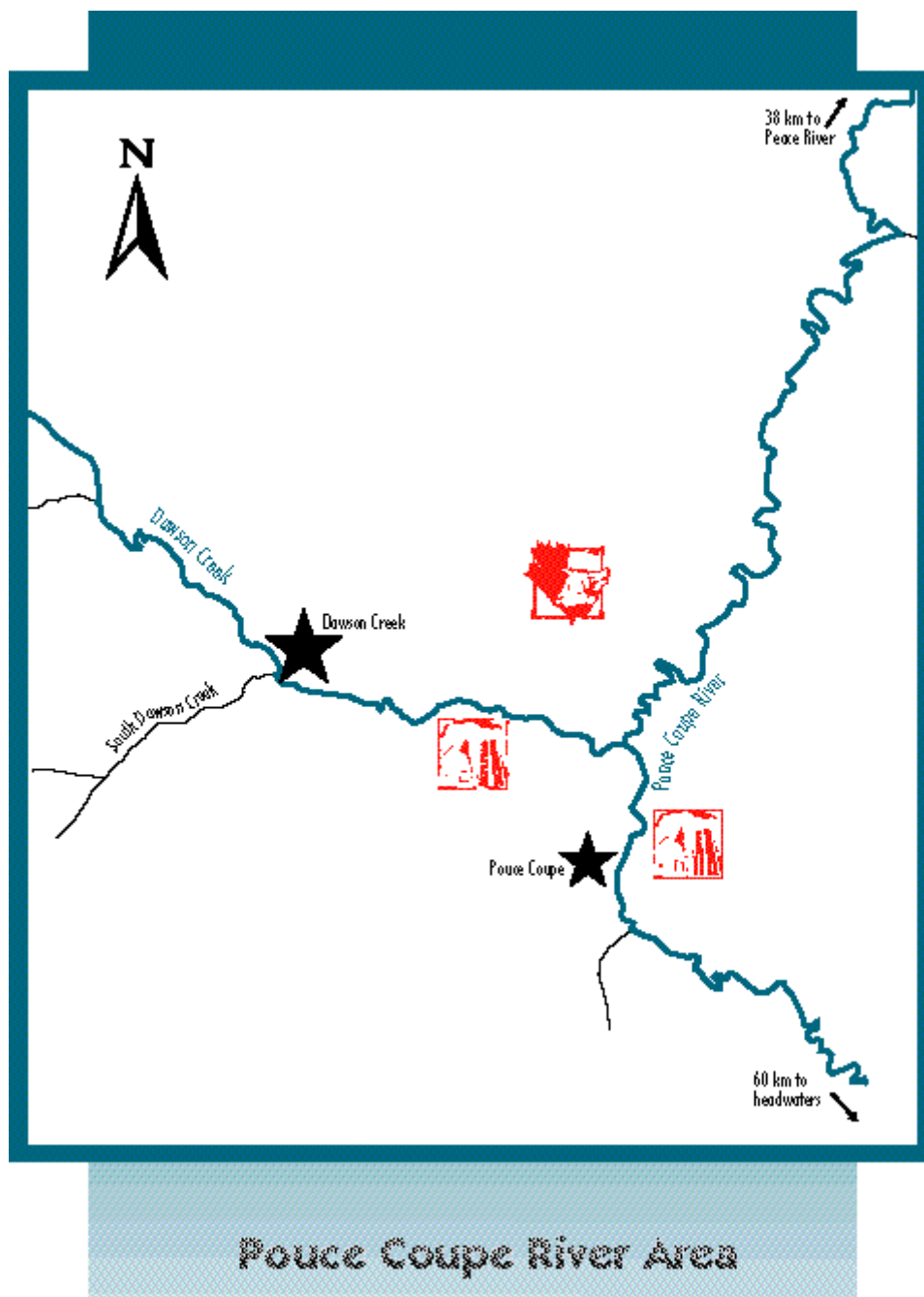
The objective for suspended solids was not met in 1987. The source was suspected to be Centurion Creek, a tributary to the Pine River.

### What does it mean to not meet this objective?

High suspended solids concentrations, if frequent, can be a concern for aquatic life.

### Does anything need to be done to improve matters?

Monitoring should continue every few years to ensure that the good state of water quality is maintained. If the high suspended solids concentrations recur, it may be necessary to find the cause before the problem can be solved.



## Pouce Coupe River

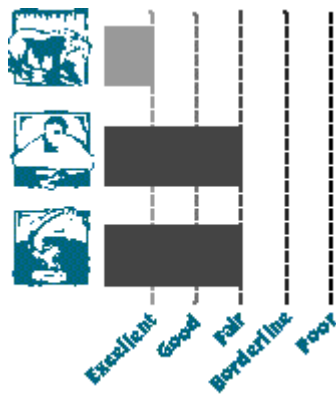
### What is the general state of water quality?

Pouce Coupe River water quality is fair (index = 33). Concerns center on the effects of contaminants from Dawson Creek and agricultural runoff.

### What are the main attributes of the Pouce Coupe River?

The Pouce Coupe River is a major tributary to the Peace River downstream from the Alberta-B.C border. The river has limited habitat for fish due to high sediment levels and abundant growths of algae.

## Fair



### What are the potential sources of contamination?

These include the sewage treatment plant discharges at Pouce Coupe and Dawson Creek, drainage from a landfill, urban development near Dawson Creek, and agriculture.

### Which objectives have been set?

Those for fecal coliforms, turbidity, suspended solids, ammonia, nitrite, the growth of algae, and dissolved oxygen. The objectives were set for those characteristics that relate to the sewage treatment plants and agriculture.

### What are the main uses of the river?

Uses include those of aquatic life, wildlife, and recreation such as swimming. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1987 to 1990, the objectives for suspended solids, turbidity, and the growth of algae were not met in three of the four years. Ammonia was not met once.

### What does it mean to not meet these objectives?

High suspended solids and ammonia concentrations can impact aquatic life, while growths of algae can cause aesthetic concerns.

### What is being done to improve matters?

The objectives were not met probably because of agricultural wastes and sewage discharges. The exact causes should be found so that the problem can be solved.

## Dawson Creek

### What is the general state of water quality?

Dawson Creek water quality is borderline (index = 56). Domestic and agricultural wastes appear to have made the creek unacceptable for drinking water or recreation. The exact causes need to be found before the problem can be solved.

## Borderline

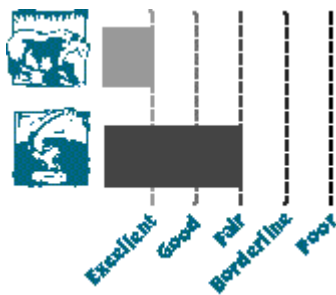
### What are the main attributes of Dawson Creek?

Dawson Creek is a tributary to the Pouce Coupe River. The creek is a poor habitat for fish due to low river flows, high sediment levels, and abundant growths of algae.

### What are the potential sources of contamination?

These include the sewage treatment plant discharge at Dawson Creek, the municipal landfill, and non-point sources such as agriculture and commercial and urban development.





### Which objectives have been set?

Those for turbidity, suspended solids, ammonia, nitrite, the growth of algae, and dissolved oxygen. The objectives were set for those characteristics that relate to the sewage treatment plant and agriculture.

### What are the main uses of the creek?

Uses include those of aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1987 to 1989, objectives for suspended solids and nitrite were never met, while those for ammonia and turbidity were not met in two of the three years.

### What does it mean to not meet these objectives?

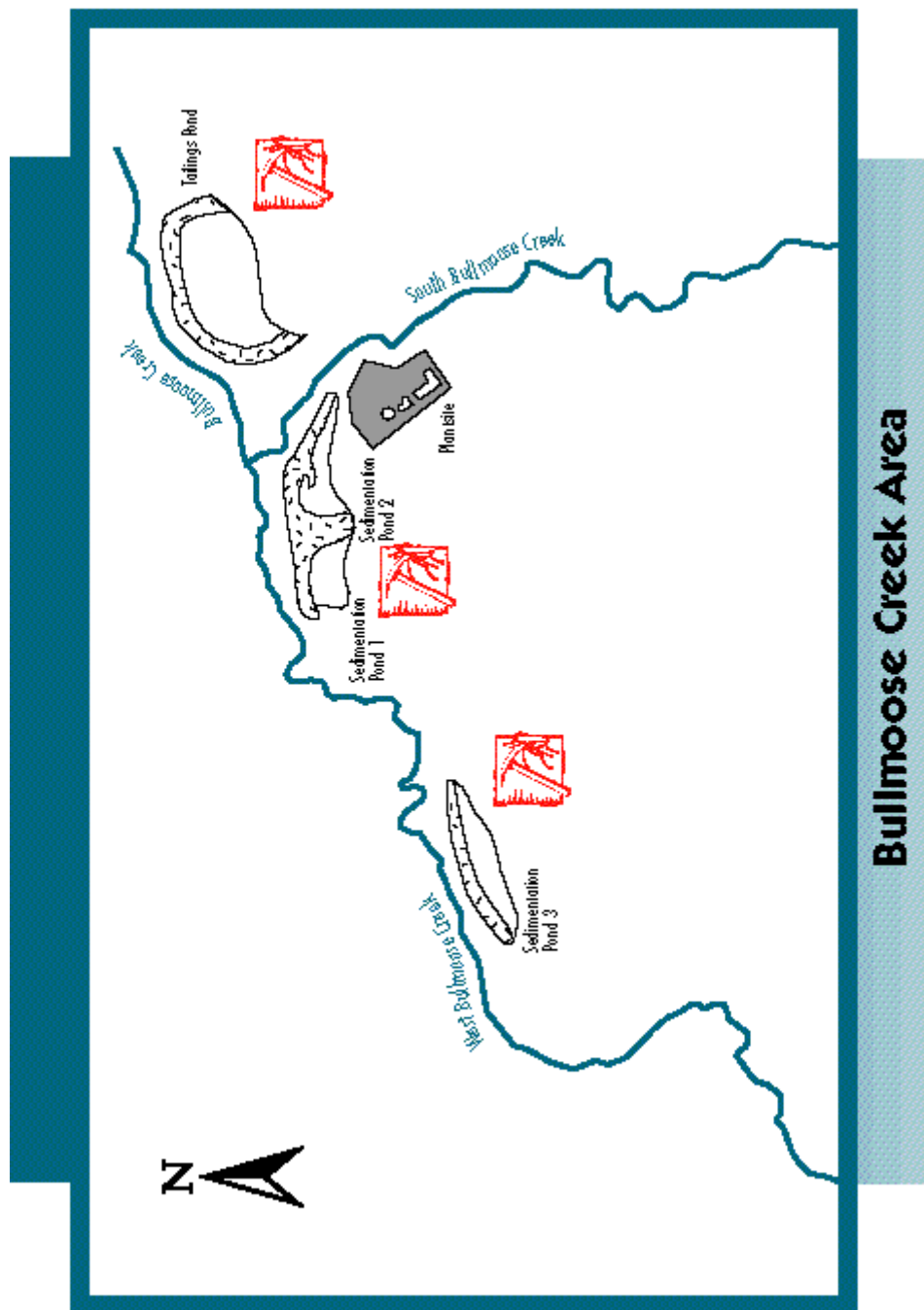
High suspended solids, nitrite, and ammonia concentrations can impact the survival of aquatic life.

### Why is the general state worse than any use rating?

The general state reflects the fact that many of the objectives are never met.

### What will be done to improve matters?

Objectives were not met probably because of agricultural wastes, sewage discharges, a municipal landfill, and urban development. The exact causes need to be found so that the problem can be solved. Residents living in the sewerage area can help by not dumping waste oil or other wastes into the storm drains.



## Bullmoose Creek

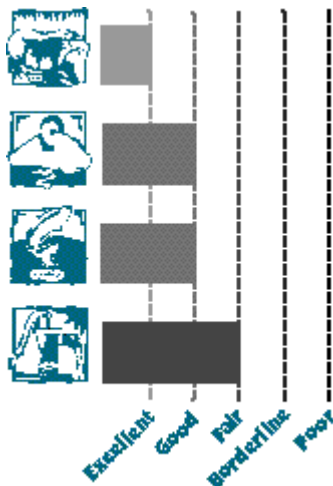
**What is the general state of water quality?**

Bullmoose Creek water quality is fair (index = 22). Studies to assess the impacts of the growth of algae would be useful in the future.

**Fair**

**What are the main attributes of Bullmoose Creek?**

Bullmoose Creek is a tributary to the Wolverine River in the northeast coal development area of the Province. It is important as habitat for Dolly Varden char.



### What are the potential sources of contamination?

These include discharges from an open pit coal mine, oil and gas exploration, gas processing, and recent timber harvesting.

### Which objectives have been set?

Those for fecal coliforms, turbidity, suspended solids, ammonia, the growth of algae, pH, dissolved oxygen, nitrate, and nitrite. The objectives were set for those characteristics that relate to the mine.

### What are the main uses of the creek?

Uses include those of aquatic life and wildlife, recreation such as swimming, and drinking water with only disinfection as treatment. Drinking water use at present is intermittent in nature. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1987 to 1993, objectives were regularly not met for turbidity and on occasion for fecal coliforms and the growth of algae.

### What does it mean to not meet these objectives?

Growths of algae detract from the aesthetics of the area for drinking water and swimmers and can pose a problem for aquatic life. High levels of turbidity and suspended solids may be due to natural erosion and runoff.

### What will be done to improve matters?

The degree to which objectives were not met in Bullmoose Creek is not serious at this time. Studies are needed to define the extent of the impact from the growth of algae. Waste Management permits should include monitoring to check that water quality objectives are being met.

## West Bullmoose Creek

### What is the general state of water quality?

West Bullmoose Creek water quality is fair (index = 23). Monitoring of nitrate levels should be continued and studies to assess the impacts of the growth of algae would be useful in the future.

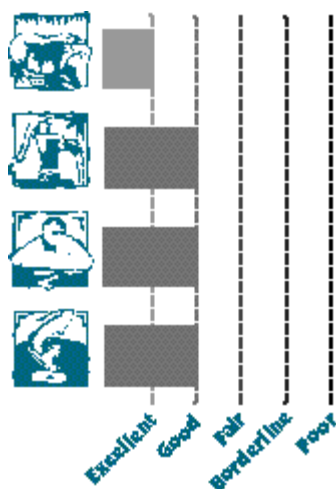
### Fair

### What are the main attributes of West Bullmoose Creek?

West Bullmoose Creek, a tributary to Bullmoose Creek, is important as habitat for Dolly Varden char.

### What are the potential sources of contamination?

These include non-point discharges from an open pit coal mine and oil and gas exploration.



### Which objectives have been set?

Those for fecal coliforms, turbidity, suspended solids, ammonia, the growth of algae, pH, dissolved oxygen, nitrate, and nitrite. The objectives were set for those characteristics that relate to the mine.

### What are the main uses of the creek?

Uses include those of aquatic life and wildlife. Future uses of recreation (such as swimming) and drinking water with only disinfection as treatment are included although they seem unlikely at this time. All these uses are protected when the objectives are met.

### Which objectives were not met?

From 1987 to 1993, objectives were regularly not met for the growth of algae and nitrate. When turbidity did not meet objectives, natural sources were believed to be responsible.

### What does it mean to not meet these objectives?

High nitrate values would be a concern for possible drinking water use in the future, especially for infants under six months of age. Turbidity and the growth of algae in excess of objectives would detract from recreational pursuits.

### Why is the general state worse than any use rating?

The general state reflects the fact that some objectives are often not met.

### What will be done to improve matters?

The degree to which objectives were not met in West Bullmoose Creek is not serious at this time. Nitrate residues from blasting at the mine must be monitored on an on-going basis. Programs designed to reduce nitrate contributions to the creek are underway.

## South Bullmoose Creek

### What is the general state of water quality?

South Bullmoose Creek water quality is good (index = 10). Studies to assess the impacts of the growth of algae would be useful in the future.

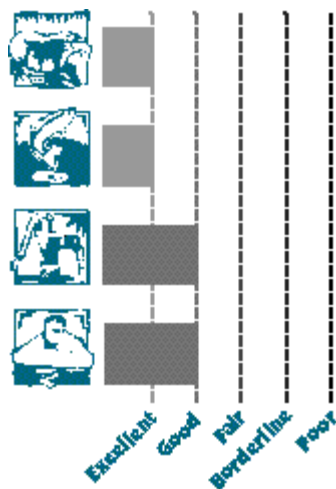
**Good**

### What are the main attributes of South Bullmoose Creek?

South Bullmoose Creek, a tributary to Bullmoose Creek, is important as habitat for Dolly Varden char.

### What are the potential sources of contamination?

These include discharges from an open pit coal mine and recent timber harvesting.



### Which objectives have been set?

Those for fecal coliforms, turbidity, suspended solids, ammonia, the growth of algae, pH, dissolved oxygen, nitrate, and nitrite. The objectives were set for those characteristics that relate to the mine.

### What are the main uses of the creek?

Uses include those of aquatic life and wildlife. Future uses of recreation (such as swimming) and drinking water with only disinfection as treatment are included although they seem unlikely at this time. All these uses are protected when the objectives are met.

### Which objectives were not met?

The objective for the growth of algae was not met from 1987 to 1989 and the objective for fecal coliforms was not met in 1990.

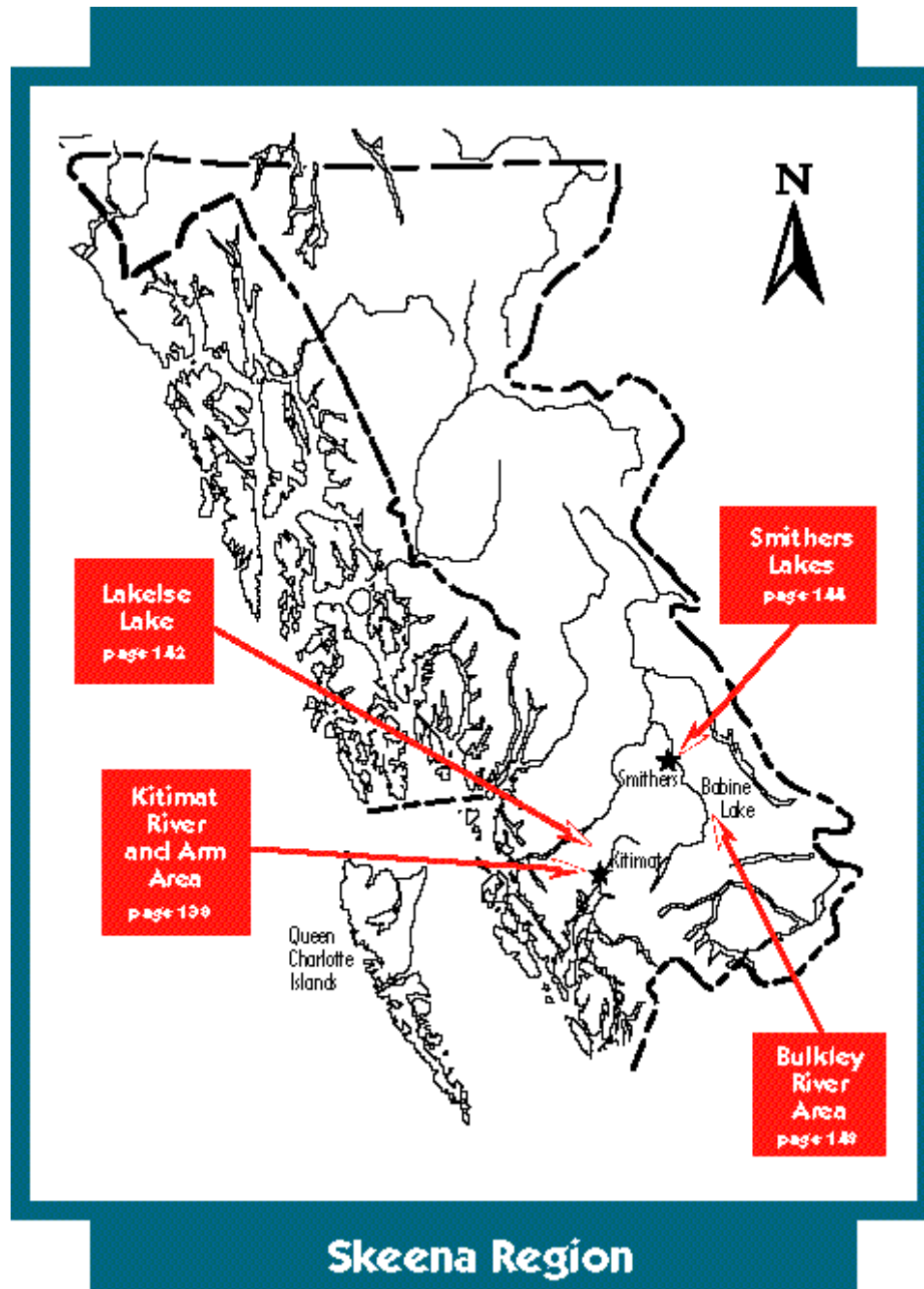
### What does it mean to not meet these objectives?

Heavy growths of algae detract from the aesthetics of the area for fishing and swimming and fecal coliforms can potentially affect drinking water use.

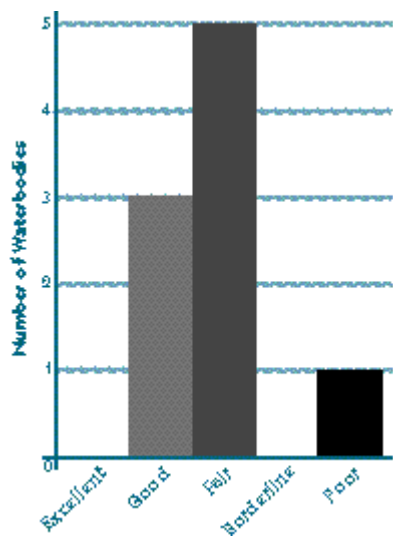
### What will be done to improve matters?

The degree to which the objective for the growth of algae was not met in South Bullmoose Creek is not serious at this time. Studies will be needed to actually define the extent of the impact. Waste Management permits should include monitoring to check that water quality objectives are being met.

## Skeena Region



## Skeena Region Summary



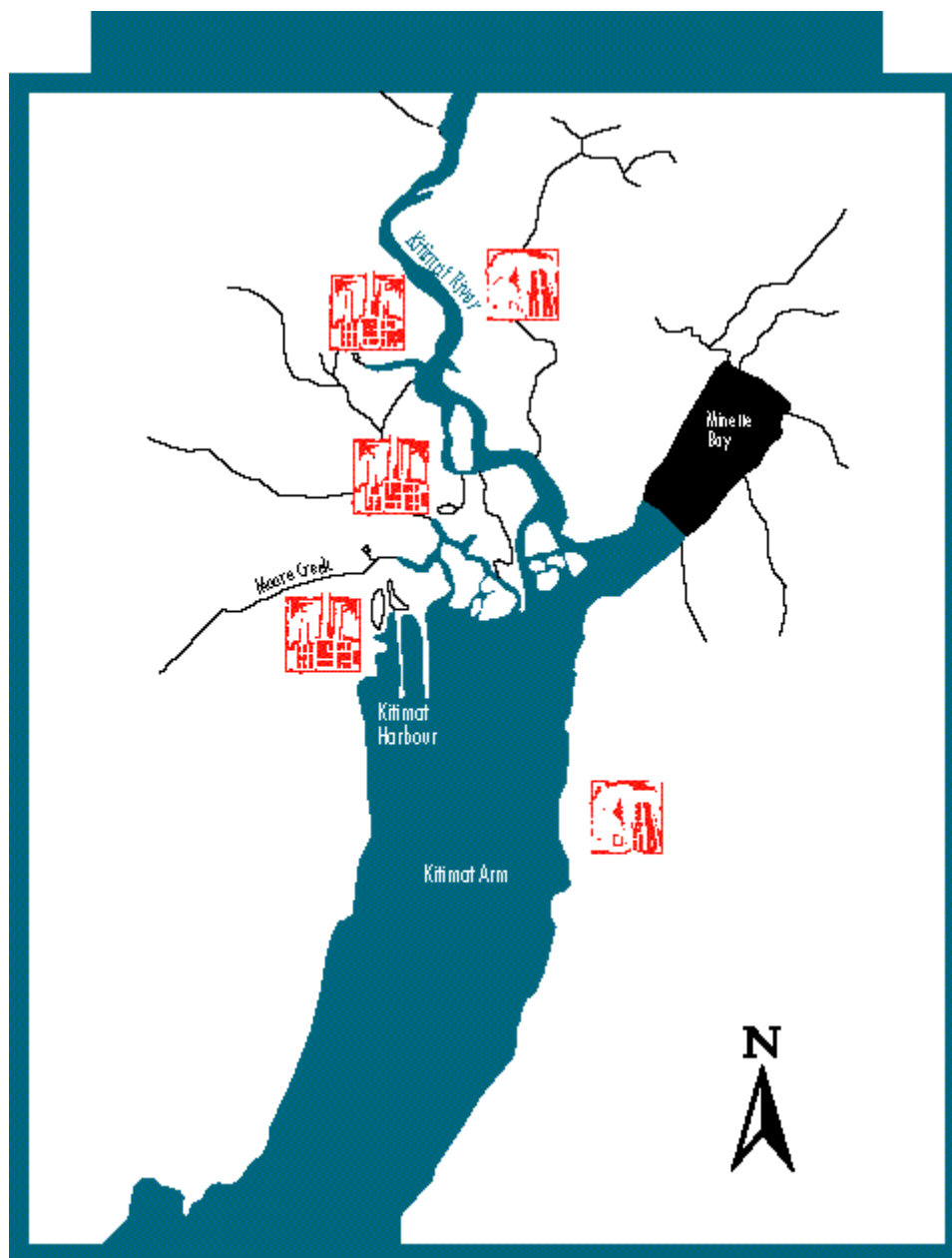
The Skeena Region is located in the north-western part of the Province bordering the Yukon and Alaska. It extends from Babine Lake in the east to the Queen Charlotte Islands in the west, as shown on the attached map. The main regional office of the Ministry is located in Smithers.

There are 9 status reports for this Region covering 5 lakes, 2 reaches of streams, and 2 marine areas. The bar-graph on this page shows that 56 percent of these waterbodies are ranked as having fair water quality, 33 percent are ranked as good, and 11 percent are in the poor category.

If you have any questions on the status reports or would like more information on other waterbodies in the Region, please contact:

Philip Ross  
Ministry of Environment, Lands and Parks  
Bag 5000, 3726 Alfred Avenue  
Smithers, B.C.  
V0J 2N0

Telephone: 847-7251  
Fax: 847-7591  
E-mail: [pross@smithers.env.gov.bc.ca](mailto:pross@smithers.env.gov.bc.ca)



**Kitimat River and Arm Area**

## Lower Kitimat River

### What is the general state of water quality?

Lower Kitimat River water quality is good (index = 17), although some improvements need to be made to protect aquatic life. The Ministry is investigating the extent of impacts and is working with industries to upgrade their treatment facilities.

### What are the main attributes of the lower Kitimat River?

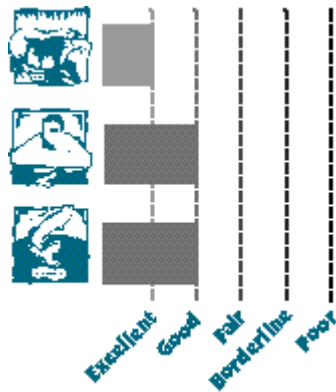
The lower Kitimat River, which flows into Kitimat Arm, is important habitat for salmonid spawning and rearing. The river also has a eulachon run.

### What are the potential sources of contamination?

These include a fish hatchery, a pulp and paper mill, an ammonia plant, the Kitimat municipal sewage plant, and



## Good



non-point sources such as urban runoff, drainage from a landfill, natural runoff, and forestry.

### Which objectives have been set?

Those for turbidity, suspended solids, ammonia, the growth of algae, pH, dissolved oxygen, and nitrite. The objectives were set for those characteristics that relate to contaminant sources. The objectives are to be updated in 1996.

### What are the main uses of the river?

Uses include those of aquatic life and wildlife and recreation such as boating. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1987 to 1993, objectives were not met regularly for turbidity and suspended solids and occasionally for nitrite and fecal coliforms.

### What does it mean to not meet these objectives?

High nitrite concentrations can be toxic to aquatic life. Turbidity and suspended solids detract from aesthetics of the area for boaters and can pose a problem for aquatic life.

### What will be done to improve matters?

The Ministry is working with industries to upgrade their treatment facilities, although higher suspended solids and turbidity levels are believed due mainly to forestry and natural runoff. The Ministry is also looking for other possible sources of impact to the river as well as investigating the extent of present impacts.

## Kitimat Harbour

### What is the general state of water quality?

Kitimat Harbour water quality is fair (index = 23) and improvements need to be made to protect aquatic life. The Ministry is investigating the extent of impacts and is working with industries to upgrade their treatment facilities.

## Fair

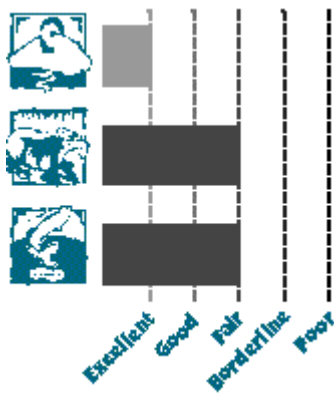
### What are the main attributes of Kitimat Harbour?

Kitimat Harbour, at the head of Kitimat Arm, is an important fishery area.

### What are the potential sources of contamination?

These include an aluminum smelter, an ammonia plant, loading facilities at wharves, discharges to the Kitimat River, and non-point sources such as marinas, log booming areas, forestry, and natural runoff.

### Which objectives have been set?



Those for fecal coliforms, turbidity, suspended solids, ammonia, cyanide, fluoride, and metals. The objectives were set for those characteristics that relate to the smelter and the ammonia plant. The objectives are to be updated in 1996.

#### What are the main uses of the harbour?

Uses include those of aquatic life and wildlife, recreation such as swimming, and harvesting of shell and fin fish. These uses are protected when the objectives are met.

#### Which objectives were not met?

Between 1988 and 1993, objectives were regularly not met for metals and fluoride and occasionally not met for turbidity and suspended solids.

#### What does it mean to not meet these objectives?

High metals and fluoride concentrations could be toxic to fish and pose a threat to shellfish through bioconcentration in tissues.

#### What will be done to improve matters?

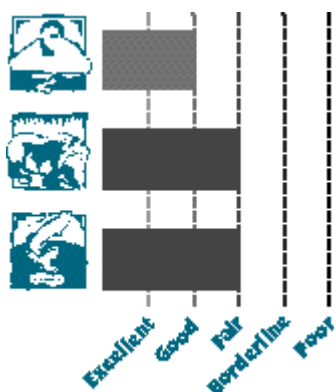
The Ministry is working with industries to upgrade their treatment facilities and is looking for other possible sources of impact. Investigations into the extent of present impacts are ongoing.

## Kitimat Arm

#### What is the general state of water quality?

Kitimat Arm water quality is fair (index = 20) and improvements need to be made to protect aquatic life. The Ministry is investigating the extent of impacts and is working with industries to upgrade their treatment facilities.

#### Fair



#### What are the main attributes of Kitimat Arm?

Kitimat Arm, located at the head of Douglas Channel off Hecate Strait, is an important fishery area.

#### What are the potential sources of contamination?

These include an aluminum smelter, an ammonia plant, sewage treatment plant effluents, and non-point source discharges from marinas, wharf facilities, forestry, and natural runoff.

#### Which objectives have been set?

Those for fecal coliforms, turbidity, suspended solids, ammonia, cyanide, fluoride, and metals. The objectives were set for those characteristics that relate to contaminant sources. The objectives are to be updated in 1996.

#### What are the main uses of the arm?

Uses include those of aquatic life and wildlife, recreation such as swimming, and harvesting of shell and fin fish. These uses are protected when the objectives are met.

**Which objectives were not met?**

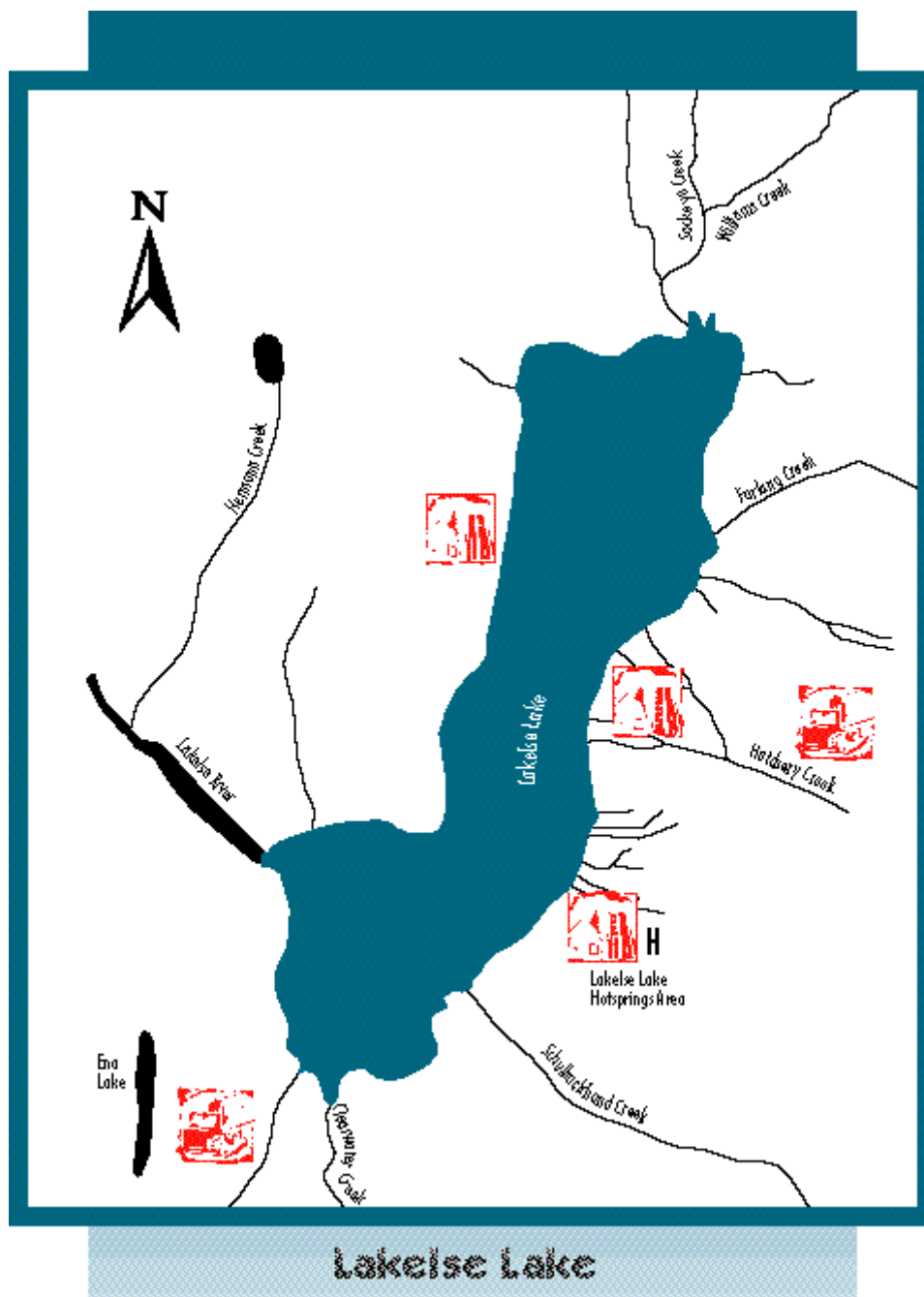
Between 1988 and 1993, objectives for metals were regularly not met and the objectives for fecal coliforms to protect consumers of molluscan shellfish were occasionally not met.

**What does it mean to not meet these objectives?**

Fecal coliform contamination means that molluscan shellfish should not be eaten, while high metal concentrations mean that metals can concentrate in shellfish tissues. There is a shellfish closure due to dioxin and furan contamination, while there is a long-term closure of molluscan shellfish harvesting due to paralytic shellfish poisoning which is believed to be a natural phenomenon.

**What will be done to improve matters?**

The Ministry is working with industries to upgrade their treatment facilities and is looking for other possible sources of impact. Investigations into the extent of present impacts are ongoing.



## Lakelse Lake

### What is the general state of water quality?

Lakelse Lake water quality is good (index = 9), with the growth of algae not always meeting acceptable levels. There are no plans to address this minor problem at this time.

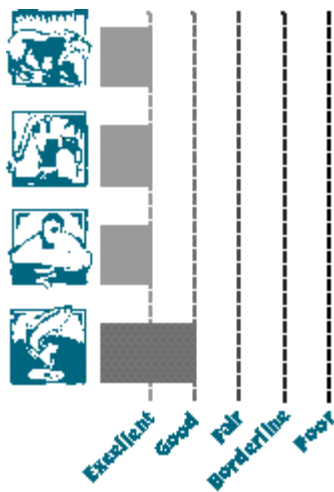
**Good**

### What are the main attributes of Lakelse Lake?

Lakelse Lake is located south from Terrace and drains into the Skeena River. It is important for recreation and as a rearing habitat for cold water fisheries.

### What are the potential sources of contamination?

These include residential and recreational



developments around the lake, agriculture, and logging.

### Which objectives have been set?

Those for fecal coliforms, turbidity, the growth of algae, and dissolved oxygen. The objectives were set for those characteristics that relate to residential development, logging, and agriculture.

### What are the main uses of the lake?

Uses include recreation such as swimming, drinking water that is disinfected only, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

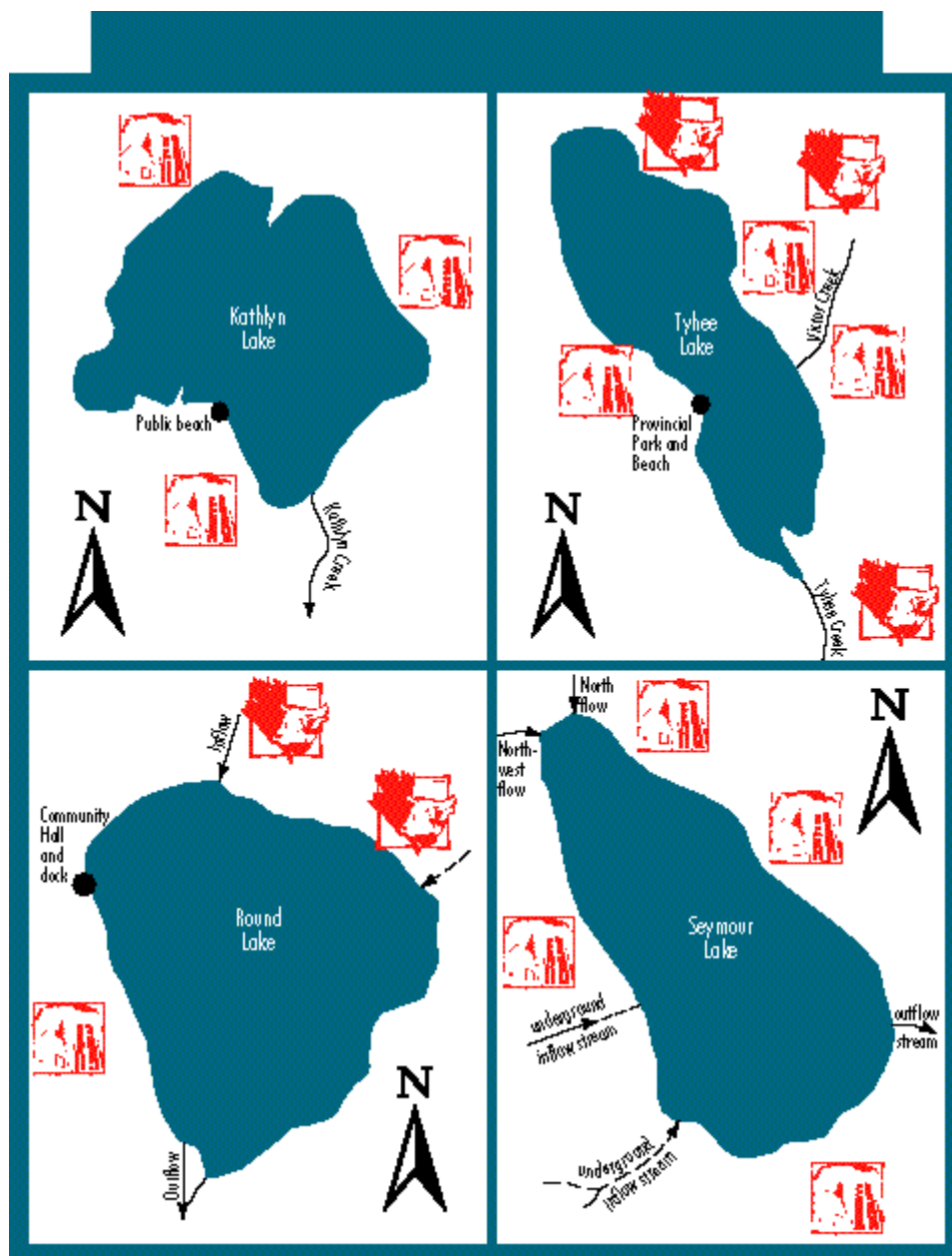
From 1987 to 1992, objectives for the growth of algae were not met in two years and the objective for phosphorus was not met in one year.

### What does it mean to not meet these objectives?

Drinking water users should continue to ensure that their treatment systems are working properly. Swimmers would not be affected. Nutrients may be at a level where the water quality could begin to degrade.

### Does anything need to be done to improve matters?

Lake water quality should continue to be monitored to ensure there is no worsening trend. Residents around the lake should ensure that septic tanks are maintained and that the use of fertilizer and pesticide is minimized.



## Smithers Lakes

### Kathlyn Lake

#### What is the general state of water quality?

Kathlyn Lake water quality is fair (index = 34), with fecal coliforms and phosphorus concentrations frequently not meeting acceptable levels. There are plans to begin rehabilitation work to improve water quality.

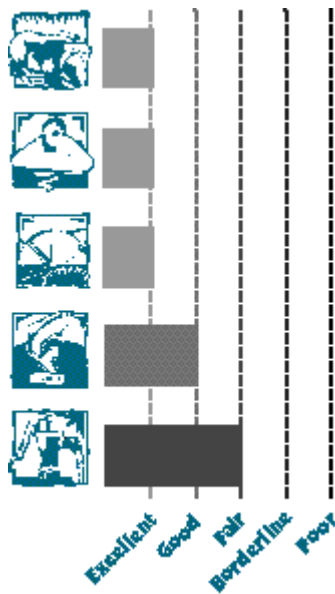
#### What are the main attributes of Kathlyn Lake?

Kathlyn Lake is located just north from Smithers and drains into the Bulkley River. It is important for recreation, irrigation, and as a domestic water supply.

#### What are the potential sources of contamination?

These include residential and agricultural development

## Fair



around the lake and road and airport runoff.

### Which objectives have been set?

Those for fecal coliforms, turbidity, colour, and phosphorus. The objectives were set for those characteristics that relate to residential development and agriculture.

### What are the main uses of the lake?

Uses include recreation such as swimming, drinking water that is disinfected only, irrigation, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1987 to 1993, the phosphorus objective was usually not met, reflecting the eutrophic (or overly productive) nature of the lake. Turbidity, colour, and fecal coliform objectives were also not met on occasion.

### What does it mean to not meet these objectives?

Drinking water users should continue to ensure that their treatment systems are working properly. Swimmers would not be affected. The excessive growth of plants and algae can impact fish survival through oxygen depletion, and can cause aesthetic problems for recreation and drinking water.

### What can be done to improve matters?

Lake management plans are being defined between residents and government, including consideration of in-lake and external methods to rehabilitate lake water quality. Residents living near the lake should maintain their septic systems and minimize fertilizer runoff.

## Seymour Lake

### What is the general state of water quality?

Seymour Lake water quality is poor (index = 65), with turbidity frequently not meeting acceptable levels. There are plans to begin rehabilitation work to improve water quality.

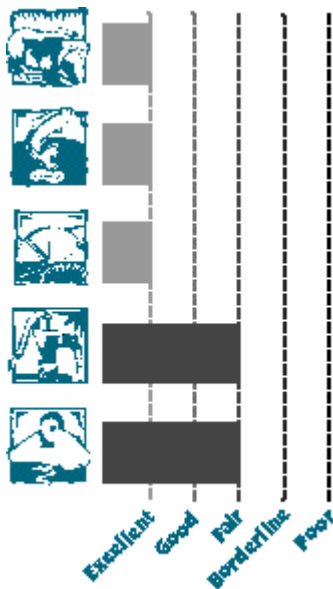
## Poor

### What are the main attributes of Seymour Lake?

Seymour Lake is located about five kilometres south from Smithers and drains into the Bulkley River. It is important for recreation, irrigation, and as a domestic water supply.

### What are the potential sources of contamination?

These include residential and agricultural development around the lake.



### Which objectives have been set?

Those for fecal coliforms, colour, and turbidity. The objectives were set for those characteristics that relate to residential development and agriculture.

### What are the main uses of the lake?

Uses include recreation such as swimming, drinking water that is disinfected only, irrigation, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1988 to 1993, objectives for turbidity and colour were usually never met, reflecting the eutrophic (or overly productive) nature of the lake. The fecal coliform objective was also not met on occasion.

### What does it mean to not meet these objectives?

Drinking water users should continue to ensure that their treatment systems are working properly; however, the main concern for drinking water is colour and turbidity. Swimmers would not be affected except that the water is coloured and aesthetically unpleasant.

### Why is the general state worse than any use rating?

The general state reflects the fact that objectives for colour and turbidity are often not met.

### What can be done to improve matters?

Lake management plans are being considered to examine in-lake and external methods to rehabilitate lake quality. Residents living near the lake should maintain their septic systems and minimize fertilizer runoff.

## Tyhee Lake

### What is the general state of water quality?

Tyhee Lake water quality is fair (index = 21), with fecal coliforms and phosphorus concentrations frequently not meeting acceptable levels. There are plans to begin rehabilitation work to improve water quality.

## Fair

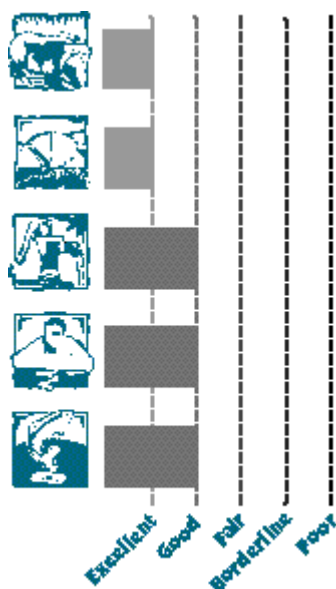
### What are the main attributes of Tyhee Lake?

Tyhee Lake is located about ten kilometres south from Smithers and drains into the Bulkley River. It is important for recreation, irrigation, and as a domestic water supply.

### What are the potential sources of contamination?

These include residential and agricultural development around the lake.





### Which objectives have been set?

Those for fecal coliforms, turbidity, colour, and phosphorus. The objectives were set for those characteristics that relate to residential development and agriculture.

### What are the main uses of the lake?

Uses include recreation such as swimming, drinking water that is disinfected only, irrigation, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1987 to 1993, phosphorus was not always met, reflecting the eutrophic (or overly productive) nature of the lake. Turbidity, colour, and fecal coliforms were also not met on occasion.

### What does it mean to not meet these objectives?

Drinking water users should continue to ensure that their treatment systems are working properly. Swimmers would not be affected. Phosphorus produces an excessive growth of plants and algae that can impact fish survival through oxygen depletion and cause aesthetic problems for recreation and drinking water.

### Why is the general state worse than any use rating?

The general state reflects the fact that several uses of the water can be impacted.

### What can be done to improve matters?

Lake management plans have been drawn up by residents and government. In-lake and external methods are under consideration to rehabilitate lake quality. Residents living near the lake should maintain their septic systems and minimize fertilizer runoff.

## Round Lake

### What is the general state of water quality?

Round Lake water quality is fair (index = 35), with phosphorus concentrations frequently not meeting acceptable levels. There are plans to begin rehabilitation work to improve water quality.

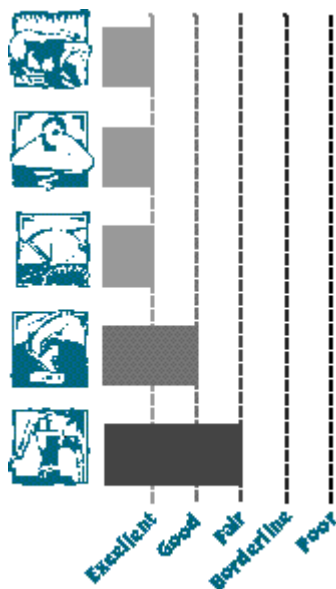
## Fair

### What are the main attributes of Round Lake?

Round Lake is located about twenty kilometres south from Smithers and drains into the Bulkley River. It is important for recreation, irrigation, and as a domestic water supply.

### What are the potential sources of contamination?

These include residential and agricultural development



around the lake.

### Which objectives have been set?

Those for fecal coliforms, turbidity, colour, and phosphorus. The objectives were set for those characteristics that relate to residential development and agriculture.

### What are the main uses of the lake?

Uses include recreation such as swimming, drinking water that is disinfected only, irrigation, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

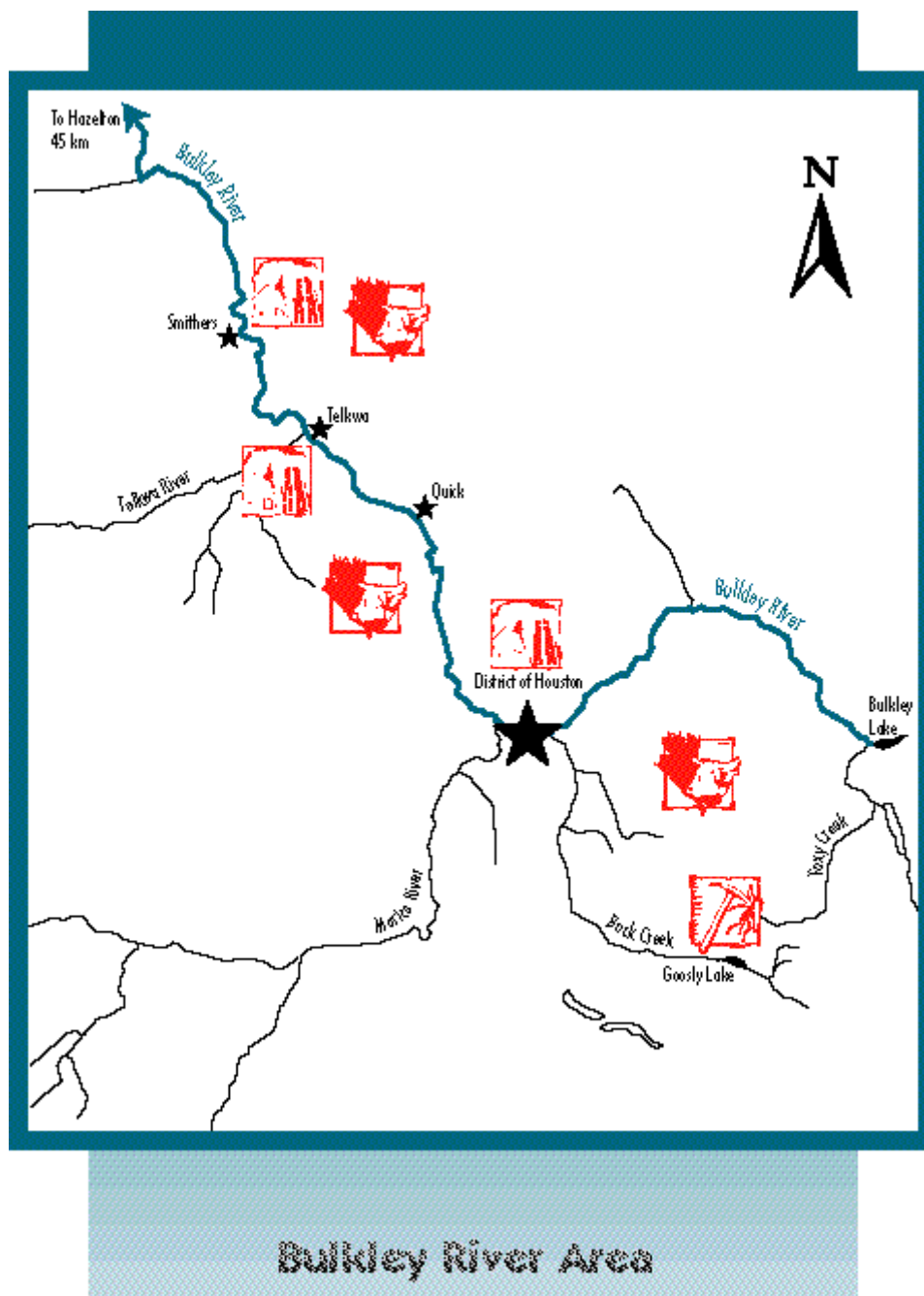
From 1988 to 1993, objectives for turbidity and colour were never met, reflecting the eutrophic (or overly productive) nature of the lake. Phosphorus was also not met on occasion.

### What does it mean to not meet these objectives?

Drinking water users should continue to ensure that their treatment systems are working properly; however, the main concern for drinking water is colour and turbidity. Swimmers would not be affected. The excessive growth of plants and algae can impact fish survival through oxygen depletion and can cause aesthetic problems for recreation and drinking.

### What can be done to improve matters?

Lake management plans are being considered to examine in-lake and external methods to rehabilitate lake quality. Residents living near the lake should maintain their septic systems and minimize fertilizer runoff.



## Bulkley River

### What is the general state of water quality?

Bulkley River water quality is good (index = 15). Fecal coliforms at times do not meet acceptable levels for drinking water.

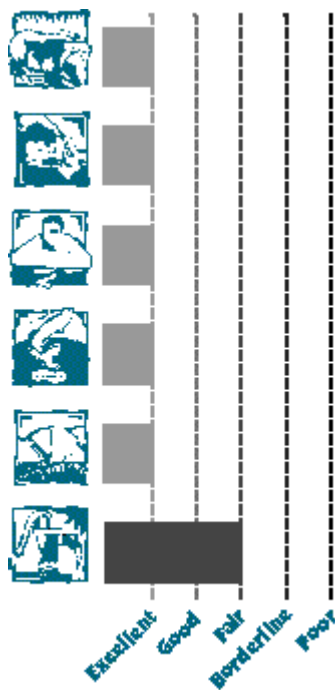
**Good**

### What are the main attributes of the Bulkley River?

The Bulkley River, a tributary to the Skeena River, is important as salmonid habitat and for recreational use upstream from Smithers.

### What are the potential sources of contamination?

These include sewage treatment plants at Houston,



Telkwa, and Smithers, a copper-silver mine in the headwaters, and non-point sources such as agriculture, urban runoff, and landfill leachates.

### Which objectives have been set?

Those for fecal coliforms, turbidity, suspended solids, ammonia, nitrite, the growth of algae, and dissolved oxygen. The objectives were set for those characteristics that relate to discharges from the sewage treatment plants and agricultural runoff.

### What are the main uses of the river?

Uses include those of aquatic life and wildlife, recreation such as swimming, livestock watering, irrigation, and drinking water with disinfection only in certain areas. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1987 to 1992, fecal coliform objectives were regularly not met upstream from Houston where impacts could originate from non-point sources.

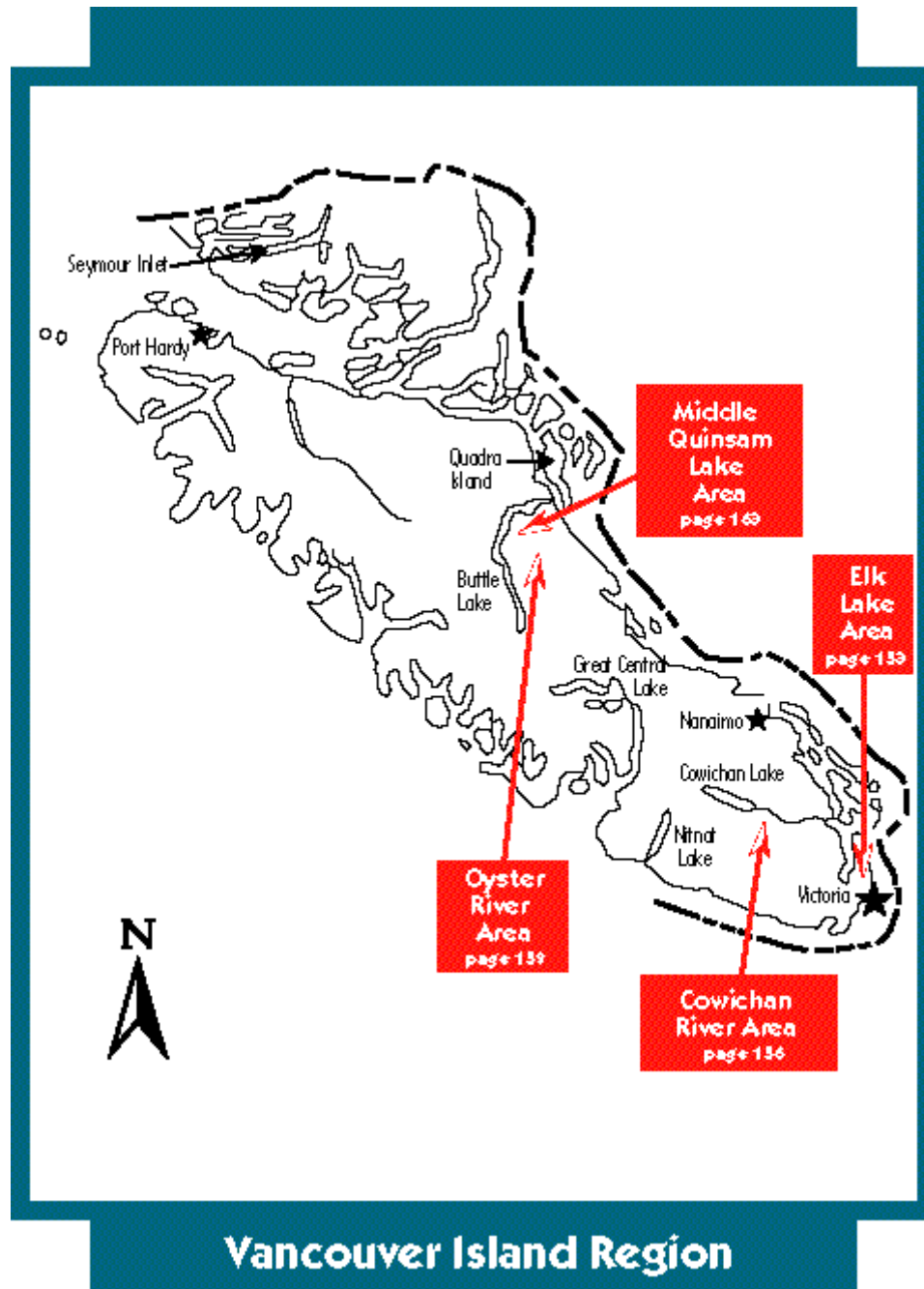
### What does it mean to not meet these objectives?

High fecal coliform levels mean that drinking water users should ensure their treatment systems are working properly. Swimmers would not be affected.

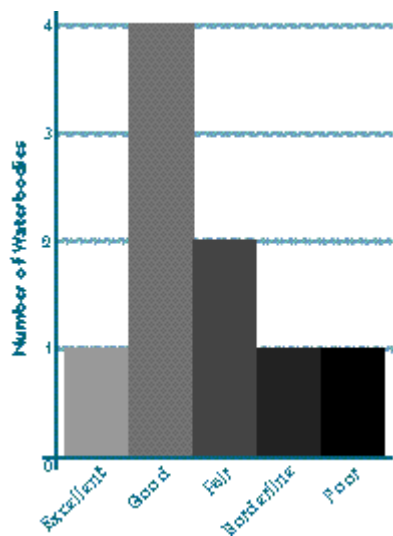
### What will be done to improve matters?

The Ministry will ensure that the discharges from sewage treatment plants are treated properly. Studies are needed on how best to control fecal coliforms that may originate from agricultural sources.

## Vancouver Island Region



## Vancouver Island Region Summary



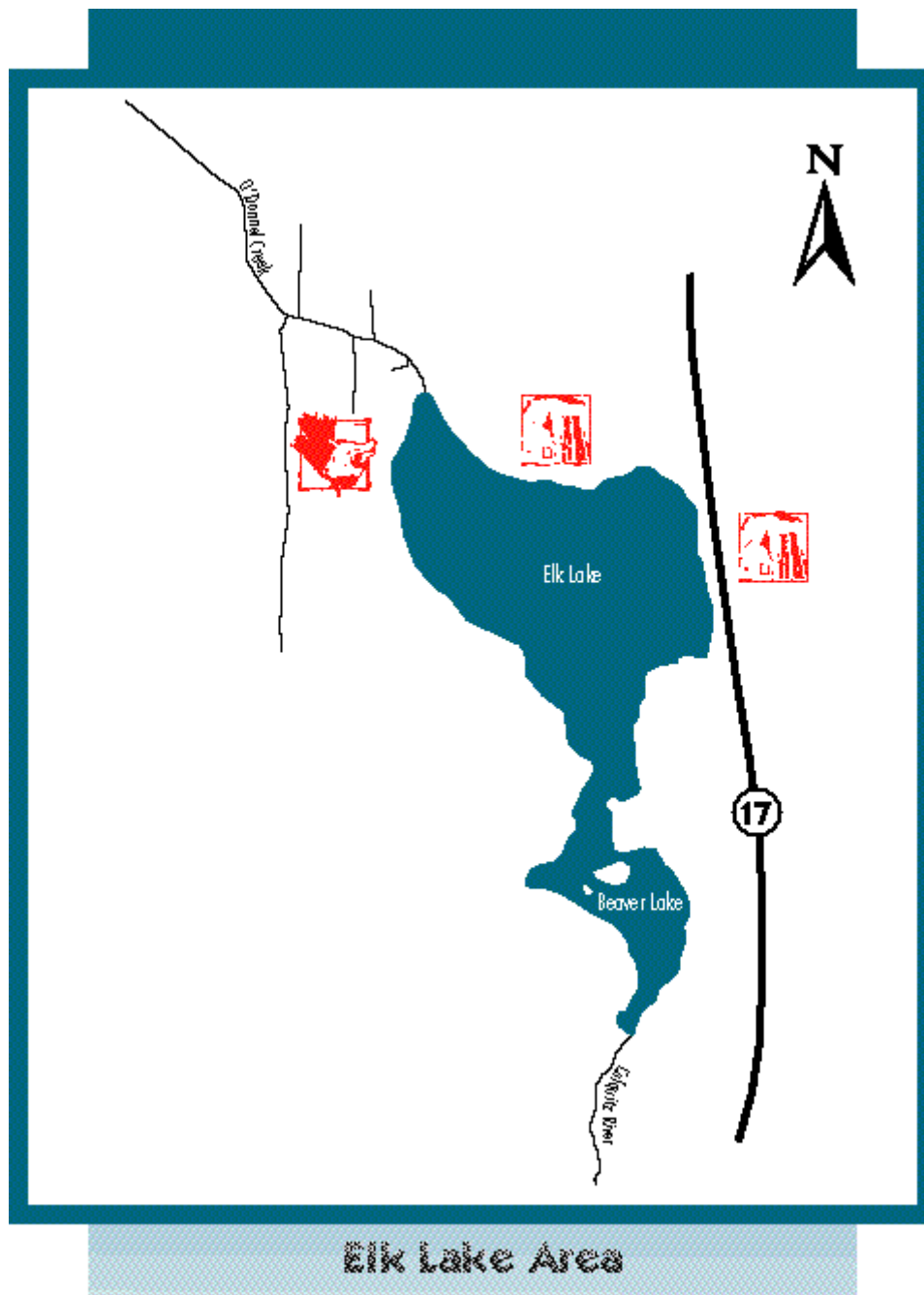
The Vancouver Island Region includes all of the island plus part of the mainland coast from Seymour Inlet in the north to Quadra Island in the south, as shown on the attached map. The main regional office of the Ministry is located in Nanaimo.

There are 9 status reports for this Region covering 3 lakes and 6 reaches of streams. The bar-graph on this page shows that 44 percent of these waterbodies are ranked as having good water quality and 22 percent as fair. The remainder are equally divided among excellent, borderline, and poor categories.

If you have any questions on the status reports or would like more information on other waterbodies in the Region, please contact:

John Deniseger  
 Ministry of Environment, Lands and Parks  
 2569 Kenworth Road  
 Nanaimo, B.C.  
 V9T 4P7

Telephone: 751-3184  
 Fax: 751-3103  
 E-mail: [jdeniseg@nanaimo.env.gov.bc.ca](mailto:jdeniseg@nanaimo.env.gov.bc.ca)



## Elk Lake

### What is the general state of water quality?

Elk Lake water quality is borderline (index = 54). Low dissolved oxygen and excessive growths of algae are thought to impact on fish production. Lake aeration combined with long-term measures to control development and agriculture would help to correct the problem.

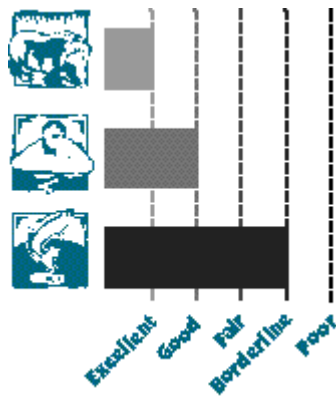
### What are the main attributes of Elk Lake?

Elk Lake, close to Victoria, is the most popular recreational and fisheries lake on southern Vancouver Island.

### What are the potential sources of contamination?

These include agriculture, septic tanks, runoff from

## Borderline



urban development, and the sediments on the bottom of the lake which release phosphorus.

### Which objectives have been set?

Those for temperature, dissolved oxygen, the growth and type of algae, and water clarity. The objectives were set to ensure the long-term health of the lake.

### What are the main uses of the lake?

Uses include recreation such as swimming, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

The objectives for dissolved oxygen, growth of algae, and type of algae were not met in 1993 during the summer months.

### What does it mean to not meet these objectives?

These results are due to the eutrophic nature, or high biological productivity, of the lake. This produces low dissolved oxygen and high growths of algae which, in turn, limit the production of fish and other desirable aquatic life and cause aesthetic problems.

### What needs to be done to improve matters?

Eutrophication of the lake is due to high phosphorus levels in the lake. The phosphorus comes from urban development, agriculture around the lake, and release of phosphorus from sediments on the lake bottom. Phosphorus release from sediments could be controlled by aeration of the lake. Long-term strategies to limit phosphorus input include ensuring that septic tanks are working properly and controlling agricultural and urban runoff. Residents living near the lake should maintain their septic systems and minimize fertilizer runoff.

## Beaver Lake

### What is the general state of water quality?

Beaver Lake water quality is poor (index = 72). Low dissolved oxygen and excessive growths of algae are thought to impact on fish production. Improvements to water quality will depend on the success achieved in improving the water quality of Elk Lake.

## Poor

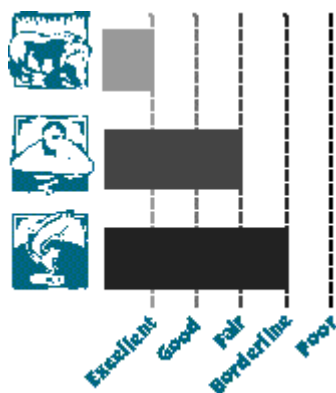
### What are the main attributes of Beaver Lake?

Beaver Lake, near Victoria, is connected to Elk Lake by a short and shallow channel. It is less than one fifth the size of Elk Lake, but shares its popularity for recreation and fishing.

### What are the potential sources of contamination?

These include agriculture, septic tanks, runoff from urban development, and the water from Elk Lake.





### Which objectives have been set?

Those for temperature, dissolved oxygen, the growth and type of algae, and water clarity. The objectives were set to ensure the long-term health of the lake.

### What are the main uses of the lake?

Uses include recreation such as swimming, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

The objectives for dissolved oxygen, growth of algae, and type of algae were not met in 1993 during the summer months.

### What does it mean to not meet these objectives?

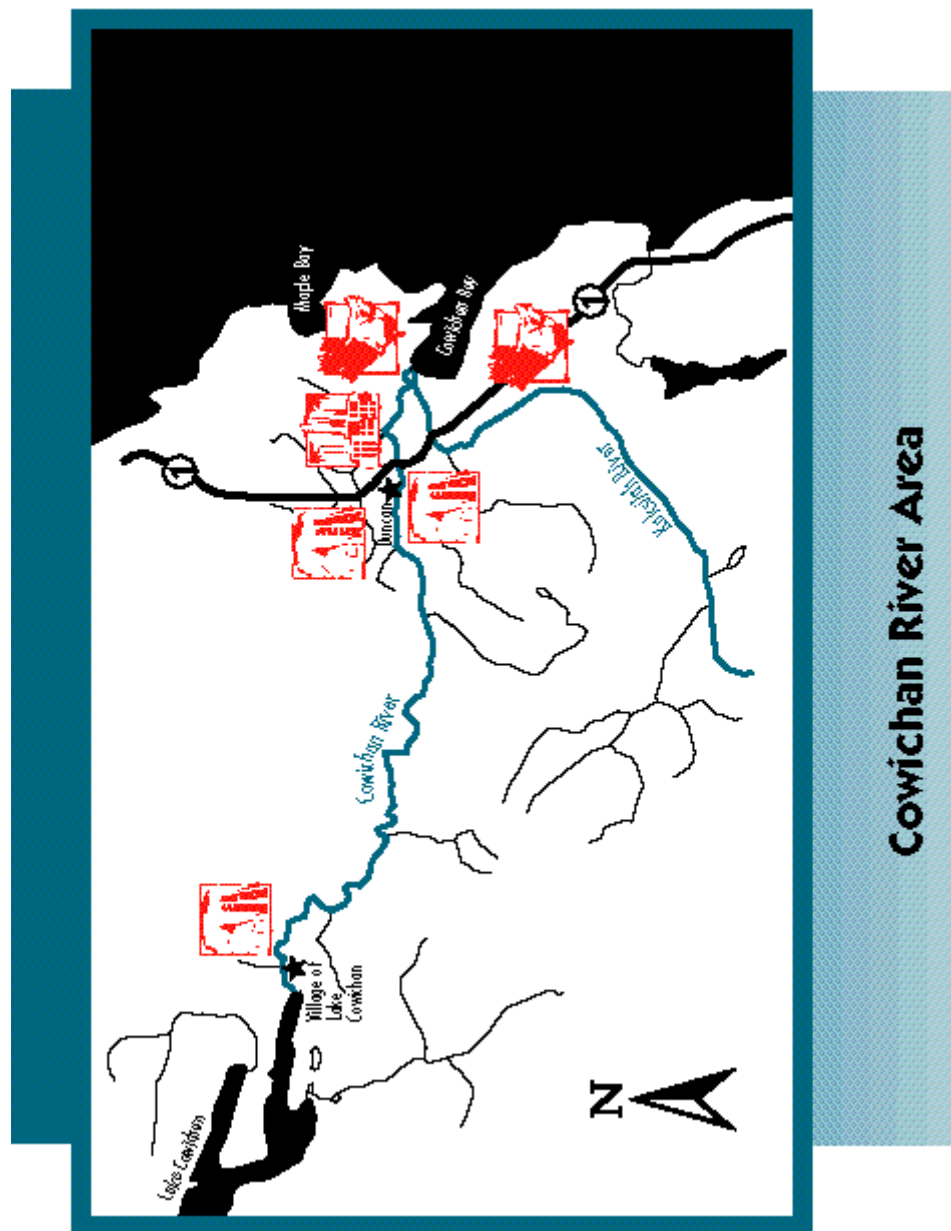
These results are due to the eutrophic nature, or high biological productivity, of the lake. This produces low dissolved oxygen and high growths of algae which, in turn, limit the production of fish and other desirable aquatic life and cause aesthetic problems.

### Why is the general state worse than any use rating?

The general state reflects the highly eutrophic nature of the lake.

### What needs to be done to improve matters?

Changes in Beaver Lake will be dependent on improvements to the quality of the water in Elk Lake. Therefore the strategy to improve Beaver Lake should be evaluated after Elk Lake has had time to respond to measures to improve its water quality. Residents living near the lake should maintain their septic systems and minimize fertilizer runoff.



## Cowichan River Area

### Cowichan River

#### What is the general state of water quality?

Cowichan River water quality is fair (index = 30), with coliforms, the growth of algae, and dissolved oxygen not meeting acceptable levels at times. While there is no cause for immediate concern, there are plans to address these problems.

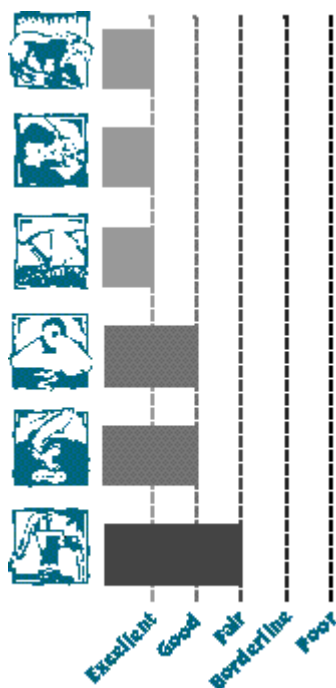
**Fair**

#### What are the main attributes of the Cowichan River?

The Cowichan River, on the east coast of Vancouver Island, is one of the most important rivers on the island for recreational and commercial fisheries.

#### What are the potential sources of contamination?

These include treated municipal sewage, a fish hatchery, agriculture, and urban development.



### Which objectives have been set?

Those for fecal coliforms, turbidity, suspended solids, ammonia, the growth of algae, dissolved oxygen, and metals. The objectives were set for those characteristics that relate to potential sources of contamination.

### What are the main uses of the river?

Uses include drinking (assuming water will be disinfected) at locations upstream from the Trans-Canada Highway, irrigation, recreation such as swimming, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1988 to 1993, the objectives for fecal coliforms were regularly not met during the summer. Objectives for dissolved oxygen and the growth of algae were also not regularly met in the lower reaches of the river.

### What does it mean to not meet these objectives?

High fecal coliform levels mean that drinking water users should ensure that their treatment systems are working properly. Swimmers would not be affected. People have complained of odours in the river due to algae. Dissolved oxygen values only rarely dropped to slight impairment levels for fish, indicating that long-term threats to fish would be minimal.

### What will be done to improve matters?

The source of fecal coliform contamination needs to be found before the problem can be solved. Monitoring for fecal coliforms will be expanded, especially in the upper reaches of the Cowichan River. Means of reducing the nutrients entering the river will be investigated and will result in changes to the Duncan-North Cowichan sewage treatment plant. Residents can help by minimizing their use of fertilizers and pesticides and by not dumping wastes into storm drains.

## Koksilah River

### What is the general state of water quality?

Koksilah River water quality is fair (index = 36) with coliforms and dissolved oxygen not meeting acceptable levels at times. While there is no cause for immediate concern, there are plans to address these problems.

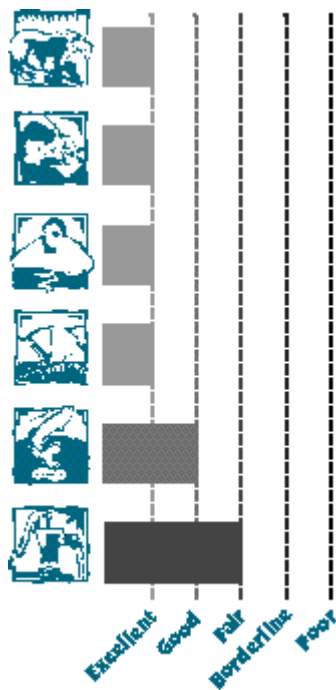
**Fair**

### What are the main attributes of the Koksilah River?

The Koksilah River is a tributary to the Cowichan River, one of the most important rivers on Vancouver Island for recreational and commercial fisheries.

### What are the potential sources of contamination?

These include agriculture, landfills, gravel operations, and urban development.



### Which objectives have been set?

Those for fecal coliforms, turbidity, suspended solids, dissolved oxygen, and metals. The objectives were set for those characteristics that relate to potential sources of contamination.

### What are the main uses of the river?

Uses include drinking (assuming water will be disinfected), irrigation, recreation such as swimming, and use by aquatic life and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

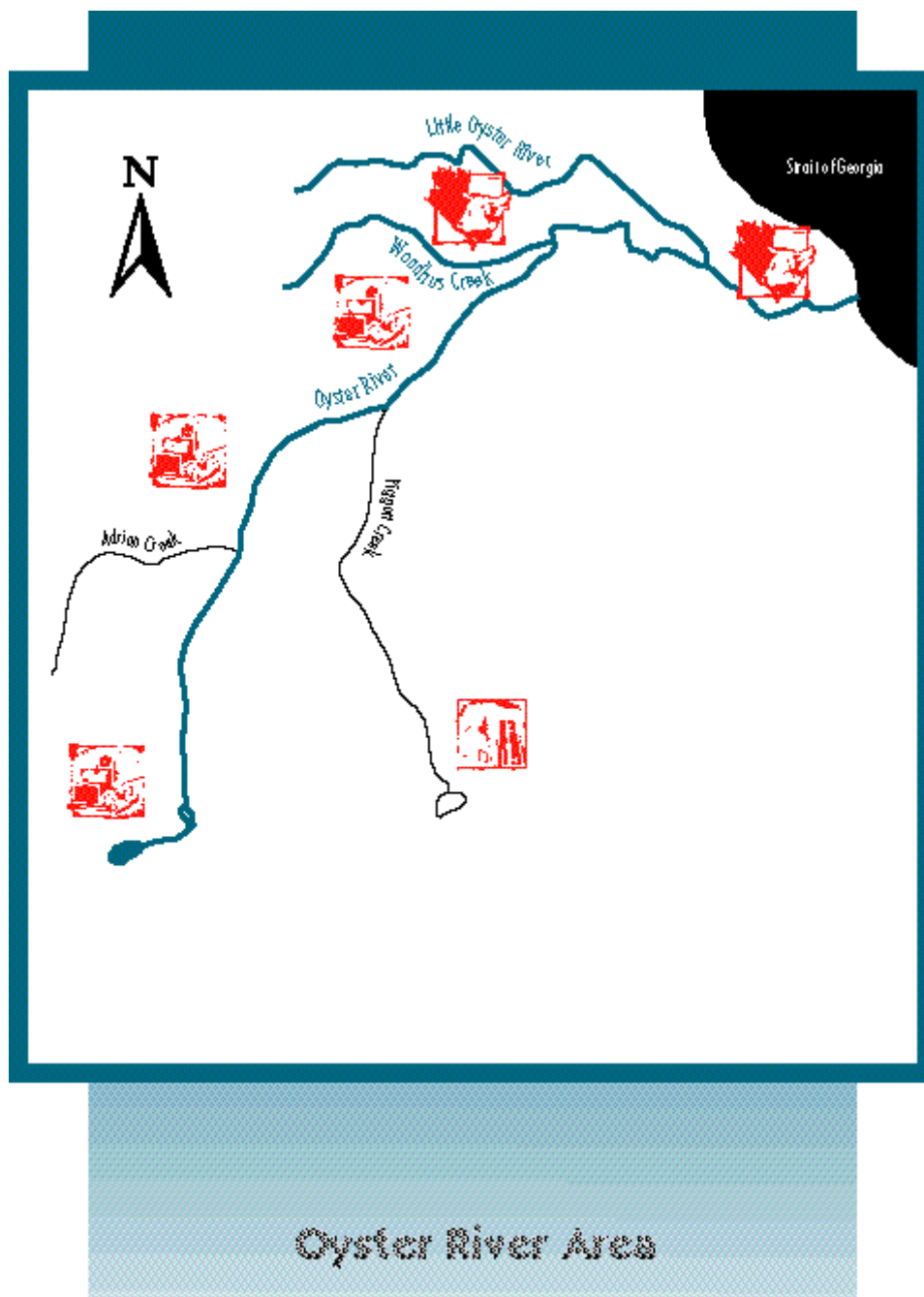
From 1988 to 1993, the objectives for fecal coliforms were regularly not met during the summer. The dissolved oxygen objective occasionally was also not met along the entire length of the river.

### What does it mean to not meet these objectives?

High fecal coliform levels mean that drinking water users should ensure their treatment systems are working properly. Swimmers would not be affected. Dissolved oxygen values only rarely dropped to levels that would cause slight impairment for fish, indicating that long-term impact to fish would be minimal.

### What will be done to improve matters?

The source of fecal coliform contamination needs to be found before the problem can be solved. Monitoring for fecal coliforms will be expanded. Residents can help by minimizing their use of fertilizers and pesticides and by not dumping wastes into storm drains.



## Oyster River

### What is the general state of water quality?

Oyster River water quality is good (index = 16). This reflects a few high metal values that have been recorded, although these measurements may not be environmentally significant.

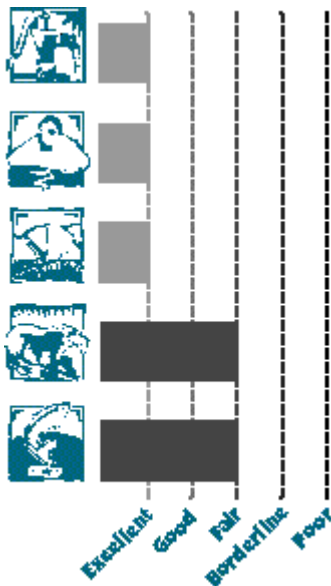
**Good**

### What are the main attributes of the Oyster River?

The Oyster River flows into the Strait of Georgia south of Campbell River on Vancouver Island. It is important as salmon habitat and for recreation.

### What are the potential sources of contamination?

These include logging and the possible mining of coal



and metal deposits in the future. Mount Washington Resort discharges treated sewage to Piggot Creek, a tributary of the Oyster River. There is agriculture at the mouth of the Oyster River.

#### Which objectives have been set?

Those for fecal coliforms, suspended solids, turbidity, nutrients, pH, and metals. The objectives were set for those characteristics that relate to logging, sewage, agriculture, and potential mining activity.

#### What are the main uses of the river?

Uses include recreation such as swimming, use by fish and wildlife, irrigation, and drinking after partial treatment. These uses are protected when the objectives are met.

#### Which objectives were not met?

From 1990 to 1993, the objectives not met included those for chromium and zinc.

#### What does it mean to not meet these objectives?

The occasional high chromium and zinc value could, theoretically, affect aquatic life and wildlife. However, the values appear to be within the degree of uncertainty of such environmental measurements and may therefore not be significant.

#### Does anything need to be done to improve matters?

No. The overall quality of the water is good and there are no indications of potential problems.

## Woodhus Creek

#### What is the general state of water quality?

Woodhus Creek water quality is good (index = 16). This reflects a few high metal values that have been recorded, although these measurements may not be environmentally significant.

**Good**

#### What are the main attributes of Woodhus Creek?

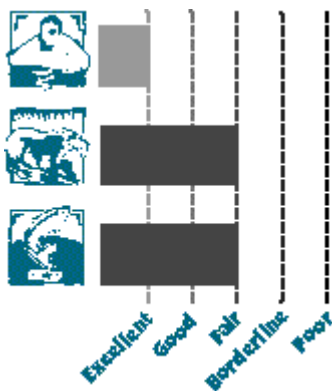
Woodhus Creek is a tributary of the Oyster River. It is important as salmon habitat.

#### What are the potential sources of contamination?

There are no direct sources of contamination, although it is possible that coal and metal deposits will be mined in the future.

#### Which objectives have been set?

Those for nutrients, pH, and metals. The objectives were set for those characteristics that relate to potential



mining activity.

#### What are the main uses of the river?

The main uses are for recreation such as swimming and by fish and wildlife. These uses are protected when the objectives are met.

#### Which objectives were not met?

From 1991 to 1993, the objectives not met included those for chromium, aluminum, and zinc.

#### What does it mean to not meet these objectives?

The occasional high metal value could, theoretically, affect aquatic life and wildlife. However, the values appear to be within the degree of uncertainty of such environmental measurements and may therefore not be significant.

#### Does anything need to be done to improve matters?

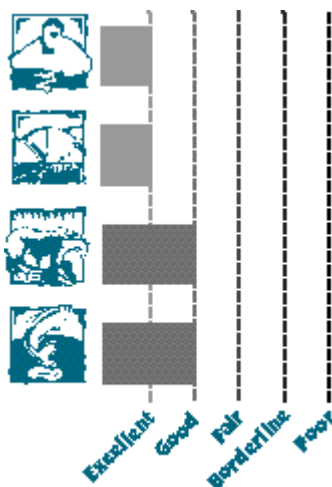
No. The overall quality of the water is good and there are no indications of potential problems.

### Little Oyster River

#### What is the general state of water quality?

Little Oyster River water quality is good (index = 16). This reflects a few high metal values that have been recorded, although these measurements may not be environmentally significant.

#### Good



#### What are the main attributes of the Little Oyster River?

The Little Oyster River is a major tributary of the Oyster River near its mouth. It is important as salmon habitat.

#### What are the potential sources of contamination?

These include agriculture in the lower reaches of the river and the possible mining of coal and metal deposits in the future.

#### Which objectives have been set?

Those for nutrients, pH, and metals. The objectives were set for those characteristics that relate to agriculture and potential mining activity.

#### What are the main uses of the river?

The main uses are by fish and wildlife and for irrigation and recreation. These uses are protected when the objectives are met.

#### Which objectives were not met?

From 1991 to 1993, the objectives not met included

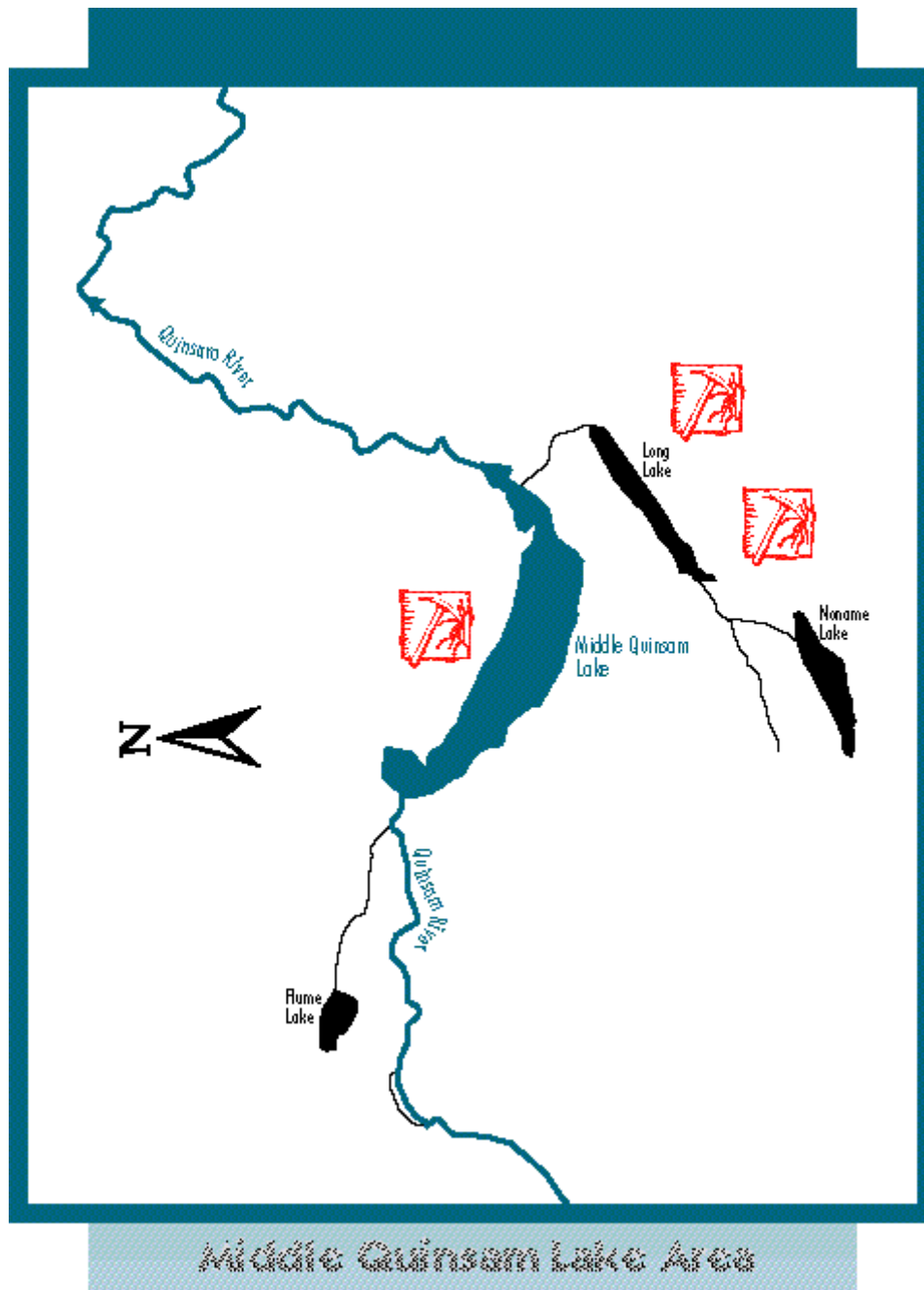
those for chromium and aluminum.

**What does it mean to not meet these objectives?**

The occasional high chromium and aluminum value could, theoretically, affect aquatic life and wildlife. However, the values appear to be within the degree of uncertainty of such environmental measurements and may therefore not be significant.

**Does anything need to be done to improve matters?**

No. The overall quality of the water is good and there are no indications of potential problems.



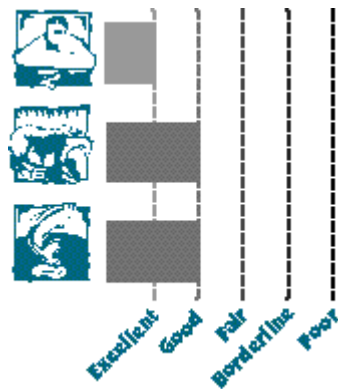


## Middle Quinsam Lake

### What is the general state of water quality?

Middle Quinsam Lake water quality is excellent (index = 3). All objectives are usually met and no corrective measures need to be taken.

### Excellent



### What are the main attributes of Middle Quinsam Lake?

Middle Quinsam Lake drains via the Quinsam River to the Campbell River on Vancouver Island. The lake, which is undeveloped, is used to rear salmon and also supports other fish and wildlife.

### What are the potential sources of contamination?

These include a coal mining operation with pits north and south of the lake. There are no direct discharges to the lake.

### Which objectives have been set?

Those for suspended solids, nutrients, pH, dissolved oxygen, and metals. The objectives were set for those characteristics that relate to the mine.

### What are the main uses of the lake?

Uses include recreation such as swimming and use by fish and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

From 1991 to 1993, the objective for total lead was not met on one occasion.

### What does it mean to not meet this objective?

The one instance of a metal objective not met had but a minor bearing on any use.

### Does anything need to be done to improve matters?

No. The overall quality of the water is excellent, demonstrating that mining wastes are being well managed.

## Quinsam River

### What is the general state of water quality?

Quinsam River water quality is good (index = 8). Most objectives are usually met and no corrective measures need to be taken.

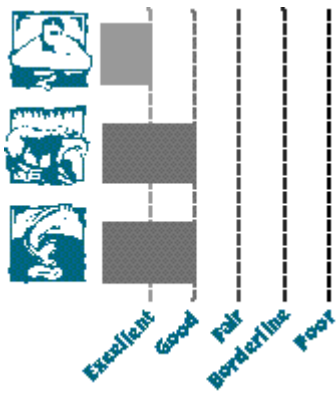
### Good

### What are the main attributes of the Quinsam River?

The Quinsam River runs from Middle Quinsam Lake to the Campbell River on Vancouver Island. The river is an important migration route for wild and hatchery salmon.

### What are the potential sources of contamination?

These include a coal mining operation with pits north



and south of Middle Quinsam Lake. There are no direct discharges to the river or lake.

#### **Which objectives have been set?**

Those for suspended solids, nutrients, pH, turbidity, and metals. The objectives were set for those characteristics that relate to the mine.

#### **What are the main uses of the river?**

Uses include recreation such as swimming and use by fish and wildlife. These uses are protected when the objectives are met.

#### **Which objectives were not met?**

From 1989 to 1993, the objective for zinc was not met on three occasions and that for nickel on one occasion.

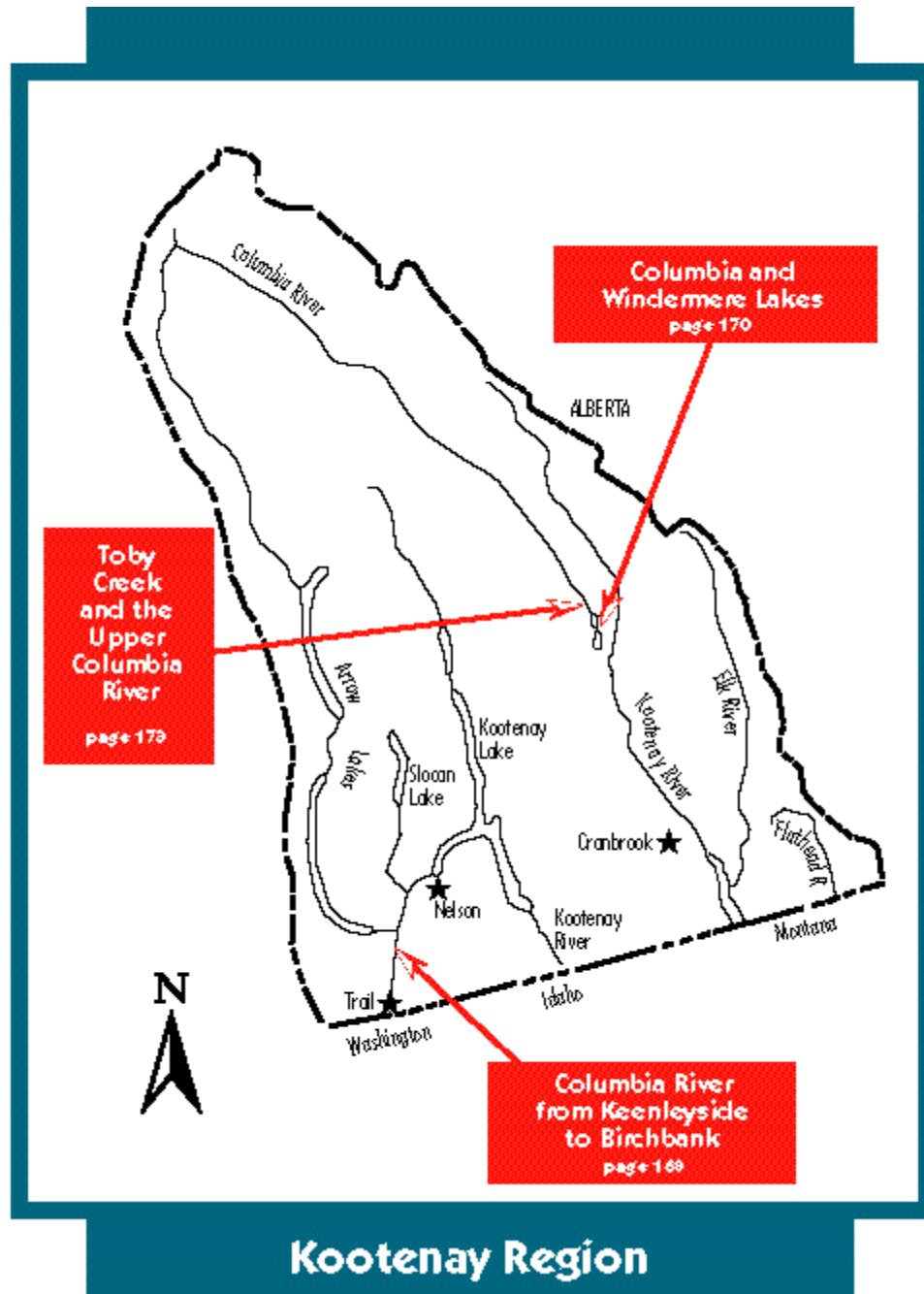
#### **What does it mean to not meet these objectives?**

The few instances of metal objectives not met had little bearing on any use.

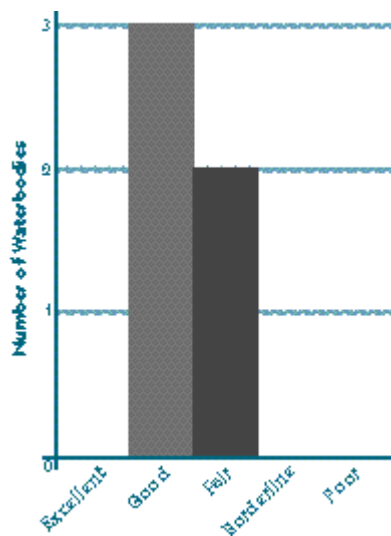
#### **Does anything need to be done to improve matters?**

No. The overall quality of the water is good, demonstrating that mining wastes are being well managed.

# Kootenay Region



## Kootenay Region Summary



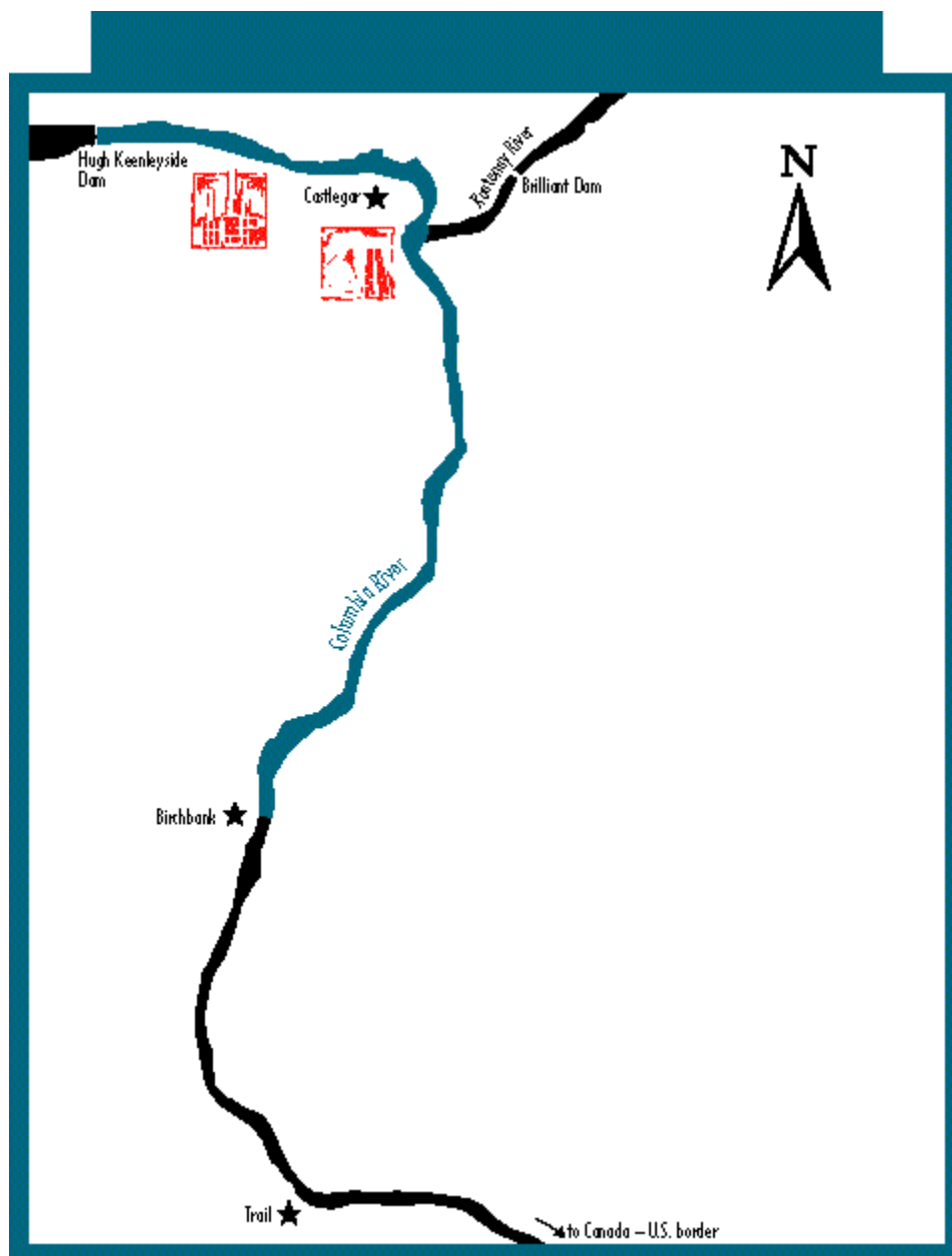
The Kootenay Region is located in the south-eastern part of the Province bordering Washington State, Idaho, and Montana. It extends from Alberta in the east to the Arrow Lakes in the west, as shown on the attached map. The main regional office of the Ministry is located in Nelson.

There are 5 status reports for this Region covering 2 lakes and 3 reaches of streams. The bar-graph on this page shows that these waterbodies are ranked as having either good or fair water quality, with most being in the good category. There are several major waterbodies, such as Kootenay Lake, the Columbia River below Trail, and the Kootenay River, not represented here because water quality objectives have not yet been set in these areas.

If you have any questions on the status reports or would like more information on other waterbodies in the Region, please contact:

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**Columbia River from Keenleyside to Birchbank**

## **Columbia River from Keenleyside to Birchbank**

### **What is the general state of water quality?**

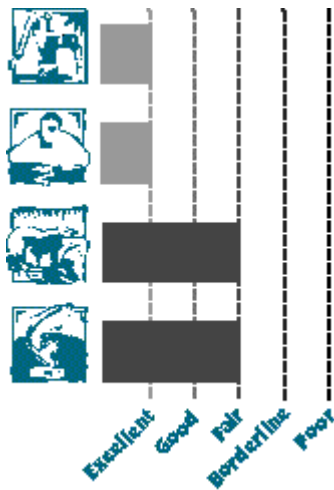
Columbia River water quality is fair (index = 35) but improving. Measures have been taken to solve the problem of dioxins and furans in fish and sediment and organic carbon in sediments. Changes planned to the Hugh Keenleyside Dam will reduce the high levels of total dissolved gas that can impact fish.

### **What are the main attributes of the Columbia River between Keenleyside and Birchbank?**

The Columbia River is a major transboundary river flowing into the U.S. The Kootenay River, a major tributary, enters at Castlegar. The Columbia River is important for aquatic life, sport fishing, and recreation.

### **What are the potential sources of contamination?**

## Fair



These include a pulp mill which completed an expansion and modernization in 1993, several discharges of treated sewage, plus runoff from urban areas.

### Which objectives have been set?

Those for fecal coliforms, colour, resin acids, dioxins and furans in sediments and fish, organic carbon in sediments, total dissolved gas, and dissolved oxygen. The objectives were set for those characteristics that relate to the main discharges.

### What are the main uses of the river?

Uses include recreation such as swimming, drinking water with partial treatment, and use by fish and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

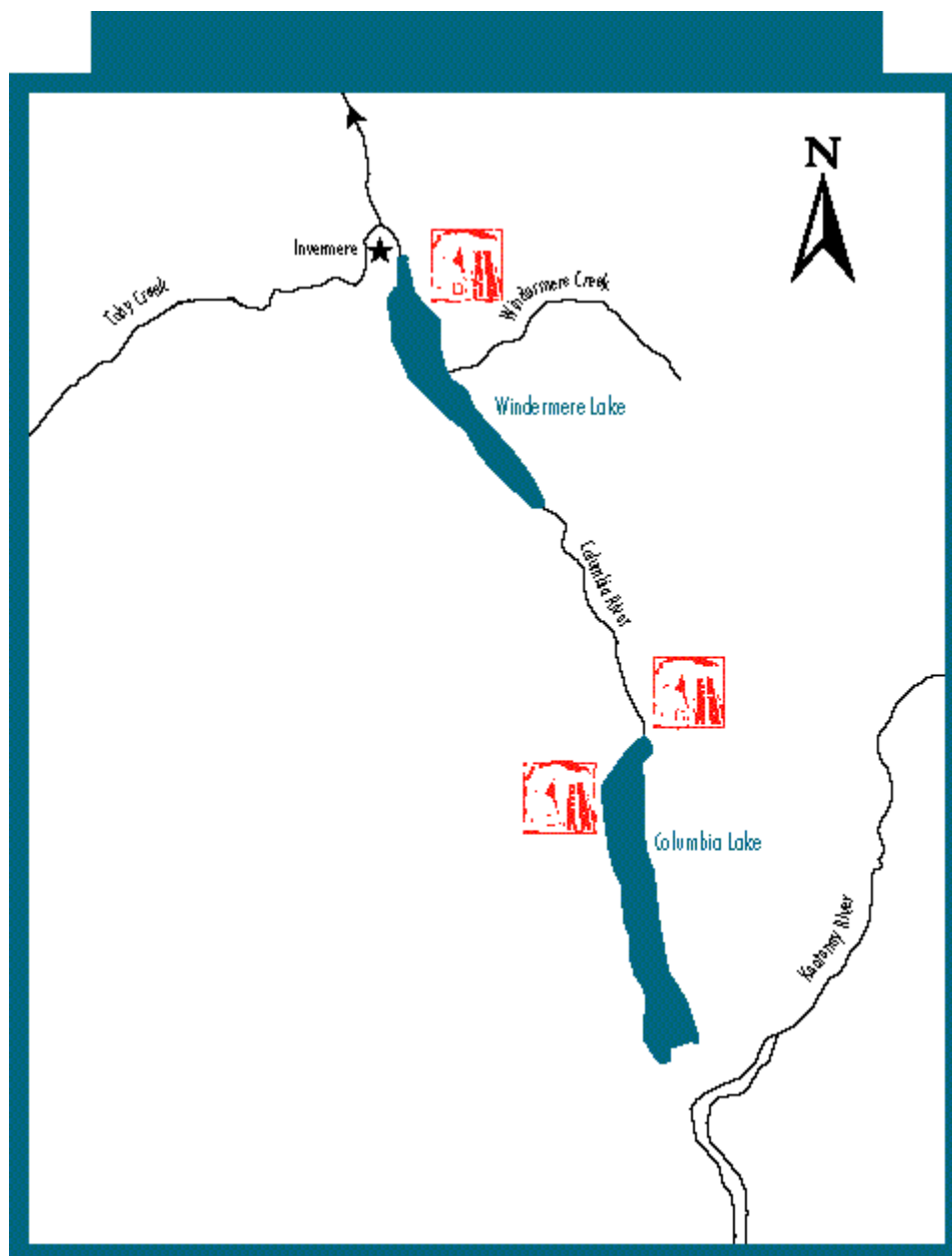
The objectives not met in 1991 to 1993 included those for organic carbon in sediments, total dissolved gas, and dioxins and furans in sediments and fish.

### What does it mean to not meet these objectives?

High levels of organic carbon in sediments, due to pulp mill fines, may be toxic to aquatic life. High total dissolved gas levels, caused by air entrainment from the Keenleyside Dam, can stress fish. Dioxins and furans from the pulp mill accumulate in fish. The dioxin and furan objectives protect fish and wildlife and are more stringent than the human health guideline.

### What will be done to improve matters?

Recent changes at the pulp mill have lowered levels of dioxins and furans in effluents below detectable limits and levels in fish are dropping. Consequently, a consumption advisory for mountain whitefish was lifted recently. The discharge of pulp mill fines has also been reduced. The future installation of a power plant at the Keenleyside Dam will result in changes that will reduce the formation of harmful dissolved gas.



**Columbia and Windermere Lakes**

## Columbia Lake

### What is the general state of water quality?

Columbia Lake water quality is good (index = 5). The lake could be adversely affected by future development if this were to increase phosphorus input.

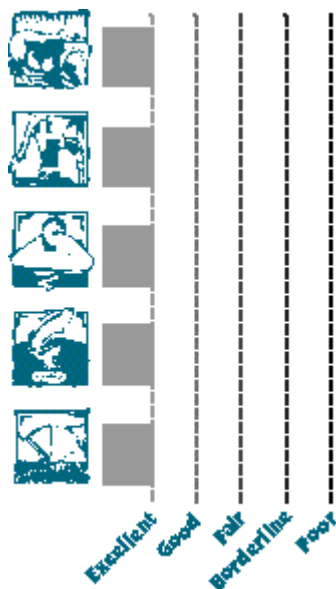
**Good**

### What are the main attributes of Columbia Lake?

Columbia Lake, which flows into Windermere Lake, is the headwaters of the Columbia River. It is important for recreation, aquatic life, and wildlife.

### What are the potential sources of contamination?

These include septic tank tile fields and runoff from



residential development.

### Which objectives have been set?

Those for fecal coliforms, turbidity, and phosphorus.

### What are the main uses of the lake?

Uses include recreation such as swimming, drinking water assuming the water is disinfected, irrigation, and use by fish and wildlife. These uses are protected when the objectives are met.

### Which objectives were not met?

The objective for phosphorus was not met by a small margin in 1987. Otherwise, objectives for phosphorus and fecal coliforms were met from 1987 to 1992.

### What does it mean to not meet this objective?

The lake will remain in good condition as long as phosphorus inputs from development are not increased above present levels. If increases occur, the lake could produce an excess growth of algae which would affect fish habitat. The water remains excellent for drinking and recreation.

### Why is the general state worse than any use rating?

The general state reflects minor departures from ideal conditions.

### Does anything need to be done to improve matters?

No, assuming there is no major development around the lake. The phosphorus objective should be checked occasionally to ensure conditions remain stable. Residents living near the lake should maintain their septic tank systems and minimize fertilizer runoff.

## Windermere Lake

### What is the general state of water quality?

Windermere Lake water quality is good (index = 4). The lake could be adversely affected by future development if this were to increase phosphorus input.

**Good**

### What are the main attributes of Windermere Lake?

Windermere Lake, which is fed by Columbia Lake, flows north into the Columbia River. It is important for recreation, aquatic life, and wildlife.

### What are the potential sources of contamination?

These include septic tank tile fields and runoff from residential development. Soil instability, enhanced by disposal of sewage to ground, can increase the threat of





contamination in some areas.

#### Which objectives have been set?

Those for fecal coliforms, turbidity, and phosphorus.

#### What are the main uses of the lake?

Uses include recreation such as swimming, drinking water assuming the water is disinfected, irrigation, and use by fish and wildlife. These uses are protected when the objectives are met.

#### Which objectives were not met?

In 1987, the objective for phosphorus was not met by a small margin and the turbidity objectives were not met on some occasions. Otherwise, all objectives were met from 1987 to 1992.

#### What does it mean to not meet these objectives?

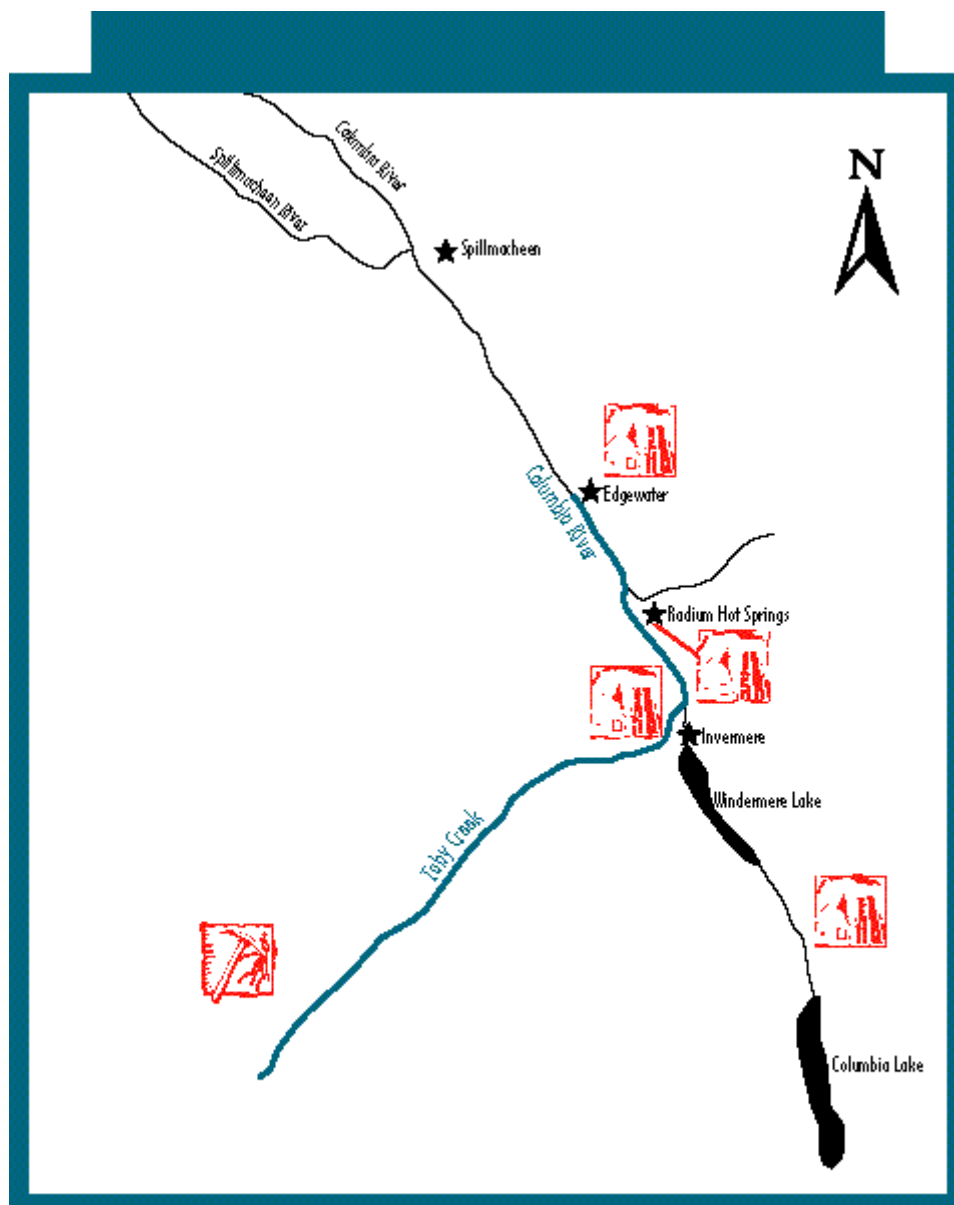
The lake will remain in good condition as long as phosphorus inputs from development are not increased above present levels. If not, the lake could produce an excess growth of algae which would affect fish habitat and drinking water aesthetics.

#### Why is the general state worse than any use rating?

The general state reflects minor departures from ideal conditions.

#### Does anything need to be done to improve matters?

No, assuming there is no major development around the lake. The phosphorus objective should be checked occasionally to ensure conditions remain stable. Residents living near the lake should maintain their septic tank systems and minimize fertilizer runoff.



## Toby Creek and the Upper Columbia River

### Toby Creek

#### What is the general state of water quality?

Toby Creek water quality is good (index = 7). There is no risk to domestic water users provided they disinfect their water supply.

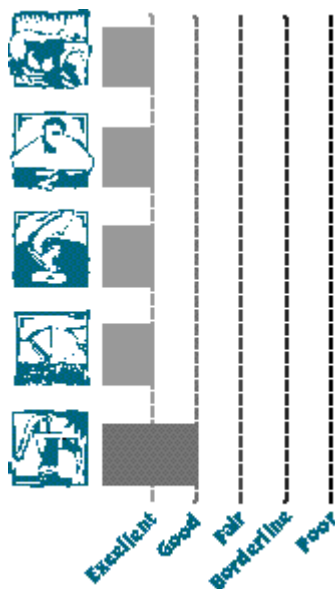
**Good**

#### What are the main attributes of Toby Creek?

Toby Creek flows from the Purcell Mountains to the Columbia River just downstream from Windermere Lake. It is valued for recreation.

#### What are the potential sources of contamination?

These include treated domestic sewage and drainage



from a closed metal mine.

#### Which objectives have been set?

Those for fecal coliforms, turbidity, suspended solids, the growth of algae, ammonia, nitrite, and metals.

#### What are the main uses of the creek?

Uses include drinking with disinfection, recreation such as swimming, irrigation, and use by fish and wildlife. These uses are protected when the objectives are met.

#### Which objectives were not met?

The fecal coliform objective was not met in 1989.

#### What does it mean to not meet this objective?

The extent to which the objective was not met means that domestic water users should ensure that their treatment systems are working properly. There is no risk to any recreational users.

#### What will be done to improve matters?

Considering the low health risk involved, there are no plans to investigate further at this time.

## Columbia River from Toby Creek to Edgewater

#### What is the general state of water quality?

Columbia River water quality from Toby Creek to Edgewater is fair (index = 31). There is no risk to domestic water users upstream from Radium provided they disinfect their water supply.

**Fair**

#### What are the main attributes of the Columbia River from Toby Creek to Edgewater?

The Columbia River between Toby Creek and Edgewater flows north from Windermere Lake. It has a high recreational value.

#### What are the potential sources of contamination?

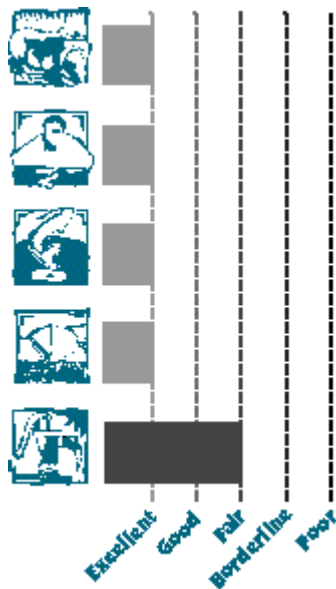
These include treated domestic sewage discharged to ground at Radium Hot Springs and discharged only during freshet at Edgewater.

#### Which objectives have been set?

Those for fecal coliforms to protect drinking upstream from Radium and recreation throughout.

#### What are the main uses of the river?

Uses include recreation such as canoeing and hunting, irrigation, and use by fish and wildlife throughout with the addition of drinking with disinfection upstream from



Radium. These uses are protected when the objectives are met.

#### Which objectives were not met?

The fecal coliform objective above Radium was not met from 1987 to 1991, although it was met in 1992.

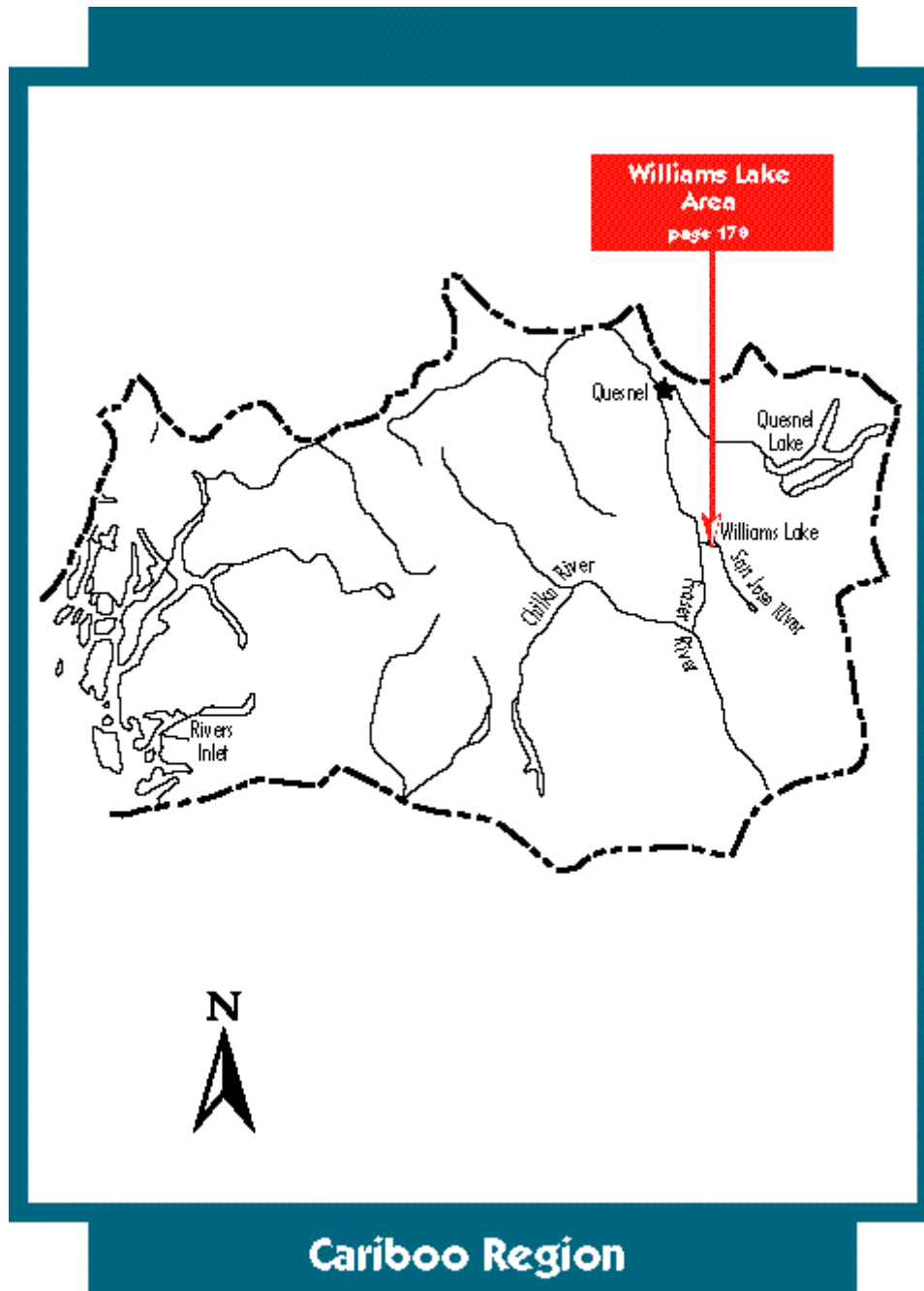
#### What does it mean to not meet this objective?

The extent to which the objective was not met means that domestic water users should ensure that their treatment systems are working properly. There is no risk to any recreational users.

#### What will be done to improve matters?

Considering the low health risk involved, there are no plans to investigate further at this time.

# Cariboo Region



## Cariboo Region Summary

The Cariboo Region is located in the interior of the Province, south of Prince George. It extends from Quesnel Lake in the east to Rivers Inlet on the west coast as shown on the attached map. The main regional office of the Ministry is located in Williams Lake.

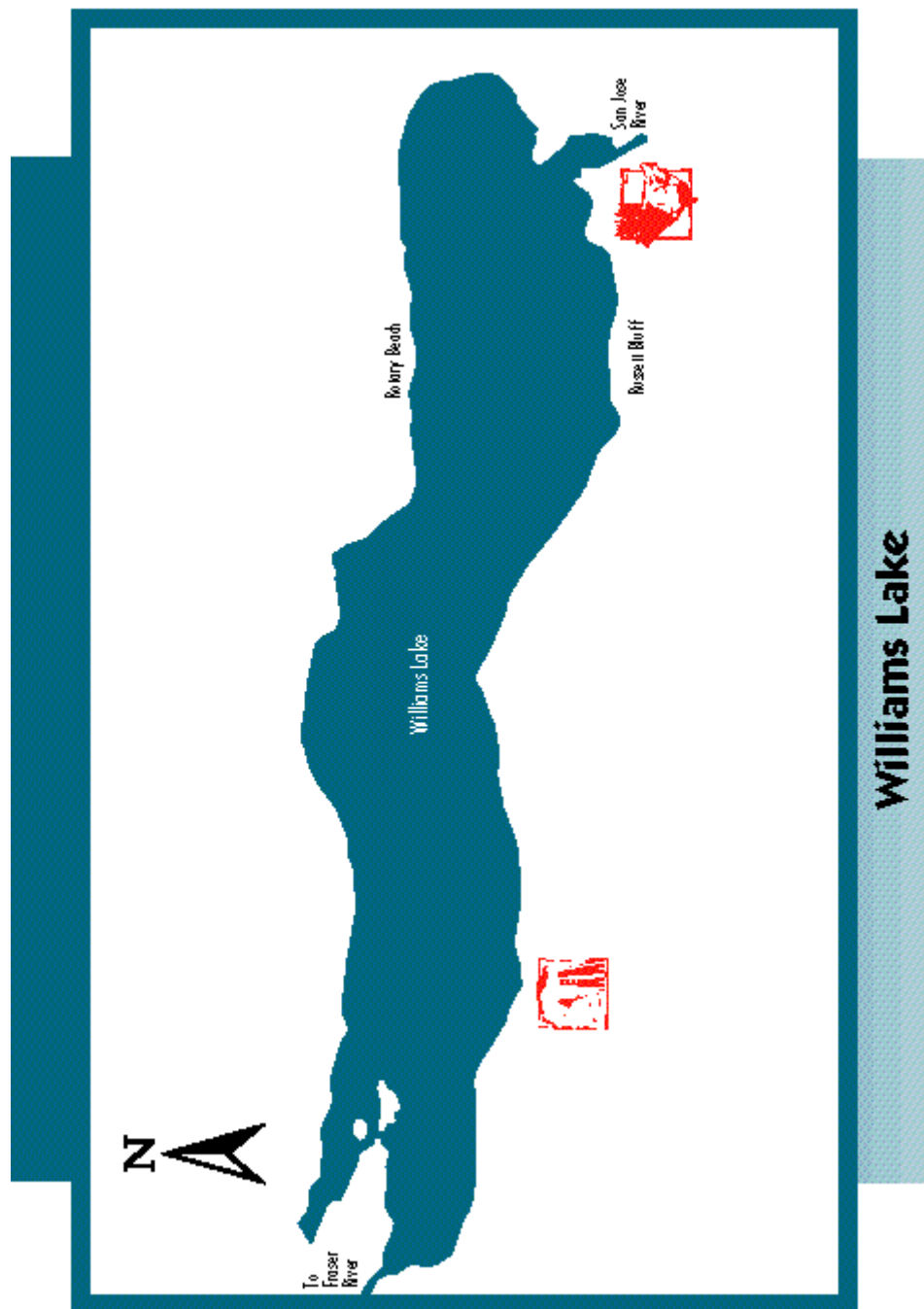
We have only one status report for this Region covering

Williams Lake.

If you have any questions on the status report or would like more information on other waterbodies in the Region, please contact:

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## Williams Lake

### Williams Lake

#### What is the general state of water quality?

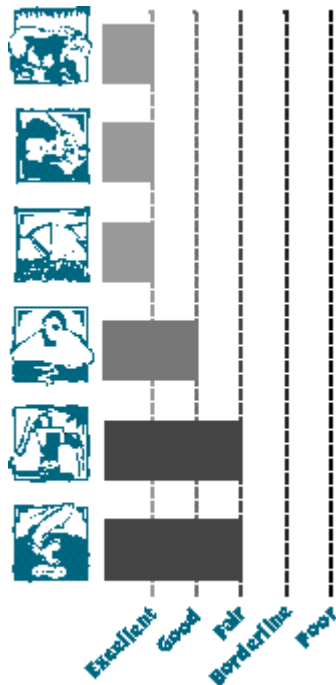
Williams Lake water quality is borderline (index = 55) which means it is in need of improvement. Dissolved oxygen, phosphorus, growth of algae, and water clarity at times do not meet acceptable levels. Steps have been taken to address these problems, which are

#### What are the main attributes of Williams Lake?

Williams Lake, which drains to the Fraser River south of Prince George, is important for aquatic life and recreation and, to some extent, as a source of drinking water for residents.

partly natural in origin.

## Borderline



## What are the potential sources of contamination?

These include the San Jose River, the main tributary which is affected by runoff from cattle ranches and, to a lesser extent, residential septic systems around the lake. In addition, the sediments on the bottom of the lake release phosphorus to the lake.

## Which objectives have been set?

Those for fecal coliforms, turbidity, the growth of algae, dissolved oxygen, phosphorus, and water clarity. The objectives were set for those characteristics that relate to agriculture and septic tanks.

## What are the main uses of the lake?

Uses include drinking (assuming water will be disinfected), recreation such as swimming, irrigation, livestock watering, and use by aquatic life and wildlife.

## Which objectives were not met?

The objectives for all characteristics, except fecal coliforms, were not met to varying degrees from 1987 to 1993. These results reflect the eutrophic nature of the lake, that is its tendency to produce excessive growth of algae. This condition likely existed to some degree under natural conditions, prior to human settlement.

## What does it mean to not meet these objectives?

Fecal coliform levels near the beaches are suitable for swimming, but are sometimes higher than acceptable for drinking water. Drinking water users should therefore ensure that their treatment systems are working properly. Low dissolved oxygen values at depth mean that fish would have a reduced habitat area in the lake at certain times of year.

## Why is the general state worse than any use rating?

The general state reflects the eutrophic nature of the lake.

## What will be done to improve matters?

Ranchers in the San Jose watershed are generally in compliance with the Agricultural Waste Control Regulation and have improved their management practices to reduce phosphorus going to Williams Lake. Further improvements are expected. The municipality is being encouraged to extend sewer systems around the lake and control runoff for future subdivision developments. Residents living near the lake should maintain their septic tank systems and minimize fertilizer runoff.



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Fraser River Middle Arm	Seymour Lake

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