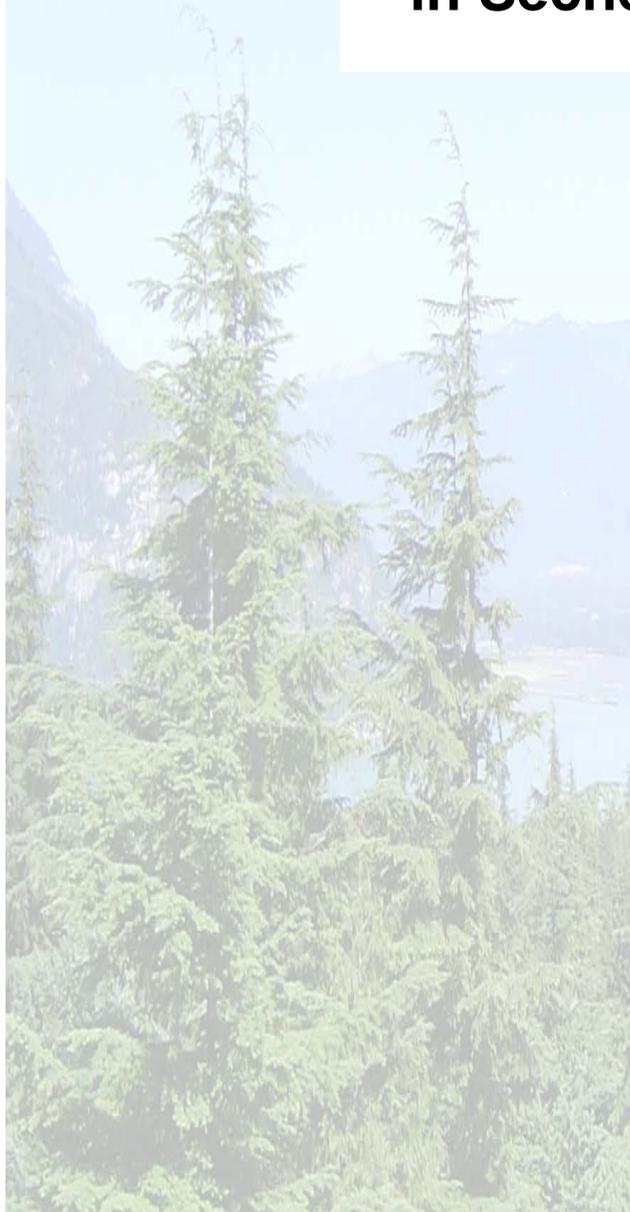




Ministry of Water, Land & Air Protection

LOWER MAINLAND REGION

Water Quality Objectives Attainment Monitoring in Sechelt Inlet in 2002



Prepared by:

Jennifer Bull
Environmental Quality Section
Ministry of Water, Land & Air Protection
Lower Mainland Region
Surrey, B.C.

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ENVIRONMENTAL QUALITY

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Southern Sechelt Inlet

**Prepared by: Jennifer Bull
Environmental Quality Section
Environmental Protection Division
Lower Mainland Region
British Columbia Ministry of Water, Land and Air Protection**

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PREFACE

Water Quality Objectives and Attainment Monitoring

Water quality objectives are established in British Columbia for water bodies on a site-specific basis and are set to protect the most sensitive designated water uses at a specific location. Objectives are prepared for those water bodies and water quality measurements that may be affected by human activity currently, or in the future.

Attainment monitoring and reporting is conducted to check whether the objectives are being met, and is important for preparing waste management plans, issuing permits, licenses and orders, as well as for regulating water uses. Monitoring usually takes place at a critical time, during a five-week period, when water quality objectives may not be met. This will generally represent the 'worst case scenario' for the water uses in question, which will ensure that they will be protected at other times when the threat to water quality is lower.

Water Quality Index

A water quality index was developed by the Canadian Council of Ministers of the Environment (CCME) in 1999 to reflect the overall and ongoing condition of water bodies. The index is based on a formula developed by the BC Ministry of Environment, Lands and Parks (MOELP, 1995), with a few modifications. The index can be used to assess water quality relative to its desirable state (as defined by the water quality objectives) and to provide insight into the degree to which water quality is affected by human activity. The index is also useful for ranking the suitability of water for use by humans and aquatic life.

The index is founded on three factors involving the measurement of the attainment of water quality objectives. The factors measure the number of objectives not met (scope), the frequency with which objectives are not met (frequency), and the maximum amount by which objectives are not met (amplitude). The index then ranks water quality into one of five categories: excellent, good, fair, marginal, and poor.

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SUMMARY

This report presents the results of monitoring undertaken in 2002 to check the attainment of Sechelt Inlet water quality objectives that were set in 1993. Objectives have not been monitored since 1994. The CCME Water Quality Index was also determined for Sechelt Inlet using 2002 results.

Bacteriological indicators, including fecal coliforms, enterococci, and *Pseudomonas aeruginosa* (*P. aeruginosa*), were monitored over a two-week period at five selected locations in southern Sechelt Inlet and Porpoise Bay. Water quality measures included dissolved oxygen, suspended solids, ammonia, nitrate, nitrite, and trace metals (copper, lead, and zinc). Sediment was sampled at four locations and analyzed for trace metals and polycyclic aromatic hydrocarbons (PAHs). Mussel tissue was also analyzed for copper, lead, and zinc at one location.

Objectives for fecal coliforms were met on all dates in 2002 in Sechelt Inlet and Porpoise Bay. Objectives for enterococci and *P. aeruginosa* were met at all locations, except 'beside the Government wharf' which yielded results that were two and six times higher, respectively, than the stated objectives. There has not been a significant change in fecal coliform and enterococci levels in Sechelt Inlet since 1994, although conditions may be slightly deteriorating in Porpoise Bay, particularly near the Government wharf.

Objectives for both ammonia-N and dissolved oxygen were met for Porpoise Bay, and Sechelt Inlet, on all dates sampled in 2002. These conditions were similar to 1993 and 1994 conditions. Objectives for suspended solids were also met in Porpoise Bay, which signals a significant improvement compared to 1993 and 1994. Trace metal concentrations in Sechelt Inlet and Porpoise Bay were low in 2002, with objectives being met for copper, lead, and zinc. This was a significant improvement compared to 1993 and 1994. Concentrations of lead in sampled mussel tissue were also well below the stated objective. Preliminary sediment analysis indicated that provincial criteria for key polycyclic aromatic hydrocarbons (PAHs) were met at the only location sampled in 2002. The Water Quality Index rating for Sechelt Inlet was Excellent in 2002, indicating that water uses are adequately protected and suitable for primary contact recreation and aquatic life.

There appears to be a significant improvement in suspended solid and trace metal concentrations compared to previous years sampled, while ammonia and dissolved oxygen results have remained relatively constant. It is recognized, however, that the number of measurements taken are somewhat limited. Recommendations include further monitoring of bacteriological indicators, particularly near the Government wharf area and in tissues, as results indicate a possible deterioration in sanitary conditions compared to 1993 and 1994. Bacterial levels should also continue to be monitored at Porpoise Bay Provincial Park beach to ensure protection of human health.

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1.0 Introduction

In 1993, water quality objectives for south Sechelt Inlet were set because resource managers, local authorities, and the public agreed that priority should be given to protecting the area's water quality for sensitive designated marine uses such as aquatic life and recreation (MOELP, 1993a).

In southern Sechelt Inlet, and particularly Porpoise Bay, bacteriological contamination is of primary concern due to limited flushing and continued existence or expansion of marinas, wharves, boating, and residential development (MOELP, 1993a). Monitoring of biological indicators is important to protect the most sensitive designated uses such as primary-contact recreation and shellfish harvesting, which remains closed due to sanitary concerns. Important bacteriological indicators include fecal coliforms, enterococci, and *Pseudomonas aeruginosa* (*P. aeruginosa*). While fecal coliforms have historically been used as the primary indicators, *Escherichia coli* (*E. coli*) and enterococci are considered to be better indicators of gastrointestinal disease (MEP, 1988b). Furthermore, presence of enterococci are a better indicator in marine waters where *E. coli* do not survive well (MEP, 1988a). *P. aeruginosa* correlates well with ear and skin infections and thus is also important to monitor (MEP, 1988b).

Other important water quality parameters in Sechelt Inlet include ammonia, dissolved oxygen, suspended solids, copper, lead, and zinc. There is the potential for nutrient input from human activities to these marine waters, and ammonia is of particular concern due to its toxicity to aquatic organisms, particularly fish, at higher concentrations. Dissolved oxygen is essential for respiration by most aquatic organisms and thus is an important environmental indicator. Suspended solids are of concern as they contribute to turbidity and can smother fish spawning grounds, as well as benthic macroinvertebrate habitat, upon settling. Suspended solids are also a concern as they can be associated with other contaminants such as metals and polycyclic aromatic hydrocarbons (PAHs). The main source of suspended solids in Sechelt Inlet has been identified as coming from tributaries draining steep slopes, particularly those intersecting logged areas (MOELP, 1993a). Aquatic life is particularly sensitive to trace metals, which have also been identified as a concern in Sechelt Inlet. Potential marine sources include antifouling paints (copper, lead), galvanized materials (zinc), and historical fuel additives (lead) (MOELP, 1993a).

Objectives for bacteriological indicators, ammonia, dissolved oxygen, suspended solids, copper, lead, and zinc were first set and checked in Sechelt Inlet and Porpoise Bay in 1993 (MOELP, 1993b). They were subsequently only checked once more in 1994 (MOELP, 1994). Objectives for fecal coliforms and enterococci were met for Sechelt Inlet and Porpoise Bay in both 1993 and 1994. *P. aeruginosa* levels were not checked in either year, even though objectives had been set. Objectives for ammonia and dissolved oxygen were also met, although dissolved oxygen was only measured in 1994. Objectives for suspended solids were exceeded in Porpoise Bay in both years, when southern Sechelt Inlet was used as a control. Objectives for copper, lead, and zinc were also exceeded in Porpoise Bay in both years, with a few exceptions (see Table 4). For instance, only maximum objectives were exceeded for copper in both years. Objectives for sediments were not monitored in 1993 or 1994 and fish tissue results for lead were

inconclusive. As objectives had not been checked in Sechelt Inlet since 1994, it was a priority to monitor these environmental indicators in 2002. The CCME Water Quality Index was also determined for Sechelt Inlet in 2002, which rates water quality based on objective attainment results.

2.0 Overview of the Study Area

2.1 Location

Sechelt Inlet is located on the Lower Mainland Coast, approximately 80 km northwest of Vancouver. The monitoring effort focused on the southern portion of Sechelt Inlet and Porpoise Bay near Sechelt (see Figure 1 in Appendix).

2.2 Hydrology and Oceanography

The Sechelt Inlet watershed is approximately 1500 km², with an annual precipitation of 1100 mm at Porpoise Bay. Freshwater discharges are influenced primarily by coastal rainfall patterns, with the highest stream flows occurring in the winter when rainfall is heaviest (MOELP, 1993a). A peak discharge may also occur in late spring in streams fed by snowmelt. The low flow period occurs from July to September (MOELP, 1993a). While most tributaries to Sechelt Inlet are small, with large seasonal variation in runoff, flash-flooding and muddy flows may occur (MOELP, 1993a). Average annual freshwater discharge into the system from all sources is approximately 110 m³/s which has little effect on overall flushing of the system (MOELP, 1993a).

Sechelt Inlet is a typical fjord, with a shallow entrance sill at Skookumchuck Narrows, long and narrow channels, and deep basins. The Inlet volume is estimated at 14 billion m³ at average tides, where water exchange from the system is limited by the entrance sill to approximately 3% of the inlet's volume over an average tidal cycle (MOELP, 1993a). Tidal currents within the inlet are weak and average tidal ranges are relatively small. The southern portion of Sechelt Inlet, and particularly Porpoise Bay, has relatively poor water circulation and exchange, making this area sensitive to water quality impacts (MOELP, 1993a).

2.3 Water Uses

The marine waters in Sechelt Inlet sustain important fisheries and recreational resources. In southern Sechelt Inlet, freshwater fisheries habitat is limited to tributaries near the head of Porpoise Bay due to steep topography, confined channels, and fast flows (MOELP, 1993a). The main fish-bearing streams in this area are Angus, Gray, and Carlson Creeks, where chum salmon are the main species, followed by pink, coho, sockeye, and chinook (MOELP, 1993a).

Recreational fishing was open to wild chinook, chum, pink, and sockeye salmon in Sechelt Inlet in 2002, but not to wild coho (DFO, 2002). A locally important recreational herring fishery in Sechelt Inlet was reported in 1993, with spawning and rearing habitat in Porpoise Bay, and this fishery is still in existence. Porpoise Bay was closed to shellfish

harvesting in 1993 due to sewage contamination (MOELP, 1993a), and this closure continues due to sanitary concerns (DFO, 2002). Mariculture remains important in Sechelt Inlet, with five fish farms located in central Sechelt Inlet and Salmon Inlet, as well as a fish farm hatchery in the southern portion of the Inlet (MAFF, 2002a). There are also seven shellfish farms currently operating in Sechelt Inlet; two in the northern and five in the southern portion, north of Porpoise Bay (MAFF, 2002b).

The area is also important for recreation such as boating and swimming. Porpoise Bay Provincial Park, located beside Angus Creek, contains a popular beach and swimming area. There is also an estuary located in the park that is home to many shore birds.

3.0 Potential Sources of Contamination

There is the potential for several point and non-point sources of water contamination into Sechelt Inlet. Potential point source waste discharges include single residential sewage disposal, community sewage treatment systems and sanitary landfills, and various industrial effluent discharges (MOELP, 1993a). Figure 2 shows the residential build-up on the west side of Porpoise Bay. A major municipal storm sewer, discharging into Porpoise Bay, was also reported in 1993, leading to possible stormwater discharge concerns (MOELP, 1993a).



Figure 2 Residential area on west side of Porpoise Bay

There are currently two permit-holders that discharge effluents into or near Sechelt Inlet. A waste permit for the Scanmar Seafoods Ltd. Hatchery at Gray Creek authorizes a discharge of 10 000 m³/day (annual average), or 48 000 m³/day maximum, of treated effluent into Sechelt Inlet via a submerged outfall. The second waste permit authorizes L.

& H. Swanson Ltd. to discharge effluent from a gravel wash plant and ready-mix trucks to land via a settling pond, with no positive discharge. The gravel company is located near Burnet Creek at Porpoise Bay, and the potential for contamination of water quality in Sechelt Inlet is unknown. There is, however, anecdotal evidence of previous impacts to the Inlet's benthic environment by other gravel operations. Figure 3 shows the proximity of the gravel pit to the marine environment on the east side of Porpoise Bay in Sechelt Inlet.



Figure 3 Industrial gravel pit and clearcuts on east side of Porpoise Bay

Potential non-point sources of water quality contamination include sewage discharges from marinas, boats, and seepage from residential septic fields (MOELP, 1993a). Mariculture operations, logging debris from logged watersheds, and upland runoff may also be potential sources of contamination.

4.0 Methodology

In 2002, monitoring locations for bacteriological and water quality indicators included South Sechelt Inlet (E218926; see cover) and two locations in Porpoise Bay; Southeast of Poise Island (E207599) and 50m from the Government wharf (E218927, see Figure 4). Additional bacteriological monitoring was also conducted from a dock 'beside the Government wharf' (see Figure 5) and at the Porpoise Bay Provincial Park beach area. Figure 1 in the Appendix shows these sampling locations. Sampling dates in 2002 included August 28 and 29, and September 4, 5, and 11. Bacteriological indicators monitored included fecal coliform, enterococci, and *P. aeruginosa*. Water quality measures included suspended solids, ammonia, nitrate, nitrite, and trace metals.

Sampling was done during flood tides on August 28, 29, and September 11, and during ebb tides on September 4 and 5. Field measurements including temperature, salinity, and dissolved oxygen were monitored on each date at each location. Measurements were taken at the surface and at 2 m increments with a calibrated YSI 556 MPS (Multi Probe System). Grab samples were collected at the surface at all locations, and a 3 L Van Dorn sampler was used to collect samples at additional depths at locations E218926 and E207599 (see Figure 6). Sampling quality control was addressed by including field blanks and collecting blind duplicate samples on each sampling date, except August 29 (see Tables 5 and 6). Samples were kept on ice in a cooler until their same-day delivery to CANTEST Ltd. (bacteriological samples) or overnight delivery to PSC Analytical Services (chemical samples).



Figure 4 Government wharf at Porpoise Bay (near E218927)

Sediment samples were collected from single grab samples, using a petite ponar, from all locations on September 4 and analyzed for organic carbon, phosphorus, metals, and polycyclic aromatic hydrocarbons (PAHs). Additionally, composite samples of mussels were collected, in triplicate, on September 11 at the Government Wharf, and their tissues analyzed for copper, lead, and zinc. The mussels were all between 42 and 62 mm in length. These analyses were done by PSC Analytical Services.



Figure 5 Sampling location 'beside the Government wharf' (indicated by arrow)

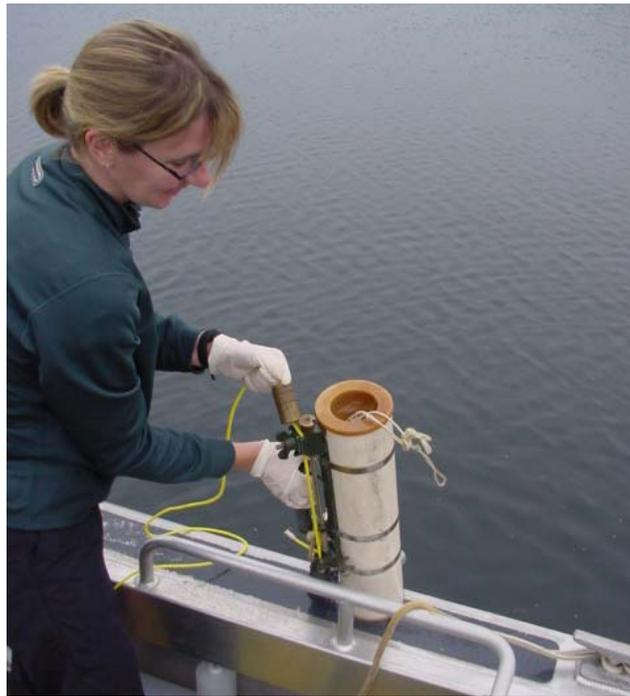


Figure 6 Operation of the Van Dorn sampler in Sechelt Inlet

5.0 Results and Data Analysis

Bacteriological, water chemistry, sediment, and mussel tissue data have been summarized in appended tables (Tables 1 to 3). Comparisons of bacteriological and water chemistry results from 1993, 1994, and 2002 are presented in Tables 4 and 5, respectively. Raw field and bacteriological data are shown in Table 6, and raw water chemistry data are shown in Table 7 of the Appendix.

The geometric mean and relevant percentiles were obtained for bacteriological results (see Table 1), with the requirement that at least five samples be collected within 30 days (MELP, 1988b). The range, average, and 80th percentiles were calculated for chemical parameters and metals, where relevant (see Table 2). For site E218927, the median for each parameter was obtained using all duplicate results, and then the result on each date that most closely approached the median was used for data analysis. This reduced bias and removed any potential outliers.

The Water Quality Index was calculated as described in CCME (2001). The factors used in the index are based on results of water quality objectives attainment and include; F_1 (Scope), the number of objectives not met; F_2 (Frequency), the frequency with which objectives are not met; and F_3 (Amplitude), the amount by which objectives are not met. Table 8 in the Appendix gives numerical ranges for the rankings and descriptions of the rankings. Since the CCME index was adapted from the BC Ministry of Environment, Lands and Parks index, the same conditions regarding data use were applied (MOELP, 1995). Some of these conditions include omitting incomplete monitoring results and using results from short-term objectives only (MOELP, 1995).

6.0 Discussion

6.1 Bacteriological Indicators

The objectives for fecal coliform and enterococci levels in Sechart Inlet are shown in Table 1, and were set based on the following international (U.S./Canada) shellfish-harvesting criteria:

- Fecal coliform - median of $\leq 14/100$ mL and a 90th percentile of $\leq 43/100$ mL
- Enterococci - median of $\leq 4/100$ mL and a 90th percentile of $\leq 11/100$ mL

Shellfish growing areas may be designated as *Approved* when the following conditions set forth in the Canadian Shellfish Sanitation Program (CSSP) Manual of Operations are met:

- The area is not contaminated with fecal material, poisonous or deleterious substances or marine biotoxins to the extent that consumption of the shellfish might be hazardous; and
- the median or geometric mean fecal coliform Most Probable Number (MPN) of the water does not exceed 14/100mL and not more than 10% pf the samples exceed a fecal coliform MPN of 43/100mL.

In contrast, objectives for Porpoise Bay were set to protect primary-contact recreation, where the criteria for fecal coliform and enterococci are geometric means of $\leq 200/100$ mL and $\leq 20/100$ mL respectively. The objective for *P. aeruginosa* levels is a 75th percentile result of $\leq 2/100$ mL for Porpoise Bay.

Objectives for fecal coliforms were met on all dates in Sechelt Inlet and Porpoise Bay in 2002, although it should be noted that samples from the 'Government wharf area' yielded a geometric mean (gm) of 162/100 mL, which is approaching the objective limit (Table 1). Objectives for enterococci were met at all locations, except the 'Government wharf area' which yielded results two times higher than the stated objective (gm = 39/100 mL; see Table 1). The same location also yielded *P. aeruginosa* results that were more than six times higher than the desired objective, with a 75th percentile result of 13/100 mL. The objective for *P. aeruginosa* was met at Porpoise Bay Park Beach and E218927 (50m from wharf).

All three bacteriological indicators were well below the objectives at Porpoise Bay Provincial Park Beach, indicating that primary-contact recreation is being protected at this swimming area. The Vancouver Coast Health Authority has also monitored fecal coliform levels at Porpoise Bay Provincial Park beach in the past, where levels have ranged from <5 to 51/100 mL in 1997, <5 to 95/100 mL in 1998, and <5 to 32/100 mL in 1999 during summer months. There have been no significant changes in fecal coliform and enterococci levels in Sechelt Inlet since 1994, although conditions may be slightly deteriorating in the Porpoise Bay area (see Table 4). The 'Government wharf area', in particular, which was not monitored earlier, yielded bacteriological results which failed to meet the objectives for the area and should be further monitored. Total monthly precipitation in Sechelt for August and September 2002 was 22 mm and 28.8 mm respectively, with 12.8 mm falling on Sept 8 and 9. The slightly higher bacterial results for Sept 11 may be a consequence of this precipitation event (see Table 6).

6.2 Water Quality Indicators

6.2.1 Ammonia

Objectives for ammonia-N in Porpoise Bay, set to protect marine life, are an average of <2.3 mg/L and maximum of 15 mg/L when pH = 7.8, salinity = 20 g/kg, and temperature = 15^oC (Table 2). These objectives were met for Porpoise Bay, and Sechelt Inlet, on all dates sampled in 2002. Ammonia levels have not significantly changed since 1993 and 1994 in Porpoise Bay, and remain relatively low (Table 5).

6.2.2 Suspended Solids

The objective for suspended solids is <10 mg/L increase over the background when the background is ≤ 100 mg/L in both Sechelt Inlet and Porpoise Bay. This objective was met and there were no increases over background levels in Porpoise Bay on all dates in 2002, when Sechelt Inlet was used as a control (Table 2). This is a significant

improvement over suspended solid concentrations in 1993 and 1994, which were up to 267 mg/L over background levels in Porpoise Bay (Table 5).

6.2.3 Dissolved Oxygen

The objective for dissolved oxygen (DO) is a minimum of 6.75 mg/L at the surface in both Sechelt Inlet and Porpoise Bay. This objective was met at all locations and dates sampled in 2002 (Table 2). While minimal DO conditions have not changed since 1994, maximal DO concentrations were 1.1 to 2.5 mg/L lower in 2002 (Table 5).

6.2.4 Trace Metals

Objectives for trace metals, which have only been set for Porpoise Bay, are

- Total copper: ≤ 2 $\mu\text{g/L}$ (30-day mean) and 3 $\mu\text{g/L}$ (maximum)
- Total lead: ≤ 2 $\mu\text{g/L}$ (30-day mean), 140 $\mu\text{g/L}$ (maximum), ≤ 3 $\mu\text{g/L}$ (80th percentile), and ≤ 0.8 $\mu\text{g/g}$ (wet weight) in fish/shellfish tissue
- Total zinc: 15 $\mu\text{g/L}$ (maximum)

Trace metal concentrations in Sechelt Inlet and Porpoise Bay were low and objectives were met for copper, lead, and zinc on all dates sampled in 2002 (Table 2). Compared to 1993 and 1994, levels of these metals have decreased significantly, indicating a general improvement in water quality in terms of trace metal contamination (see Table 5). Maximum concentrations of copper were four times higher than the objective in Porpoise Bay in 1993, and were two times higher in Sechelt Inlet in 1994. The objectives for lead were also exceeded in 1994, with average and 80th percentile concentrations ten and thirteen times higher, respectively, in Porpoise Bay. Similarly, maximum concentrations of zinc were two times higher than the objectives for Porpoise Bay in both 1993 and 1994.

Mussel tissue was also sampled from the Government wharf in 2002 (see Figure 7), and the objective for lead concentration was well below the stated criterion (Table 2). Fish tissue was sampled in both 1993 and 1994, but results for lead were indefinite, which does not allow for meaningful comparison (Table 5). Based on the lead trend in the water column, lead analysis in fish tissue may now be considered a low priority.

6.3 Sediments

While there are no objectives set for sediments in Sechelt Inlet and Porpoise Bay, objectives could be contemplated if warranted by preliminary monitoring results (MOELP, 1993a). Preliminary results for sediments sampled on September 4 are shown in Table 3, along with provincial criteria for sediments, where available. Figures 8 and 9 show the sediment samples collected from south Sechelt Inlet (E218926) and Porpoise Bay Provincial Park beach area, respectively.



Figure 7 Location of mussels used for tissue analysis at the Government wharf

Interim Sediment Quality Guidelines (ISQG – MOELP, 1998) for cadmium and copper were exceeded in Sechelt Inlet, while criteria for arsenic and cadmium were exceeded in Porpoise Bay in 2002 (Table 3). Sediment particle size distributions varied widely between all 4 monitoring sites. The deepest station, E218926, sediments had the finest particle size (over 50% clay) while sediments at the government wharf site, E218927) was predominantly sand (over 96%). Further monitoring of sediment may be warranted as sediment was only sampled once and few data are available. Results also show that provincial criteria for key polycyclic aromatic hydrocarbons (PAHs) were met at the only Porpoise Bay location sampled (E218927), although criteria for some PAHs were below the method detection limits (see Table 3).

6.4 Water Quality Index rating

The calculated CCME Water Quality Index (WQI) rating for Sechelt Inlet was Excellent (index=96) in 2002. The only objectives not met in 2002 were those for enterococci and *Pseudomonas aeruginosa* at the site 'beside the government wharf'. Thus, water uses in Sechelt Inlet can be considered to be adequately protected and suitable for primary contact recreation and aquatic life at this time.



Figure 8 Sediment sample from south Sechelt Inlet (E218926)



Figure 9 Sediment sample from Porpoise Bay Provincial Park area

7.0 Conclusions and Recommendations

As water quality objectives had not been monitored since 1994, the Ministry prioritized attainment monitoring in Sechelt Inlet and Porpoise Bay in 2002. There appears to be a significant improvement in suspended solid and trace metal concentrations compared to previous years sampled, while ammonia and dissolved oxygen results have remained relatively constant, and at acceptable levels. It is recognized, however, that the number of measurements taken are somewhat limited. The Water Quality Index rating for Sechelt Inlet was Excellent in 2002, indicating that water uses are adequately protected for primary contact recreation and aquatic life.

Based on the 2002 data, it is recommended that efforts be focused on bacteriological monitoring in Porpoise Bay, particularly near the Government wharf area, as results indicate a possible deterioration in sanitary conditions compared to 1993 and 1994. Bacteriological levels should also continue to be monitored at Porpoise Bay Provincial Park beach to ensure protection of human health. It may also be desirable to continue monitoring trace metals in sediment and tissue from fish or shellfish since data are scarce.

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Appendix

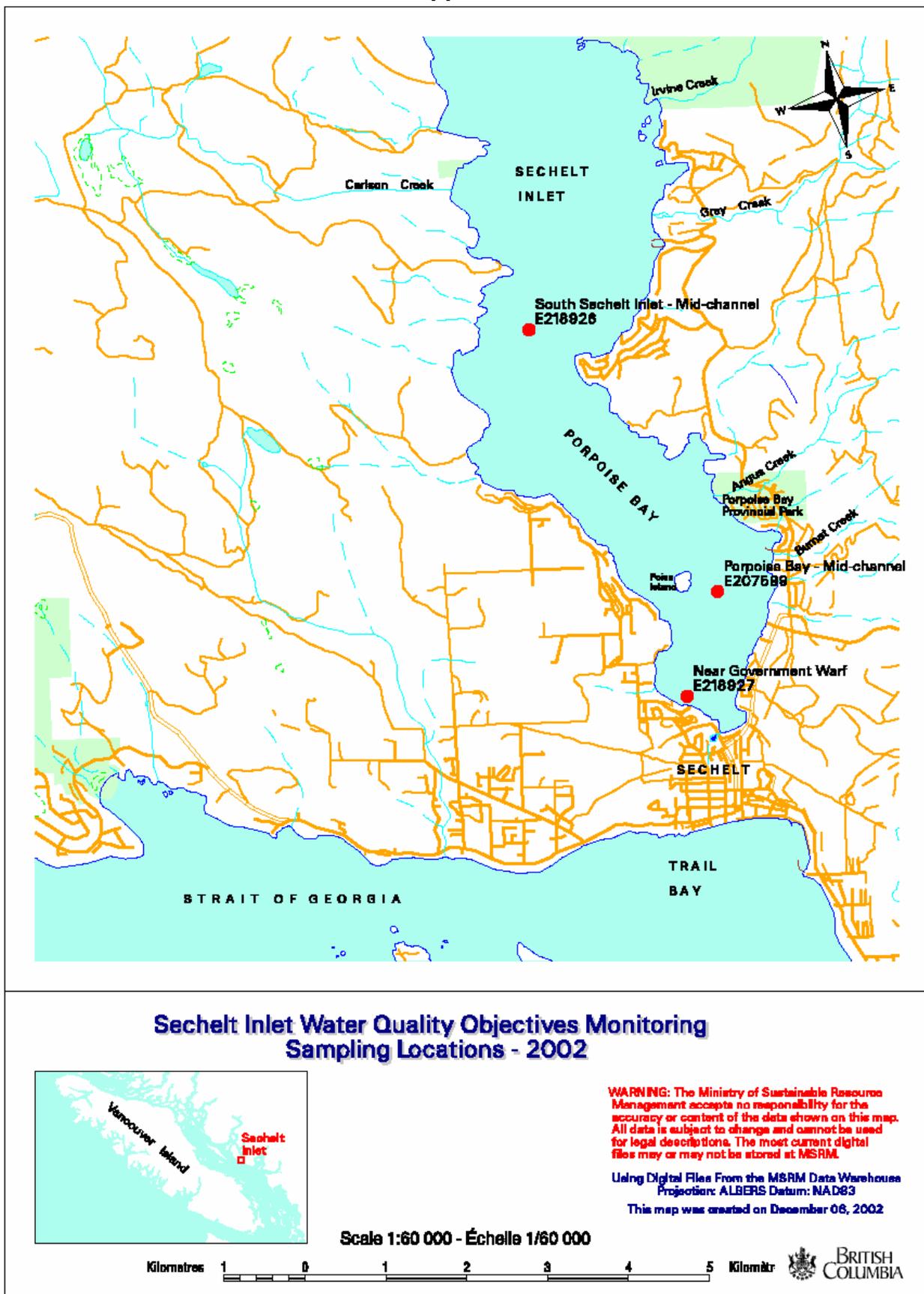


Figure 1 Sechelt Inlet sampling locations –2002

Table 1 Sechelt Inlet bacteriological objectives - 2002

Values include: ranges, medians (med), geometric means (gm), 90th percentiles (np), and 75th percentiles (75th), where applicable, and sample depths in parentheses.

Results that exceeded objectives are in bold.

Variable & Objective	Site	Date	Sample Size (n)	Value	Conclusion
Fecal Coliforms (Colonies/100 mL) ≤14/100 mL median (med) ≤43/100 mL 90 th perc (np)	Sechelt Inlet E218926 (Mid-channel S Sechelt)	Aug 28, 29 Sept 4, 5, 11	13	<1 – 66 med = <1 np = 3 (0 – 140 m)	Objectives met
Fecal Coliforms (Colonies/100 mL) ≤200/100 mL geometric mean (gm)	Porpoise Bay E207599 (south-east of Poise Island)	Aug 28, 29 Sept 4, 5, 11	15	<1 – 36 gm = 2 (0 – 24 m)	Objective met
	Porpoise Bay E218927 (50m from Gov't wharf)	Aug 28, 29 Sept 4, 5, 11	5	<1 – 110 gm = 16 (all at 0 m)	Objective met
	Beside the Gov't Wharf	Aug 28, 29 Sept 4, 5, 11	5	62 – 350 gm = 162 (all at 0 m)	Objective met
	Porpoise Bay Park Beach	Aug 28, 29 Sept 4, 5, 11	5	1 – 15 gm = 3 (all at 0 m)	Objective met
Enterococci (Colonies/100 mL) ≤4/100 mL median (med) ≤11/100 mL 90 th perc (np)	Sechelt Inlet E218926 (Mid-channel S Sechelt)	Aug 28, 29 Sept 4, 5, 11	13	<1 – 35 med = <1 np = 7 (0 – 140 m)	Objectives met
Enterococci (Colonies/100 mL) ≤20/100 mL geometric mean (gm)	Porpoise Bay E207599 (south-east of Poise Island)	Aug 28, 29 Sept 4, 5, 11	15	<1 – 14 gm = 2.5 (0 – 24 m)	Objective met
	Porpoise Bay E218927 (50m from Gov't wharf)	Aug 28, 29 Sept 4, 5, 11	5	<1 – 19 gm = 2.5 (all at 0 m)	Objective met
	Beside the Gov't Wharf	Aug 28, 29 Sept 4, 5, 11	5	14 – 150 gm = 39 (all at 0 m)	Objective not met
	Porpoise Bay Park Beach	Aug 28, 29 Sept 4, 5, 11	5	<1 – 3 gm = 1 (all at 0 m)	Objective met
Pseudomonas aeruginosa (Colonies/100 mL) ≤2/100 mL 75 th percentile	Porpoise Bay E218927 (50m from Gov't wharf)	Aug 28, 29 Sept 4, 5, 11	5	<1 75 th perc = <1 (all at 0 m)	Objective met
	Beside the Gov't Wharf	Aug 28, 29 Sept 4, 5, 11	5	<1 – 15 75th perc = 13 (all at 0 m)	Objective not met
	Porpoise Bay Park Beach	Aug 28, 29 Sept 4, 5, 11	5	<1 – 9 75 th perc = 1 (all at 0 m)	Objective met

Table 2 Sechelt Inlet water quality objectives - 2002
 Values include: ranges, averages (ave), and 80th percentiles (80th), where applicable. Results that exceeded objectives are in bold.

Variable & Objective	Site	Date	Sample Size (n)	Value	Conclusion
Ammonia-N <2.3 mg/L average 15 mg/L maximum at pH = 7.8 salinity = 20 g/kg temp = 15 ^o C	Porpoise Bay E207599 (south-east of Poise Island)	Aug 28, 29 Sept 4, 5, 11	15	<0.005 – 0.052 mg/L ave = 0.016 mg/L (0 – 24 m)	Objectives met
	Porpoise Bay E218927 (50m from Gov't wharf)	Aug 28, 29 Sept 4, 5, 11	5	<0.005 – 0.254 mg/L ave = 0.006 mg/L (all at 0m)	Objectives met
	Sechelt Inlet E218926 (Mid-channel S Sechelt)	Aug 28, 29 Sept 4, 5, 11	14	<0.005 – 0.006 mg/L ave = 0.005 mg/L (0 – 140 m)	For reference only
Suspended solids <10 mg/L increase over background when background ≤100 mg/L	Sechelt Inlet E218926 (Mid-channel S Sechelt) control for Porpoise Bay	Aug 28, 29 Sept 4, 5, 11	13	<4 – 28 mg/L (0 – 140 m)	Indefinite result (no control)
	Porpoise Bay E207599 (south-east of Poise Island)	Aug 28, 29 Sept 4, 5, 11	15	<4 – 15 mg/L no increase (0 – 24 m)	Objectives met
	Porpoise Bay E218927 (50m from Gov't wharf)	Aug 28, 29 Sept 4, 5, 11	5	<4 – 11 mg/L no increase (all at 0m)	Objectives met
Dissolved Oxygen 6.75 mg/L minimum at the surface	Sechelt Inlet E218926 (Mid-channel S Sechelt)	Aug 28, 29 Sept 4, 5, 11	5	8.3 – 9.0 mg/L	Objective met
	Porpoise Bay E207599 (south-east of Poise Island)	Aug 28, 29 Sept 4, 5, 11	5	8.3 – 8.8 mg/L	Objective met
	Porpoise Bay E218927 (50m from Gov't wharf)	Aug 28, 29 Sept 4, 5, 11	5	7.9 – 9.1 mg/L	Objective met
	Porpoise Bay Park Beach	Aug 28, 29 Sept 4, 5, 11	5	8.2 – 9.2 mg/L	Objective met
Total Copper (Cu) ≤2 µg/L average 3 µg/L maximum	Sechelt Inlet E218926 (Mid-channel S Sechelt)	Aug 28, 29 Sept 4, 5, 11	4	0.2 – 0.4 µg/L ave = 0.28 µg/L	Objective met
	Porpoise Bay E207599 (south-east of Poise Island)	Aug 28, 29 Sept 4, 5, 11	5	0.2 – 0.3 µg/L ave = 0.28 µg/L	Objective met
	Porpoise Bay E218927 (50m from Gov't wharf)	Aug 28, 29 Sept 4, 5, 11	5	0.3 – 0.4 µg/L ave = 0.34 µg/L	Objective met
Mussel tissue (no criteria available)	At Gov't wharf	Sept 11	3	0.9 – 1.3 µg/g	For reference purposes
Total Lead (Pb) ≤2 µg/L average 140 µg/L maximum ≤3 µg/L (80 th percentile)	Sechelt Inlet E218926 (Mid-channel S Sechelt)	Aug 28, 29 Sept 4, 5, 11	4	<0.1 – 0.1 µg/L ave = 0.1 µg/L 80 th perc = 0.1 µg/L (all at 0m)	Objectives met
	Porpoise Bay E207599 (south-east of Poise Island)	Aug 28, 29 Sept 4, 5, 11	5	<0.1 – 0.1 µg/L ave = 0.1 µg/L 80 th perc = 0.1 µg/L (all at 0m)	Objectives met

Variable & Objective	Site	Date	Sample Size (n)	Value	Conclusion
	Porpoise Bay E218927 (50m from Gov't wharf)	Aug 28, 29 Sept 4, 5, 11	5	<0.1 – 0.3 µg/L ave = 0.1 µg/L 80 th perc = 0.1 µg/L (all at 0m)	Objectives met
Mussel tissue ≤0.8 µg/g (wet weight in tissue)	At Gov't wharf	Sept 11	3	0.1 – 0.2 µg/g	Objective met
Total Zinc (Zn) 15 µg/L maximum	Sechelt Inlet E218926 (Mid-channel S Sechelt)	Aug 28, 29 Sept 4, 5, 11	4	<1 – 1 µg/L (all at 0m)	Objective met
	Porpoise Bay E207599 (south-east of Poise Island)	Aug 28, 29 Sept 4, 5, 11	5	<1 - 2 µg/L (all at 0m)	Objective met
	Porpoise Bay E218927 (50m from Gov't wharf)	Aug 28, 29 Sept 4, 5, 11	5	<1 - 1 µg/L (all at 0m)	Objective met
Mussel tissue (no criteria available)	At Gov't wharf	Sept 11	3	20.7 – 23.8 µg/g	For reference purposes

Table 3 Sechelt Inlet sediment analysis – 2002

Sediment criteria are included where available (see text box below table for definitions). Results that exceeded criteria are in bold.

Variable & Provincial Criteria (if available)	Sechelt Inlet E218926 (Mid-channel S Sechelt)	Porpoise Bay E207599 (south-east of Poise Island)	Porpoise Bay E218927 (50m from Gov't wharf)	Porpoise Bay Park Beach
Physical distribution (% w/w)				
>2.00 mm (gravel)	0	0	0.11	7.94
<2.00 & >0.063 mm (sand)	16.19	40.48	96.88	87.03
<0.063 & >0.004 mm (silt)	31.35	49.41	1.72	3.29
<0.004 mm (clay)	52.46	10.11	1.30	1.74
Carbon (µg/g)				
Total carbon	44 000	25 000	18 000	12 000
Organic carbon	43 000	25 000	18 000	12 000
Inorganic carbon	580	<500	<500	<500
Phosphorus (µg/g)				
Total phosphorus	434	794	246	266
Metals (µg/g)				
Aluminum	8620	6380	2590	3520
Antimony	1	0.4	<0.1	0.1
Arsenic 7.2 µg/g ISQG ¹	6.5	9.8	3	2.2
Barium	25.5	24.3	10.1	14.6
Beryllium	0.2	<0.1	<0.1	<0.1
Bismuth	<0.1	<0.1	<0.1	<0.1
Cadmium 0.68 µg/g interim TEL ²	1.08	3.32	0.87	0.43
Calcium	2790	3900	1420	3200
Chromium 52 µg/g ISQG ¹	11.7	12.8	3	4.7
Cobalt	3.9	2.1	0.9	1.7
Copper 19 µg/g ISQG ¹	26.4	18.3	4	4.4
Iron	6030	6570	2870	4300
Lead 30 µg/g ISQG ¹	5.4	4.2	1.1	1.2
Magnesium	5190	4330	1510	2180
Manganese	145	91.5	46.9	78.5
Molybdenum	3.6	4.9	0.7	0.2
Nickel 30 µg/g effects range low ³	13.3	8.4	1.9	3
Potassium	1820	1070	386	521
Selenium ≤2.0 µg/g mean ⁴	1.9	1.3	<0.5	<0.5
Silver 1.0 µg/g effects range low ³	0.21	0.15	<0.05	<0.05
Sodium	22500	12400	2760	2660
Strontium	40	35	12.9	30.9
Tellurium	0.3	<0.1	<0.1	<0.1
Thallium	0.14	0.18	0.15	0.15
Tin	0.2	0.5	<0.1	<0.1
Titanium	228	254	79	152
Vanadium	32	14	4	10
Zinc <0.01 µg/g	40.4	43.9	11.8	14.6

Variable & Provincial Criteria (if available)	Sechelt Inlet E218926 (Mid-channel S Sechelt)	Porpoise Bay E207599 (south-east of Poise Island)	Porpoise Bay E218927 (50m from Gov't wharf)	Porpoise Bay Park Beach
Zirconium	0.7	0.9	<0.5	<0.5
Polycyclic aromatic hydrocarbons (PAHs) (µg/g)				
Acenaphthene ≤0.15 µg/g ⁴			<0.01 µg/g	
Acenaphthylene 0.006 µg/g ISQG ¹			<0.01 µg/g	
Anthracene 0.047 µg/g ISQG ¹			<0.01 µg/g	
Benzo(a)anthracene 0.075 µg/g ISQG ¹			<0.01 µg/g	
Benzo(b)fluoranthene			<0.01 µg/g	
Benzo(k)fluoranthene			<0.01 µg/g	
Benzo(g,h,i)perylene 0.31 µg/g no adverse effect ⁵			<0.02 µg/g	
Benzo[a]pyrene ≤0.06 µg/g ⁴			<0.01 µg/g	
Chrysene ≤0.2 µg/g ⁴			<0.01 µg/g	
Dibenz(a,h)anthracene 0.006 µg/g ISQG ¹			<0.02 µg/g	
Fluoranthene 0.113 µg/g ISQG ¹			<0.01 µg/g	
Fluorene ≤0.2 µg/g ⁴			<0.01 µg/g	
Indeno(1,2,3-c,d)pyrene 0.34 µg/g no adverse effect ⁵			<0.02 µg/g	
Naphthalene ≤0.01 µg/g ⁴			<0.01 µg/g	
Phenanthrene 0.087 µg/g ISQG ¹			<0.01 µg/g	
Pyrene 0.153 µg/g ISQG ¹			<0.01 µg/g	
Total PAHs			<0.01 µg/g	
Total Low MW PAHs 3.7 µg/g no adverse effect ⁵			<0.01 µg/g	
Total High MW PAHs 9.6 µg/g no adverse effect ⁵			<0.01 µg/g	

¹ ISQG = Interim Sediment Quality Guideline (MOELP, 1998)

² TEL = Interim Threshold Effect Level (MOELP, 1998)

³ effects range low, based on National Status and Trends Program Approach (NSTPA) (MOELP, 1998)

⁴ BC Ministry of Water, Land and Air Protection guidelines (<http://wlapwww.gov.bc.ca/wat/wq/BCguidelines>)

⁵ no adverse effect on biota (MOELP, 1998)

Table 4 Comparison of Sechelt Inlet bacteriological objectives in 1993, 1994, and 2002

Values include: ranges, medians (med), geometric means (gm), 90th percentiles (np), and 75th percentiles (75th) where applicable. Results that exceeded objectives are in bold.

Variable & Objective	Site	1993 (Aug 12-Sept 15)	1994 (Jul 28-Aug 22)	2002 (Aug 28-Sept 11)	Conclusion
Fecal Coliforms ≤14/100 mL median (med) ≤43/100 mL 90 th perc (np)	Sechelt Inlet E218926 (Mid-channel S Sechelt)	<1 – 3/100 mL med = <1/100 mL np = 2/100 mL (1 – 30 m)	0 – 2/100 mL med = 0/100 mL np = 1/100 mL (1 – 30 m)	<1 – 66/100 mL med = <1/100 mL np = 3/100 mL (0 – 140 m)	No significant change
Fecal Coliforms ≤200/100 mL geometric mean (gm)	Porpoise Bay E207599 (south-east of Poise Island)	<1 – 1/100 mL gm = <1/100 mL (1 – 29 m)	0 – 2/100 mL gm = <1/100 mL (all at 0 m)	<1 – 36/100 mL gm = 2/100 mL (0 – 24 m)	No significant change
	Porpoise Bay E218927 (50m from Gov't wharf)	<1 – 14/100 mL gm = 2/100 mL (1 - 11 m)	0 – 28/100 mL gm = <4/100 mL (all at 0 m)	<1 – 110/100 mL gm = 16/100 mL (all at 0 m)	Condition slightly worse
	Beside the Gov't Wharf	Not sampled	Not sampled	62 – 350/100 mL gm = 162/100 mL (all at 0 m)	Further monitoring needed
	Porpoise Bay Park Beach	Not sampled	Not sampled	1 – 15/100 mL gm = 3/100 mL (all at 0 m)	Condition good
Enterococci ≤4/100 mL median (med) ≤11/100 mL 90 th perc (np)	Sechelt Inlet E218926 (Mid-channel S Sechelt)	all <1/100 mL np = <1/100 mL (1 – 30 m)	0 – 14/100 mL med = 0/100 mL np = 7/100 mL (all at 0 m)	<1 – 35/100 mL med = <1/100 mL np = 7/100 mL (0 – 140 m)	No significant change
Enterococci ≤20/100 mL geometric mean (gm)	Porpoise Bay E207599 (south-east of Poise Island)	<1 – 1/100 mL gm = <1/100 mL (1 – 29 m)	0 – 2/100 mL gm = <1/100 mL (all at 0 m)	<1 – 14/100 mL gm = 2.5/100 mL (0 – 24 m)	Condition slightly worse
	Porpoise Bay E218927 (50m from Gov't wharf)	<1 – 8/100 mL gm = 2/100 mL (1 – 11 m)	0 – 4/100 mL gm = <1/100 mL (all at 0 m)	<1 – 19/100 mL gm = 2.5/100 mL (all at 0 m)	No significant change
	Beside the Gov't Wharf	Not sampled	Not sampled	14 – 150/100 mL gm = 39/100 mL (all at 0 m)	Further monitoring needed
	Porpoise Bay Park Beach	Not sampled	Not sampled	<1 – 3/100 mL gm = 1/100 mL (all at 0 m)	Condition good
Pseudomonas aeruginosa ≤2/100 mL 75 th percentile	Porpoise Bay E218927 (50m from Gov't wharf)	No data collected	No data collected	<1/100 mL 75 th = <1/100 mL (all at 0 m)	Condition good
	Beside the Gov't Wharf	Not sampled	Not sampled	<1 – 15/100 mL 75th = 13/100 mL (all at 0 m)	Further monitoring needed
	Porpoise Bay Park Beach	Not sampled	Not sampled	<1 – 9/100 mL 75 th = 1/100 mL (all at 0 m)	Condition adequate

Table 5 Comparison of Sechelt Inlet water quality objectives in 1993, 1994, and 2002

Values include: ranges, averages (ave), and 80th percentiles (80th), where applicable. Results that exceeded objectives are in bold.

Variable & Objective	Site	1993 (Aug 12-Sept 15)	1994 (Jul 28-Aug 22)	2002 (Aug 28-Sept 11)	Conclusion
Ammonia-N <2.3 mg/L average 15 mg/L maximum at pH = 7.8 salinity = 20 g/kg temp = 15°C	Porpoise Bay E207599 (south-east of Poise Island)	<0.005 – 0.006 mg/L ave <0.005 mg/L (1 – 29 m)	<0.005 – 0.016 mg/L ave = 0.007 mg/L (1 – 30 m)	<0.005 – 0.052 mg/L ave = 0.016 mg/L (0 – 24 m)	No significant increase
	Porpoise Bay E218927 (50m from Gov't wharf)	<0.005 – 0.028 mg/L ave = 0.009 mg/L (1 – 11 m)	<0.005 – 0.045 mg/L ave = 0.013 mg/L (1 – 5 m)	<0.005 – 0.254 mg/L ave = 0.006 mg/L (all at 0m)	No change
	Sechelt Inlet E218926 (Mid-channel S Sechelt)	Not sampled/reported	<0.005 – 0.015 mg/L ave = 0.007 mg/L (1 – 30 m)	<0.005 – 0.006 mg/L ave = 0.005 mg/L (0 – 140 m)	For reference only (no change)
Suspended solids <10 mg/L increase over background when background ≤100 mg/L	Sechelt Inlet E218926 (Mid-channel S Sechelt) <i>control for Porpoise Bay</i>	<4 – 12 mg/L (1 – 30 m)	14 – 56 mg/L (1 – 30 m)	<4 – 28 mg/L (0 – 140 m)	No change
	Porpoise Bay E207599 (south-east of Poise Island)	4 – 274 mg/L (1 – 27 m) max increase = 267 mg/L (Sept 2, 29 m)	13 – 200 mg/L (1 – 30 m) max increase = 183 mg/L (Aug, 30 m)	<4 – 15 mg/L (0 – 24 m) no increase	Conditions improving
	Porpoise Bay E218927 (50m from Gov't wharf)	4 – 52 mg/L (1 – 11 m) max increase = 42 mg/L (Sept, 6- 11 m)	12 – 40 mg/L (1 – 11 m) max increase = 8 mg/L	<4 – 11 mg/L (all at 0m) no increase	Conditions improving
Dissolved Oxygen 6.75 mg/L minimum at the surface	Sechelt Inlet E218926 (Mid-channel S Sechelt)	No data collected	7.9 – 11.0 mg/L	8.3 – 9.0 mg/L	Condition slightly worse (maximum)
	Porpoise Bay E207599 (south-east of Poise Island)	No data collected	8.1 – 11.3 mg/L	8.3 – 8.8 mg/L	Condition slightly worse (maximum)
	Porpoise Bay E218927 (50m from Gov't wharf)	No data collected	7.5 – 10.2 mg/L	7.9 – 9.1 mg/L	Condition slightly worse (maximum)
	Porpoise Bay Park Beach	No data collected	No data collected	8.2 – 9.2 mg/L	Condition good
Total Copper (Cu) ≤2 µg/L average 3 µg/L maximum	Sechelt Inlet E218926 (Mid-channel S Sechelt)	No data collected	<1 – 7 µg/L ave = 2 µg/L	0.2 – 0.4 µg/L ave = 0.28 µg/L	Conditions improving
	Porpoise Bay E207599 (south-east of Poise Island)	No data collected	No data collected	0.2 – 0.3 µg/L ave = 0.28 µg/L	Condition good
	Porpoise Bay E218927 (50m from Gov't wharf)	<1 – 13 µg/L ave = 3 µg/L	<1 – 3 µg/L ave = 1 µg/L	0.3 – 0.4 µg/L ave = 0.34 µg/L	Conditions improving
Mussel tissue (no criteria available)	At Gov't wharf	No data collected	No data collected	0.9 – 1.3 µg/g	For reference purposes

Variable & Objective	Site	1993 (Aug 12-Sept 15)	1994 (Jul 28-Aug 22)	2002 (Aug 28-Sept 11)	Conclusion
Total Lead (Pb) ≤2 µg/L average 140 µg/L maximum ≤3 µg/L (80 th percentile)	Sechelt Inlet E218926 (Mid-channel S Sechelt)	No data collected	No data collected	<0.1 – 0.1 µg/L ave = 0.1 µg/L 80 th = 0.1 µg/L (all at 0m)	Condition good
	Porpoise Bay E207599 (south-east of Poise Island)	No data collected	No data collected	<0.1 – 0.1 µg/L ave = 0.1 µg/L 80 th = 0.1 µg/L (all at 0m)	Condition good
	Porpoise Bay E218927 (50m from Gov't wharf)	<1 – 11 µg/L ave = 2 µg/L 80 th = 2.5 µg/L (1 – 11 m)	5 – 47 µg/L ave = 21 µg/L 80th = 41 µg/L (1 – 5 m)	<0.1 – 0.3 µg/L ave = 0.1 µg/L 80 th = 0.1 µg/L (all at 0m)	Conditions improving
≤0.8 µg/g (wet weight in tissue)	At Gov't wharf	<2 µg/g (fish tissue) Indefinite result	<10 µg/g (fish tissue) Indefinite result	0.1 – 0.2 µg/g (mussel tissue)	Condition good
Total Zinc (Zn) 15 µg/L maximum	Sechelt Inlet E218926 (Mid-channel S Sechelt)	No data collected	No data collected	<1 – 1 µg/L (all at 0m)	Condition good
	Porpoise Bay E207599 (south-east of Poise Island)	No data collected	No data collected	<1 - 2 µg/L (all at 0m)	Condition good
	Porpoise Bay E218927 (50m from Gov't wharf)	<5 - 31 µg/L (1 - 11 m)	<5 - 31 µg/L (1 – 5 m)	<1 - 1 µg/L (all at 0m)	Conditions improving
Mussel tissue (no criteria available)	At Gov't wharf	No data collected	No data collected	20.7 – 23.8 µg/g	For reference purposes

Table 6 Sechelt Inlet field data and raw bacteriological data – 2002

Site	Date	Tide	Depth (m)	Water Temperature (°C)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Fecal Coliforms (CFU/100 mL)	Enterococci (CFU/100 mL)	<i>Pseudomonas aeruginosa</i> (CFU/100 mL)
Sechelt Inlet E218926 (Mid-channel S Sechelt)	Aug 28	Flood	0	18.8	18.62	9.03	<1	<1	
			30	11.8	26.46	5.34			
			80	18.5	21.43	8.26	4	1	
	Aug 29	Flood	120	9.5	27.62	2.72	<1	<1	
			0	9.2	28.02	1.38	<1	<1	
			80	16.1	24.40	8.98	<1	<1	
	Sept 4	Ebb	120	9.1	27.96	1.68	<1	<1	
			0	9.1	28.04	1.42	<1	<1	
			80	15.2	21.24	8.99	<1	<1	
	Sept 5	Ebb	120	9.2	27.79	1.71	1	<1	
			0	9.1	28.22	0.82	<1	1	
			80	15.6	22.81	8.45	66	35	
	Sept 11	Flood	120	9.3	28.13	0.86	<1	3	
			0	9.1	28.04	1.26	1	8	
			80						
Porpoise Bay E207599 (south-east of Poise Island)	Aug 28	Flood	0	18.4	16.81	8.75	<1	<1	
			14	12.3	26.12	4.17	<1	1	
			24	11.6	26.36	3.86	<1	2	
	Aug 29	Flood	0	18.3	22.64	8.78	12	4	
			10	11.9	25.88	4.60	<1	11	
			20	11.8	26.17	4.69	<1	14	
	Sept 4	Ebb	0	16.6	24.62	8.57	5	<1	
			10	12.2	25.98	3.94	3	<1	
			20	11.8	26.38	3.29	2	<1	
	Sept 5	Ebb	0	15.9	23.13	8.46	8	1	
			10	11.7	26.18	3.88	1	<1	
			20	11.4	26.55	4.36	<1	<1	
	Sept 11	Flood	0	16.0	22.65	8.26	36	14	
			10	12.5	25.99	7.09	<1	6	
			20	12.0	26.27	4.33	<1	9	
Porpoise Bay E218927 (50m from Gov't wharf)	Aug 28	Flood	0	18.6	19.70	9.02	2, 1	1, 1	<1
	Aug 29	Flood	0	18.5	22.67	9.09	74, 110	4, 9	<1, <1
	Sept 4	Ebb	0	16.5	24.49	8.86	<1, 4	3, 1	<1, <1
	Sept 5	Ebb	0	15.9	23.15	8.81	22, 39	<1, 1	<1, <1
	Sept 11	Flood	0	16.0	22.48	7.87	56, 57	12, 19	<1, <1
Porpoise Bay Park Beach	Aug 28	Flood	0	17.9	18.80	9.24	7	<1	9
	Aug 29	Flood	0	18.2	22.33	8.55	15	2	<1
	Sept 4	Ebb	0	16.6	24.40	8.20	1	<1	<1
	Sept 5	Ebb	0	15.5	23.08	8.81	3	<1	<1
	Sept 11	Flood	0	15.6	22.74	8.95	1	3	<1
Beside the Gov't Wharf	Aug 28	Flood	0				62	14	13
	Aug 29	Flood	0				170	38	<1
	Sept 4	Ebb	0				130	21	15
	Sept 5	Ebb	0				350	55	<1
	Sept 11	Flood	0				230	150	<1
Field Blank	Aug 28						<1 (all dates)	<1 (all dates)	<1 (all dates)

Table 7 Sechelt Inlet raw water quality data – 2002

Site	Date	Depth (m)	Ammonia-N (mg/L)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Suspended Solids (mg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)	
Sechelt Inlet E218926 (Mid-channel S Sechelt)	Aug 28	0	<0.005	<0.02	<0.002	<4	0.4	0.1	1	
		30	<0.005	0.31	0.004	<4				
	Aug 29	0	<0.005	<0.02	<0.002	11				
		80	<0.005	0.43	<0.002	11				
	Sept 4	0	<0.005	<0.02	<0.002	<4	0.2	<0.1	<1	
		80	<0.005	0.4	<0.002	<4				
		120	<0.005	0.39	<0.002	6				
	Sept 5	0	0.006	<0.02	0.002	10	0.2	<0.1	<1	
		80	<0.005	0.42	0.004	12				
		120	<0.005	0.39	0.003	28				
	Sept 11	0	<0.005	<0.02	<0.002	7	0.3	<0.1	1	
		80	<0.005	0.42	<0.002	12				
		120	<0.005	0.39	<0.002	14				
	Porpoise Bay E207599 (south-east of Poise Island)	Aug 28	0	<0.005	<0.02	0.012	<4	0.3	<0.1	<1
			14	0.027	0.32	0.008	7			
24			0.028	0.33	0.012	<4				
Aug 29		0	<0.005	<0.02	<0.002	<4	0.3	<0.1	<1	
		10	<0.005	0.3	0.005	7				
Sept 4		20	<0.005	0.31	0.005	7				
		0	<0.005	<0.02	<0.002	7	0.3	0.1	2	
Sept 5		10	0.021	0.23	0.004	4				
		20	<0.005	0.3	0.003	5				
		0	<0.005	<0.02	0.002	6	0.2	<0.1	<1	
Sept 11		10	0.021	0.29	0.006	14				
		20	0.006	0.32	0.006	14				
		0	<0.005	<0.02	<0.002	13	0.3	<0.1	1	
Porpoise Bay E218927 (50m from Gov't wharf) (duplicates included)		Aug 28	0	<0.005, <0.005	<0.02, <0.02	0.002, 0.002	<4, 6	0.3, 0.4	<0.1, 0.1	<1, <1
			0	0.01	<0.02	<0.002	8	0.4	0.1	<1
	Aug 29	0	0.254, <0.005	0.23, 0.04	<0.002, <0.002	<4, <4	0.3, 0.3	<0.1, 0.3	<1, <1	
	Sept 4	0	0.011, <0.005	<0.02, <0.02	0.002, 0.002	11, 9	0.3, 0.3	<0.1, <0.1	<1, <1	
	Sept 5	0	<0.005, 0.019	<0.02, <0.02	<0.002, <0.002	8, 9	0.4, 0.4	<0.1, <0.1	1, 1	
Field Blank	Aug 28		<0.005	<0.02	<0.002	<4				
	Aug 29		<0.005	<0.02	<0.002	<4				
	Sept 4		<0.005	<0.02	0.002	<4				
	Sept 5		0.014	<0.02	0.003	<4				
	Sept 11		<0.005	<0.02	<0.002	<4				

Table 8 Relationship between CCME Water Quality Index (WQI) values and rankings, and descriptions of rankings (CCME, 2001)

Ranking	CCME WQI Value	Description
Excellent	95-100	Water quality is protected with a virtual absence of threat or impairment Conditions very close to natural or pristine levels
Good	80-94	Water quality is protected with only a minor degree of threat or impairment Conditions rarely depart from natural or desirable levels
Fair	65-79	Water quality is usually protected but occasionally threatened or impaired Conditions sometimes depart from natural or desirable levels
Marginal	45-64	Water quality is frequently threatened or impaired Conditions often depart from natural or desirable levels
Poor	0-44	Water quality is almost always threatened or impaired Conditions usually depart from natural or desirable levels