CANADA – BRITISH COLUMBIA
WATER QUALITY MONITORING AGREEMENT

BUSINESS PLAN

2010-2013

Environment Canada Environnement Canada

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CANADA – BRITISH COLUMBIA
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Coordinating Committee

June, 2010

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Introduction

The Ministers of Environment for Canada and British Columbia signed the Canada - B.C. Water Quality Monitoring Agreement in 1985. The Agreement has an indefinite term with an annual negotiation of the monitoring and assessments for the upcoming year. The purpose of the Agreement is to provide for the coordination and integration of Canada and B.C. water quality monitoring activities to develop joint, cost-shared, comprehensive assessments of water quality. The objectives of the Agreement are:

- To achieve a continuing commitment by Canada and B.C. to acquire water quality data;
- To obtain scientifically sound water quality information; and
- To achieve compatibility between respective water quality databases for water resource management.

The Agreement has focused on the collection of quality-assured data for the purposes of long-term trend monitoring and assessment of the fresh surface waters of British Columbia.

This business plan covers the fiscal years 20010-2011, 2011-2012, and 2012-2013. The plan contains details of and timelines for the attainment of performance criteria over this time period. There will be an annual review of the plan, at which time it will be rolled ahead by one year.

The **Agreement Vision** is:

"A defined and sustained core water quality monitoring program that focuses on watersheds that cross international, provincial or territorial boundaries and/or are important for water supply, fisheries, or recreation and that may be harmed by human activity. The monitoring program and/or its information are:

- Responsive to the needs of Canada, and support federal mandates (the *Canada Water Act*, the *International Boundary Waters Treaty Act*, the *Department of Environment Act* and the *Canadian Environmental Protection Act*)
- Responsive to the needs of British Columbia, and support provincial mandates (the *Environmental Management Act* and the *Drinking Water Protection Act*) and directly support the Great Goal 4 and the performance measure outline in Goal 1, Objective 1 of the B.C. Ministry of Environment Service Plan.
- Responsive to the needs of other clients (see Table 1)
- Accessible
- Reported regularly to stakeholders and the public in comprehensive assessments
- Influential in terms of water resource management decisions
- Delivered through partnerships
- Integrated, coordinated, and compatible with partners
- Scientifically sound
- Conducted safely
- Sustained through the user-pay principle where feasible."

CCME Principles on Environmental Monitoring and Reporting

The Canadian Council of Ministers of the Environment published a Statement of Principles on Environmental Monitoring and Reporting in 2000. One of the objectives of the statement is to guide the negotiation of arrangements between federal and provincial environment departments for the cooperative delivery of monitoring and reporting that is effective, efficient, scientifically sound, comparable across jurisdictions, and communicated in a timely and accessible manner. The principles are listed below and have been used to guide the development of the business plan:

1. **Communication of information:** There will be open, transparent and timely reporting of information from monitoring programs, sufficient to meet the needs of jurisdictions and their obligation to communicate to the public.

2. **Mandates respected:** Cooperative arrangements will respect the mandates of jurisdictions and other parties.

3. **Shared responsibility:** Providing resources and implementing monitoring and reporting activities is a shared responsibility among federal, provincial, territorial and local governments, and between governments, industry, academic institutions and other partners. Identifying these responsibilities is an integral component of cooperative arrangements.

4. **Effectiveness and efficiency**: Parties will plan and deliver monitoring and reporting activities in a way that makes the best use of public and private resources.

5. **Timely sharing of data between parties:** Parties will share their data with each other in a timely fashion to support their activities and to meet their legal, program and/or international obligations.

6. **Third party access to data:** Third parties may have access to data for research and/or analysis other than that for which it was originally collected, subject to the applicable government legislation, policies and contractual obligations.

7. **Proprietary information:** Parties will protect proprietary information included in data in accordance with applicable policies and legislation.

8. **Cost recovery:** Where appropriate, parties may make data, analysis and reports available on a cost-recovery basis, consistent with applicable government policies.

9. **Scientific standards:** Parties will respect commitments to national and international monitoring and reporting protocols, and will work cooperatively to develop new protocols as appropriate, to allow for the meaningful analysis and comparison of data and results.

10. **Standardized data and data management:** Parties agree that data should be standardized and to respect data management protocols and develop new protocols as appropriate, to ensure compatibility and facilitate the effective sharing of data, support data integrity, permit comprehensive data analysis, and protect historical records.

11. **Accountability and transparency:** Parties will make information about cooperative arrangements available to stakeholders and the public, and will consult, as appropriate, in developing these arrangements.

12. **Reciprocal notice:** Parties will provide appropriate prior notice in the event of terminating or changing cooperative arrangements.

Key Contributors

The principal contributors to the Canada – B.C. Water Quality Monitoring Program are presented in Table 1. Key to the delivery of the program are:

- Ministry of Environment
  - Environmental Quality Branch, Water and Air Monitoring and Reporting Section
    - Administration, coordination, data approval, Water quality database (EMS) expertise and administration, assessment and reporting, funding
  - Regional Environmental Protection Offices
    - Coordination, safety/quality assurance audits, sampling, recruiting, training, funding
  - Laboratory Services
    - Quality assurance and laboratory expertise
- Environment Canada
  - Science and Technology Branch, Water Quality Monitoring and Surveillance Division, Pacific and Yukon Water Quality Monitoring Office
    -Administration, coordination, data approval, assessment and reporting, training, funding, special studies
  - Meteorological Service of Canada
    - Data management (ENVIRODAT and data transfers to EMS)
  - Science and Technology Branch, National Laboratory for Environment Testing
    - Analytical services for trace elements and specialized organic compounds
- Provincial laboratory services provider, currently Maxxam Analytical
  - Analytical services for general chemistry and coliform bacteria
- Lay collectors
  - Sampling

Water Quality Monitoring, Assessment and Reporting Process

The following is a chronological description of the steps in the process as illustrated in Figure 1:

1. Water Quality Monitoring Plan

- Annual business plan specifying stations, variables, frequencies, timing of routine and quality assurance sampling and monitoring, CABIN sampling, and reporting.
- The business plan is based on client requests and previous water quality assessments.

2. Sample Collection

- Performed by lay collectors and government staff in accordance with the water quality monitoring plan.
- Station risk assessments for swift water or ice safety concerns.
- Training for swift water and ice safety and sampling quality assurance.
- Minimum of annual audits for safety and quality assurance of sampling practices.
- Monthly sampling completeness review (i.e., missed samples or variables, sample transit time and temperature) and annual sampling completeness reporting.
- Resolution of sampling completeness deficiencies (ongoing).

3. Laboratory Analyses

- Performed by National Laboratory for Environmental Testing (trace elements, low-level total phosphorus and specialized organics), and Maxxam Analytics Inc. (general chemistry and coliform bacteria) for routine and quality assurance samples in accordance with the water quality monitoring plan.
- Review of quality assurance sampling conducted to ensure cleanliness of the sampling equipment and the analytical methods, and the precision and accuracy of the analytical results.
- Preliminary review of routine and quality assurance data as they are received to screen for gross errors for timely correction.
- CABIN (benthic invertebrate samples) may be sent to a number of different contract labs. Quality assurance on these samples includes internal lab QA (e.g. processing and sorting efficiency), and external (EC) QA (the National Taxonomist checks 10% of samples submitted to external labs).

4. Data Management

- Laboratory and field data for general chemistry and bacteriology are transferred to ENVIRODAT and EMS from Maxxam Analytical Inc., by Environment Canada and BC Ministry of Environment, respectively, including quality assurance review of the data transfer. Environment Canada transfers trace metals and total phosphorus data to ENVIRODAT from NLET.
- Laboratory and field data for trace metals and total phosphorus are transferred from ENVIRODAT to EMS by Environment Canada and B.C. Ministry of Environment.
- Quality assurance review of data transfer to EMS by B.C. Water and Air Monitoring and Reporting Section.
- Resolution of ENVIRODAT to EMS data transfer errors.
- CABIN data resides on the national CABIN Website, and is also pulled into the Water Quality Website for stations sampled.

5. Data Approval

- A quality assurance review of the data on ENVIRODAT or EMS to identify errors, omissions, artificial contamination, poor precision, and anomalies for investigation and correction or qualification in the databases.
- An assessment of the status (with respect to water quality objectives or guidelines), trends, completeness, and levels of detection with reporting of problems to decision-makers for resolution.
- Conducted annually by calendar year and to be completed within 12 months from the end of a calendar year. Note that the data approval process was delayed for two years (2007

and 2008) awaiting finalization of national (Environment Canada) data flagging protocol. As a result data is currently approved only to the end of 2006. It is planned to approved all data up to the end of 2009 during the 2010-11 fiscal year.

6. Data Publication

- Ongoing transfer of approved data to the Environment Canada Water Quality Website, where clients can access the data directly, and/or plot the data over time, with appropriate water quality guidelines and/or objectives. Other information (trend reports, water quality index assessments, etc.) will also be available on the site.

7. Water Quality Assessment

- An in-depth evaluation of the water quality data for a station or stations, normally for a period of five or more years of routine data, or for an intensive survey of the quality of water, sediment and biota.
- Evaluates the status of water quality, sediment and biota with respect to water quality objectives or guidelines, or CABIN assessments, assesses trends over time, assesses the adequacy of the monitoring program, and recommends water quality management actions, including monitoring, which is then reflected in the water quality monitoring plan.
- The Government of British Columbia has committed to attaining stable or improving water quality trends at 96% of the water bodies monitored under the Canada – B.C. Water Quality Monitoring Agreement. Results from the Site Assessment Reports for the Federal-Provincial stations are used to calculate this performance measure.
- Water quality index assessments will also be carried out as required under the national reporting framework (e.g. CESI, the National Nutrient Report), and for Ecosystem Initiatives.
- Conducted at a frequency of about once every five years (program goal) for each station for routine data (frequency and priorities as indicated by data approvals, previous assessments, and client requests), and within 12 months of the completion of an intensive survey.
- Assessments reported on the website.

8. Monitoring Network Assessment

- An evaluation of all of the stations in the federal-provincial network that ensures that federal and provincial mandates and priorities are being addressed, and considers the adequacy and effectiveness of the network, the need for new stations and variables, the need to suspend or reactivate stations, and the need to reallocate resources among stations, or into new areas (e.g. biological monitoring).
- Conducted once every five years, and considers the results of water quality assessments and stakeholder input.
- Results in revision of the water quality monitoring plan.
- A network assessment was initiated in 2009, and will be finalized in 2010.

Risks and Opportunities

Risks

- The Canada – B.C. Water Quality Monitoring Program has made significant progress in conducting the present modest monitoring program in a manner that fulfills the

CCME Principles on Environmental Monitoring and Reporting. Specifically, considerable improvements have been made for the principles of timely communication of information (#1) and meeting scientific standards (#9). Data are to be approved and reported within one year.

- The Canada – B.C. Water Quality Monitoring Program currently consists of 39 long-term water quality stations on key streams. This is a very small number of stations, considering the size of the province and the number of waterbodies it contains. In comparison, the Canada – B.C. Hydrometric Agreement currently operates about 475 flow stations in the province. The water quality network is too sparse to be representative of the water quality of the province. In addition, the monitoring focuses on the quality of the water column, and comprehensive monitoring of the aquatic environment, including bottom sediment and aquatic biota, is conducted only infrequently. CABIN (benthic invertebrate) monitoring is being integrated at the network sites over time to help address this. The risk to the government partners is that they do not have a comprehensive overview of aquatic environmental quality in the province for informed decision-making and state of environment reporting.

Opportunities

- Environment Canada acquired additional funding through the Georgia Basin Action Plan. This presented an opportunity to expand the monitoring network to include additional water bodies on Vancouver Island and the Lower Mainland areas. Seven new stations in the Georgia Basin were added to the network in 2003-2004. This Priority Ecosystem funding has been extended through 2010-11, and is expected to become part of the permanent budget.

- In recent years water has again become a topic of interest within Environment Canada, and a number of water Memoranda to Cabinet have been submitted for potential funding. Additional funds have been received to carry out additional monitoring for water quality index reporting under the CESI program. This has allowed the addition of four new stations to the network in new areas of the province, and the measurement of new variables. Approval for an additional 5-year extension of the CESI program has been sought, and “CESI 2” has currently been approved for 2009-10 only, with a greatly reduced budget.

- In an attempt to respond to criticisms from the federal Auditor General regarding the lack of environmental information being made available, Environment Canada has developed a web site to access and to display water quality data from this monitoring program. The web site is at www.waterquality.ec.gc.ca.

- Graphical software (Envirographer) has been developed that permits the production of time-series plots of federal-provincial water quality data that can be used for timely data approvals and assessments, and that can be distributed to decision-makers and other data users to provide a timely source of semi-interpreted information. It will be further upgraded this year to continue to expedite data review and approval, and is now being used by several other EC regions as well.

- The federal government reported has reported nationally on water quality since 2005 in the Canadian Environmental Sustainability Indictors (Water Quality Index) reports. Both the Ministry of Environment and Environment Canada jointly prepared a more in-depth regional report on the same data, that was released in 2007; an updated version of this report is being produced in 2010. British Columbia also produced a report on environmental trends (Environmental Trends in British Columbia – 2007), and a national Environment Canada report on the status and trends of nutrients in surface waters is currently being finalized and will be released in 2010-11. Much of the BC data used for this national assessment was generated through the Agreement. All of these efforts will allow us to profile the data generated from the network by determining status using the Water Quality Index and reporting on water quality trends.

- Statistical reviews of about 15 stations with over five years of data suggested that monitoring frequency at many sites might be reduced while not compromising the trend analysis program at those sites. Based on this analysis and other considerations about maintaining sampler interest and using these data for other purposes, a reduced monitoring frequency may yield a savings in resources that can be applied to increasing the number of stations covered under the Agreement. This has been explored during the network review and resulted in a reduction in sampling frequency at a number of sites. This process will carry on over the next few years as stations are assessed under the Agreement reporting schedule.

- Other partnership opportunities for monitoring are also being explored. For example a northern oil and gas consortium is interested in partnering on some new long-term sites in northeastern BC, to assess potential water quality impacts from oil and gas exploration and extraction. This is an area of the province where there is currently very little network coverage.

Proposed Results for 2010-13

Scientifically sound information on the quality of water that is of federal and/or provincial priority, crosses international, provincial or territorial boundaries and/or is important for water supply, fisheries, or recreation, and that may be harmed by human activity, is used in making decisions. Safety of personnel is paramount during data collection.

Performance Criteria

1. Scientifically sound data are collected in a safe manner.

1.1 Approved stations are monitored at a set frequency to determine status and trends in water quality.

- Monitoring operations continued at the 39 existing stations (ongoing).

1.2 The water quality-monitoring program is conducted in a safe manner.

1.2.1 Site safety audits and risk assessments are conducted.

- A minimum of one safety audit per station per year is conducted (ongoing).
- Professional site safety risk assessments are conducted at all new shore-based and through-ice sampling stations as required (ongoing).

1.2.2 Sample collectors and auditors have up-to-date training for swift water awareness at all shore-based stations and ice safety at all through-ice-sampling stations. Re-training is required once every three years (2011 for swift water awareness, and ongoing as new sample collectors are retained).

1.2.3 Hazardous incidents or accidents are investigated and remedial action or training is undertaken.

1.3 Data quality is maintained through a routine quality assurance (QA) program.

- All samplers are trained on correct sampling procedures in accordance with the Agreement field manual and other protocols by regional provincial or federal staff.
- The field QA program is maintained and improved as data are generated and as required when data quality problems are detected (ongoing).
- A minimum of one QA audit per station per year is conducted (ongoing).
- 80+% sampling and data completeness is maintained (ongoing).
- Communication among sample collectors, laboratories, data managers, and data assessors to identify and resolve QA issues is ensured (ongoing).
- A revised field manual for sampling, safety and quality assurance was completed in October, 2005; sampling protocols produced or updated as required.
- CABIN field QA consists of triplicate at network sites that are heterogeneous. .

1.4 Data approvals are completed for all stations annually.

- Federal-Provincial data approvals are completed by December 31st of the following year (i.e., data approvals are completed within one year of sample collection).

1.5 State of water quality assessment reports are posted on the web by December 31 of the following year (i.e., reports are posted within one year of completion).

1.6 Data from the network are used to calculate the water quality index for those stations having data from 2006-08 by July 2010.

1.7 Benthic invertebrate assessments using CABIN (Canadian Aquatic Biomonitoring Network) procedures will continue in selected major basins. CABIN monitoring will eventually be carried out at all network sites on a rotating basis as basin models become available (frequency to be determined based on studies currently being carried out).

1.8 Biological (fish and other biota) and sediment quality monitoring is implemented at a frequency that resources permit. Some of this may be carried out in partnership with other groups (e.g. CRIEMP), or under Environment Canada's Surveillance Program.

2. Sound program management is provided.

2.1 Canada-BC water quality monitoring program is effectively reviewed and managed to maintain relevant and high priority monitoring.

- Annual data approvals are completed, and significant findings are reported to decision-makers.
- Annual Report for Agreement for the preceding fiscal year is produced (November of each year).
- Three-year business plan for Agreement (including annual operating Schedules) is updated (draft in May of each year).

2.2 The water quality program is delivered through partnerships and sustained through the user-pay principle where feasible.

2.3 The federal-provincial monitoring network is reviewed every year to ensure that organizational priorities are addressed. A more in-depth evaluation of network design is carried out once every five years. Changes that occur due to these reviews are detailed in the Annual Report, and recorded in the Business Plan.

- An evaluation of the entire monitoring network will be done once every five years. The last network review was done in 2003-2004 and implemented in the 2004-05 monitoring plan. This produced decisions about termination of sites at Myers Creek, the Pend Oreille River at the US Border, and the Fraser River at Stoner.
- The current review began in 2009-10, and is continuing into 2010-11. Decisions made to date include:
  - Discontinuation of the sites on the San Juan, St. Mary's, and Koksilah Rivers
  - Decreased sampling frequency (from bi-weekly to monthly) at the Peace, Okanagan, and two Kettle River sites
  - Addition/removal of certain variables in accordance with the "Federal-Provincial Core Variable List" (see Table 3, p. 14, and data assessments

3. Water quality information is available and reported to partners, clients, stakeholders and the public.

3.1 An Internet site has been established to provide data to the general public and clients. The site features a graphing function that allows data to be plotted over time, with appropriate water quality guidelines and/or objectives. The site is updated routinely.

3.2 All long-term stations are reviewed for status (with respect to guidelines or objectives) and apparent trends annually. Decision-makers are alerted to significant findings.

- Data approvals are prepared annually for each station to correct errors and omissions, to qualify results, and to identify water quality concerns.

3.3 All long-term stations are assessed for status and trends approximately every five years.

- Water quality assessments are prepared for each station approximately once every five years. This implies assessing a minimum of seven or eight stations per year to cover all 39 stations over roughly a five year period. A proposed schedule of assessments is presented in Table 2.
- Assess the value of preparing a second B.C. Trend Report (2010).
- Alternate web-based formats will be examined for reporting assessments and trends.

Detailed Plans for 2010-11

The detailed plans for 2010-11 (i.e., Schedules B and D for 2010-11) are attached in Appendix 1. They provide details on the activities and budgets for 2010-11.

Table 1. Principal Partners, Contributors, Clients, and Customers

Who	**Why they are interested**
Ministry of Environment Environmental Protection Division: Vancouver Island Region - Nanaimo Lower Mainland Region - Surrey Kootenay Region - Nelson Okanagan Region - Penticton Thompson Region - Kamloops Cariboo Region - Williams Lake Omineca-Peace Region – Prince George Skeena Region – Smithers Water Stewardship Division (WSD) Environmental Stewardship Division (ESD)	Regions are partners in the Agreement, collecting samples or providing field assistance & safety/quality assurance audits for contracted sample collectors. Data are used for water quality management, including environmental impact assessment of existing & new developments, water supply & waste disposal projects, permit administration, water quality investigations, non-point source pollution monitoring, attainment of objectives, and trend assessment. WSD have interests in drinking water supplies while ESD has interests in fisheries resources.
Ministry of Environment, Environmental Quality Branch, Water and Air Monitoring and Reporting Section Laboratory Services	A partner in the Agreement, contributing 50% of the monitoring costs and most of the administration & data assessment costs. Data are used for trend assessment, objective attainment & guideline development. Potential partner, for groundwater monitoring of provincial observation well network & in key aquifers. Contribute laboratory and quality assurance expertise, and contribute data management (EMS) expertise.
Lay Collectors	People residing near water quality stations, who are contracted to collect water samples, and who often have an interest in protecting the quality of the waterbody.
Ministry of Health Services/Regional Health Authorities	Water supply and waste disposal assessments.
Environment Canada - Pacific & Yukon Water Quality Monitoring and Surveillance Office Meteorological Service of Canada Science and Technology Branch Environmental Stewardship Branch	A partner in the Agreement, contributing 50% of the total cost of administration, monitoring, and assessment. Data are used for trend assessment, national and regional reporting, water quality objective and guideline development (e.g., Columbia River), and environmental impact assessments.

Table 1.Principal Partners, Contributors, Clients, and Customers (continued)

Who	Why they are interested
Provincial lab services provider (currently Maxxam Analytical Inc.)	Performs general chemistry and microbiological analyses for the Agreement. Prepares and ships sampling kits to sample collectors.
Pacific and Yukon Laboratory for Environmental Testing - Vancouver	Performs general chemistry and microbiological analyses for selected Agreement sites. Prepares and ships sampling kits to sample collectors at those sites.
National Laboratory for Environmental Testing - Burlington	Performs trace element and specialized organic analyses for the Agreement.
Fisheries & Oceans Canada - Pacific & Yukon Region	Water quality assessments for fisheries purposes.
Environment Canada UNEP GEMS program (Global Environmental Monitoring System)	Data are used for guideline development and national assessments, including national reporting and assessments (e.g. CESI, National Nutrient Report). Water quality data from many sites contributed to the GEMStat database, and used for global assessment of status and trends
Statistics Canada Health Canada	Partners in the national CESI reporting process
Canadian Council of Ministers of the Environment	Data are used for guideline development.
Environmental Consultants Development or Product proponents	Data are used for water supply and waste disposal projects, water quality investigations, environmental impact assessment of proposed developments, and development/marketing of water treatment products.
Industry	Examples: Mining/smelting companies - e.g., Teck Cominco at Trail. Data are used for impact assessment, permit administration, assessment of attainment of water quality objectives, and other reporting (e.g. CESI, National Nutrient Report). BC Hydro – recent nutrient/productivity assessment in Kootenay basin re: Water Use Plans
US Environmental Agencies (e.g., US EPA, Washington State Dept. of Ecology, US Geological Survey)	Data are used for research, water quality assessment & management, and transboundary issues, including IJC references.
Researchers	Example: UBC study of nutrients & fisheries

	management in the Kootenay-Columbia basins.
Public, government officials at local, provincial & federal levels, & stewardship groups BC-Alberta Transboundary Water Quality Technical Group	Data are used to produce State of Environment, Water Quality Status, and Water Quality Trend reports for British Columbia, as well as numerous water quality assessment reports on specific waterbodies. Stewardship groups are partners in provincial groundwater monitoring.

Table 2. Proposed Assessment Schedule for Federal-Provincial Water Quality Stations

STATION NAME	*START*	*LAST ASSESSMENT*	*YEARS SINCE ASSESSMENT*	*SCHEDULE*	*YEARS U OF*
Fraser River Estuary (Gravesend Reach)	2008	nil		2010-11 (2)	
Fraser River at Hope	1979	2004	5	2010-11 (4)	
Fraser River at Marguerite	1984	2004	5	2010-11 (4)	
Fraser River at Red Pass	1984	2004	5	2010-11 (4)	
Chilcotin River u/s Christie Rd Bridge	2005	nil	4	2010-11 (6)	
Horsefly River above Quesnel Lake	2006	nil	3	2010-11 (4)	
Nicola River near mouth at Thompson River	2003	nil	5	2010-11 (6)	
Thompson River at Spences Bridge	1984	2004	5	2010-11 (5)	
Salmon River at Highway 1 Bridge	1988	2004	5	2010-11 (5)	
Nechako River at Prince George	1985	2004	5	2010-11 (5)	
N. Alouette River at 132nd and Edge Street	2004	nil	5	2010-11 (5)	
Bear River at Stewart (re-activated 2006)	1984	1995	5	2010-11 (5)	
Callaghan Creek above Cheakamus confluence (at Highway 99)	2004	nil	5	2011-12 (7)	
Callaghan Creek at Callaghan Lake	2004	nil	5	2011-12 (7)	
Cheakamus River @ Daisy Lake Forest Rd Bridge (downstream from STP)	2004	nil	5	2011-12 (7)	
Cheakamus River at Cheakamus Lake Road	2004	nil	5	2011-12 (7)	
~~Fraser River at Hansard~~	1984	2004	~~5~~	~~2010-11 (5)~~	
Quinsam River near the Mouth	1986	2004	5	2011-12 (6)	
~~San Juan River at Island Rd~~	2004	Nil	~~5~~	~~2010-11 (5)~~	
Englishman River at Highway 19	2004	nil	5	2011-12 (6)	
Tsolum River below Murex Creek	1997	2005	4	2011-12 (6)	

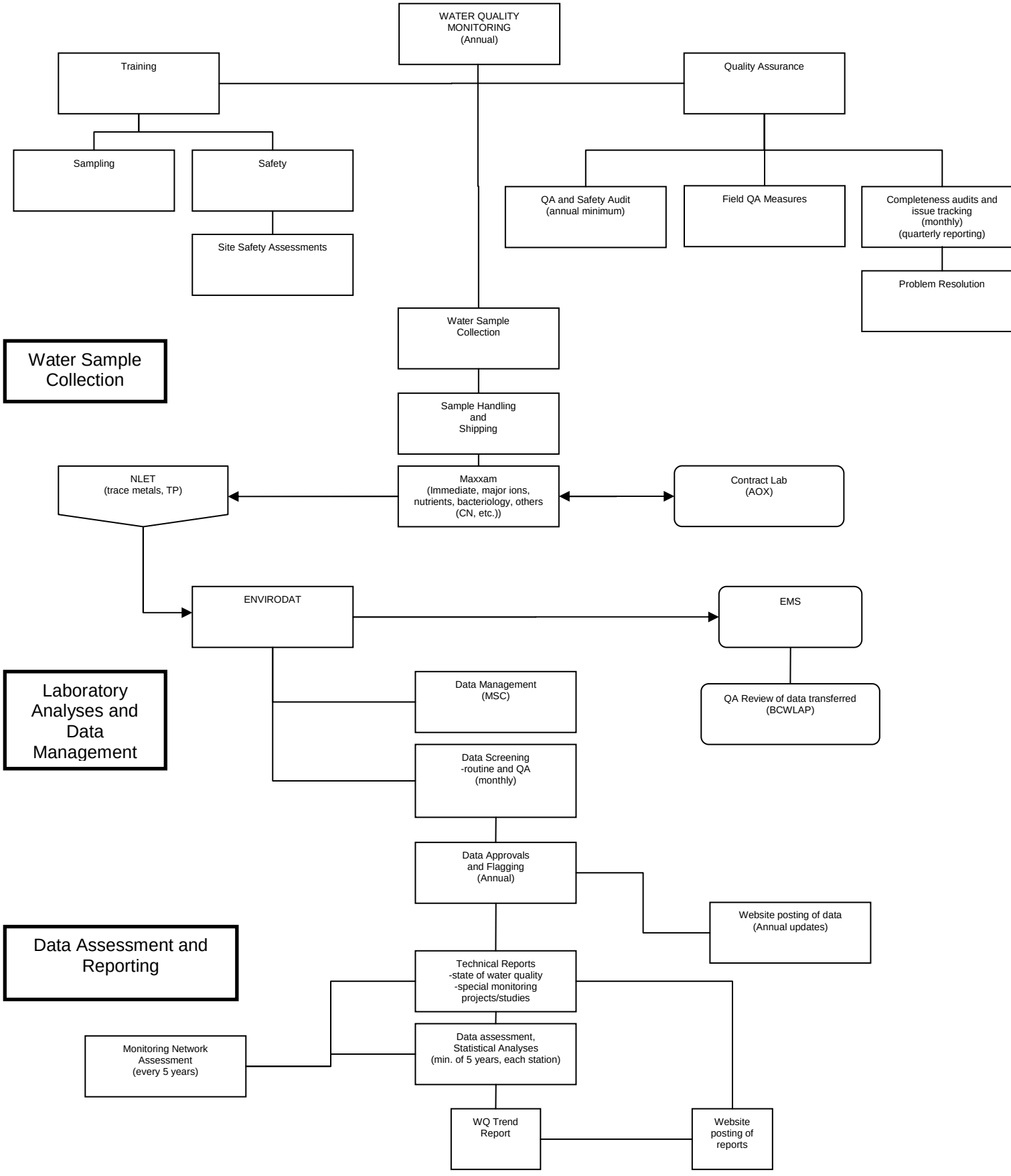
Table 2. Proposed Assessment Schedule for Federal-Provincial Water Quality Stations (continued)

STATION NAME	*START*	*LAST ASSESSMENT*	*YEARS SINCE ASSESSMENT*	*SCHEDULE*	*YEARS UNA AS OF 2*
Columbia River at Waneta	1979	2004	5	2012-13 (5)	6
Columbia River at Birchbank	1983	2005	4	2012-13 (7)	5
Columbia River at Nicolson	2003	2006	3	2012-13 (5)	4
Pend d'Oreille River at Waneta	1997	2006	3	2012-13 (5)	4
Dean River below Anahim Lake	2006	nil	3	2012-13 (5)	4
Similkameen River at Princeton	1988	2006	3	2012-13 (5)	4
Similkameen River near the US Border	1979	2006	3	2012-13 (5)	4
Sumas River at U.S. Border (near Huntington)	1979	2005	4	2012-13 (8)	5
Iskut River below Johnson River	1980	2009	1	2013-14(5)	2
Kettle River at Carson	1980	2009	1	2013-14(5)	2
Kettle River at Midway	1980	2009	1	2013-14(5)	2
~~Moyie River at Kingsgate (reactivated 2005)~~	~~1979~~	~~2009~~	~~1~~	~~2013-14(5)~~	~~2~~
Okanagan River at Oliver	1980	2009	1	2013-14(5)	2
Peace River above Alces River	1984	2009	1	2013-14(5)	2
Salmon River near Hyder, Alaska	1982	2009	1	2013-14(5)	2
Skeena River at Usk	1984	New F-P (2009)	1	2013-14(5)	
Cowichan River near the mouth	1999	2010	0	2014-15 (5)	1
~~Koksilah River at Highway 1~~	~~1999~~	~~2010~~	~~0~~	~~2014-15 (5)~~	~~1~~
~~St. Mary River at Wycliffe Junction~~	~~1999~~	~~2010~~	~~0~~	~~2014-15 (5)~~	~~1~~
Elk River at Highway 93 Bridge	1984	2010	0	2014-15 (5)	1
Elk River below Sparwood	2002	2010	0	2014-15 (5)	1
Kootenay River at Creston	1979	2010	0	2014-15 (5)	1
Kootenay River at Fenwick Station	1984	2010	0	2014-15 (5)	1

Table 3. Federal-Provincial Core Variable List

Required Variables	**Variables Suggested when Appropriate or at Station Initiation until Assessed**	**Site Specific Variables (To be reviewed prior to station initiation for possible inclusion)**
Carbon, dissolved organic	Fluoride, dissolved	Carbon, total organic
Colour, true	Sulphate, dissolved	Carbon, dissolved inorganic
Conductivity, specific	Nitrogen, ammonia	Carbon, total inorganic
Hardness (ICP package) - Na, Ca, Mg, S and K	Phosphorus, total dissolved	Coliforms, fecal
Metals, trace - total (NLET)	Oxygen, Dissolved	*E.Coli*
Nitrogen, total	Alkalinity, total	*Enterococci*
Nitrogen, NO3 and NO2	Chloride, dissolved	Nitrogen, total organic
Nitrogen, NO3		Nitrogen, total Kjeldahl
Nitrogen, NO2		Nitrogen, total dissolved
pH		Salinity
Phosphorus, total (NLET)		Residue, total dissolved solids
Residue, total suspended solids		Residue, total solids
Temperature, water		AOX
Turbidity		Trace Organics
Temperature, air		Pesticides
		Fixed Non-Filterable Residue
		Metals, trace - Dissolved (NLET)

Figure 1 Water Quality Monitoring, Assessment & Reporting Process



Appendix 1
Canada - British Columbia
Water Quality Monitoring Agreement

To: Thomas White
Beverly McNaughton
Administrators,
Canada - B.C. Water Quality
Monitoring Agreement

June 11, 2010
Federal File: 7012-3
Provincial File: 77560-01

Re: Water Quality Monitoring Program for the Fiscal Year 2010-11

Attached are the proposed Schedules B (Monitoring Activities) and D (Estimated Annual Costs) for the 2010 fiscal year for the Canada - B.C. Water Quality Monitoring Agreement for your approval. The proposed spending, totaling $816,000, is to be shared equally and is detailed in the attached Schedules. The decrease in costs over the previous fiscal year is due to savings made through the network review (several discontinued stations, variables, and reduced sampling frequency at some stations) that will be re-invested in new priority stations and/or variables, and reduced CABIN sampling costs (sufficient data has been collected for construction of Columbia and Okanagan basin models; funds will now be directed towards FP station CABIN assessments).

The program for 2010-11 includes the following activities:

1. Conduct monitoring at 39 existing Agreement stations.
2. Continue with improvements to the automated monitoring station in the Fraser River Estuary (buoy platform)
3. Participate in Quality Assurance Work Group activities.
4. Conduct at least one safety/quality assurance audit for each station.
5. Transfer 2008 and 2009 ENVIRODAT F-P metals data to EMS.
6. Carry out 2007 – 2009 data approvals for ENVIRODAT data.
7. Prepare 2009-2010 Annual Report for the Agreement.
8. Finalize regional Water Quality Index Report (2001-2007).
9. Complete a report on status and trends in the Fraser River basin.
10. Complete a journal article on the Kootenay River Basin and associated Elk River water quality issues.
11. Complete a journal article on the Bear River site in northern BC.
12. Contribute Water Quality Index assessments and background information from F-P stations to the 2010 national CESI (Canadian Environmental Sustainability) Report.
13. Further expand biological monitoring program (CABIN) at federal-provincial water quality sites.
14. Finalize Agreement network review report, and continue implementation of recommendations.

We, the undersigned Coordinators of the Canada -B.C. Water Quality Monitoring Agreement, recommend your approval of the proposed program for 2010-11:

_____	_____
A. Ryan, Federal Coordinator	T. Dessouki, Provincial Coordinator
_____	_____
S. Strachan, Federal Coordinator	V. Jensen, Provincial Coordinator

Approved:

_____	_____
B. McNaughton, Federal Administrator	Thomas White, Provincial Administrator
_____	_____
Date	Date

SCHEDULE B (2010-11) Part 1.1 Federal-Provincial Monitoring Stations

Cariboo Region	Rationale & Issues	Responsibility	Annual Frequency	Reporting	Additional Monitoring Initiated
Fraser River at Marguerite	Improving water quality, pulp mills, municipal effluents, fisheries BC and Canadian Heritage River	Federal-Provincial	26	Trend, Objectives, Water Quality Index (WQI)	CABIN (FRAP)
Chilcotin River u/s Christie Rd Bridge	Global warming on the Tchaikazen (Taseko) and Chilko icefields, pine beetle harvesting activities, and effects of ranching on downstream aquatic life, drinking water and agricultural water uses. High fisheries values and First Nations food fisheries values; improved spatial coverage of water quality information	Provincial	26	Trend, Objectives, WQI	CABIN (2006)
Horsefly River above Quesnel Lake	CESI station; Non-point sources (agriculture, logging, mining), second largest sockeye salmon run off the Fraser, improved spatial coverage of water quality information. BC Heritage River	Provincial	26	Trend, Objectives, WQI	
Dean River upstream from Anahim Lake	CESI station; Climate change impacts, world renowned rainbow trout, salmon and steelhead, improved spatial coverage of water quality information	Provincial	26	Trend, Objectives, Control, WQI	CABIN (2008)

Kootenay Region	Rationale & Issues	Responsibility	Annual Frequency	Reporting	Additional Monitoring Initiated
Elk River u/s Fernie	Declining water quality, coal mining, water supply, fisheries, transboundary leaving BC. Increasing Se, N and SO4.	Federal-Provincial	26	Trend, Objectives, WQI	
Elk River at Highway 93 Bridge	Declining water quality, coal mining, water supply, fisheries, transboundary leaving BC. Increasing Se, N and SO4. GEMS site.	Federal-Provincial	26	Trend, Objectives, WQI GEMS	
Kootenay River at Fenwick Station	Improving water quality, metal mining, pulp mill, fisheries, transboundary leaving BC. Background for coal mining in Elk Basin; increasing P.	Federal	26	Trend, Objectives, WQI	
Kootenay River at Creston	Declining phosphorus to Kootenay L., Libby Dam, fisheries, transboundary entering BC.	Federal	26	Trend, Objectives, WQI	
Columbia River at Birchbank	Pulp mill, dams, water supply, fisheries, control station for lower Columbia (transboundary leaving BC), total gas pressure. BC Heritage River	Federal	26	Trend, Objectives, Control, WQI	
Columbia River at Waneta	Improving water quality, smelter/fertilizer plant, pulp mill, dams, transboundary leaving BC. CMP site, GEMS site. BC Heritage River	Federal	52	Trend, Objectives, WQI, GEMS	CMP
Columbia River at Nicolson	Important wetland area, upstream control, transboundary river; serves as background for lower Columbia; BC Heritage River	Federal	13	Trend, Control, WQI	
Pend d'Oreille River at Waneta	Transboundary leaving BC, concerns re: dams (total gas pressure, temperature), metals & nutrients. Increasing P. Cumulative effects prior to confluence with Columbia; influences from U.S., 2 dams and mining	Federal	13	Trend, Objectives, WQI	

Okanagan Region	Rationale & Issues	Responsibility	Annual Frequency	Reporting	Additional Monitoring Initiated
Okanagan River at Oliver	Eutrophication downstream in Osoyoos L., transboundary leaving BC, fisheries, recreation. Could add pesticides (PSF, Priority Ecosystem (PE) site, GEMS site	Federal	13	Trend, Objectives, WQI GEMS	CABIN CMP, PSF, PE (2007)
Kettle River at Midway	Upstream station for potential US mine, transboundary leaving BC, fisheries. Some increasing trends (F and fecal coliforms); BC Heritage River	Federal	13	Trend, Objectives, Control, WQI	
Kettle River at Carson	Downstream station for potential US mine, transboundary entering BC, fisheries. BC Heritage River	Federal	13	Trend, Objectives, WQI	
Similkameen River at Princeton	Upstream control station for lower river (transboundary leaving BC), mines, agriculture, municipal effluents, fisheries, recreation	Federal	26	Trend, Objectives, Control, WQI	CABIN(2006)
Similkameen River near the US Border	Transboundary leaving BC, mines, agriculture, municipal effluents, fisheries, recreation. PE site, GEMS site.	Federal	26	Trend, Objectives, WQI, GEMS	CABIN, PE (2006)

Lower Mainland Region	Rationale & Issues	Responsibility	Annual Frequency	Reporting	Additional Monitoring Initiated
Fraser River at Hope	Improving water quality, pulp mills, municipal effluents, fisheries, control for lower Fraser, BC and Cdn Heritage river; GEMS site. Control for buoy (Fraser Estuary) station.	Federal-Provincial	26	Trend, Objectives, Control, WQI, GEMS	CABIN (FRAP, 2003)
Fraser River Estuary Buoy (Gravesend Reach)	Improving water quality, pulp mills, municipal effluents, fisheries; transboundary entering Strait of Georgia, industry, agriculture, urbanization in the estuary area, loadings to the Strait of Georgia. BC and Cdn Heritage river;	Federal-Provincial	26	Trend, Objectives, Loadings, WQI	
North Alouette River at 132nd Ave.	Non-point source pollution from anticipated urban development; some agricultural impacts	Provincial	26	Trend, Objectives, WQI	CABIN (2004)
Cheakamus River at Daisy Lake Forest Rd	Increasing non-point and point source pollution anticipated from Whistler (Olympic) development, GEMS site	Federal-Provincial	26	Trend, Objectives, WQI, GEMS	CABIN (2004)
Cheakamus River at Cheakamus Lake Road	Control, increasing non-point and point source pollution anticipated from Whistler (Olympic) development	Federal-Provincial	26	Trend, Objectives, Control, WQI	
Callaghan Creek below Callaghan Lake	Control, increasing non-point and point source pollution anticipated from Olympic (Nordic) development. Could seek funding from VANOC.	Provincial	20	Trend, Objectives, Control, WQI	CABIN (2004)
Callaghan Creek u/s Cheakamus confluence	Increasing non-point and point source pollution anticipated from Olympic (Nordic) development. . Could seek funding from VANOC.	Provincial	26	Trend, Objectives, WQI	CABIN (2004)
Sumas River at International Boundary	Increasing non-point source (agriculture) loads and impacts, trans-boundary river. PSF, PE site.	Federal-Provincial	26	Trend, Objectives, WQI	CABIN, PSF, PE (FRAP, 2003)

Omineca-Peace Region	Rationale & Issues	Responsibility	Annual Frequency	Reporting	Additional Monitoring Initiated
Fraser River at Red Pass	Control for Fraser River, province, and nationally; climate change impacts; fisheries. BC and Cdn Heritage River. GEMS site.	Federal-Provincial	26	Trend, Objectives, WQI, GEMS	CABIN (FRAP, 2006)
Nechako River at Prince George	Kemano Project, fisheries, control for mid-Fraser. Could maybe reduce frequency.	Provincial	26	Trend, Objectives, WQI	
Peace River above Alces River	Dams, refinery, pulp mill, fisheries, transprovincial leaving BC. Could maybe reduce frequency. BC Heritage River	Federal-Provincial	13	Trend, Objectives, WQI	
Skeena Region					
Salmon River near Hyder, Alaska	Improving/problem water quality, metal mining (historic gold mine releases), fisheries, transboundary leaving BC. Potential glacier effects due to climate change	Federal	26	Trend, Objectives, WQI	
Iskut River below Johnson River	Metal mining, fisheries, major tributary to transboundary river leaving BC.	Federal	26	Trend, Objectives, WQI	
Bear River at Stewart	CESI station; Coastal control, historic mining activity in basin, historic concerns for arsenic and selenium, re-activated (former federal site); re-assess after 3-5 years of data.	Federal	26	Trend, Objectives, Control, WQI	
Skeena River at Usk	High fisheries values, represents large land base, loadings, GEMS site.	Provincial	26	Trend, WQI, GEMS	
Thompson Region					
Thompson River at Spences Bridge	Improving water quality, pulp mill, municipal effluents, fisheries	Provincial	26	Trend, Objectives, WQI	
Salmon River at Highway 1 Bridge	Water quality problems due to agriculture, poor water quality, NPS, fisheries, water supply, watershed restoration underway, PSF, GEMS site	Federal-Provincial	26	Trend, Objectives, WQI, GEMS	CABIN (FRAP, 2004), PSF
Nicola River at Mouth	Agricultural impacts, named one of the most endangered rivers in BC, temperature and nutrient concerns	Provincial	13	Trend, Objectives, WQI	CABIN (FRAP, 2006)

Vancouver Island Region	Rationale & Issues	Responsibility	Annual Frequency	Reporting	Additional Monitoring Initiated
Quinsam River near the Mouth	Declining water quality from coal mining, fisheries and fish hatchery, potential water supply	Provincial	26	Trend, Objectives, WQI	CABIN (2003)
Tsolum River below Murex Creek	Poor water quality due to abandoned mine, fishery eliminated, remediation planned	Provincial	26	Trend, Objectives, WQI	CABIN (2003)
Cowichan River near the mouth	Fair water quality due to non-point sources of pollution & remediation planned; Canadian Heritage River	Federal-Provincial	26	Trend, Objectives, WQI, GEMS	CABIN (2003)
Englishman River at Lower Hwy Crossing	Water quality impacted due to u/s agriculture, forestry and urban impacts, community group involvement	Provincial	26	Trend, Objectives, WQI	CABIN (2004)

SCHEDULE B (2010-11)

Part 1.2 Federal - Provincial Monitoring Activities

Activities	Estimated Federal Share $	Estimated Provincial Share $
Routine Water Quality Monitoring • Operate the 39 Federal-Provincial water quality monitoring stations listed in Part 1.1, including quality assurance monitoring (blanks, replicates, & blind reference samples), & safety and quality assurance audits.	**336,000**	**339,400**
Quality Assurance (QA) & Safety • Plan, implement and audit a quality assurance & safety program for the monitoring stations listed in Part 1.1, including analysis of lab & field QA data. • Initiate 2007-2009 data approvals for ENVIRODAT data	**21,500**	**12,500**
Biological (Benthic Invertebrate) Monitoring • CABIN sampling at Federal-Provincial stations	**12.000**	**24,600**
Data Assessment • Completion of water quality assessment reports and journal articles • Produce regional WQI report	**38,500**	**23,500**
Data Exchange • Implement F-P data transfer from ENVIRODAT to EMS for 2008-09 metals data	**0**	**8,000**
TOTALS	**408,000**	**408,000**

SCHEDULE D (2010-11)

ESTIMATED ANNUAL COSTS	Estimated Federal Share $	Estimated Provincial Share $
Routine Water Quality Monitoring		
• Laboratory Services	61,600	150,000
• Staff (Regions & Headquarters)	75,600	25,000
• Travel	7,000	1,000
• Shipping (to and from lay collectors & Maxxam; from Maxxam to NLET)	19,200	19,200
• Operations support	65,000	58,500
• Contracts (lay collectors)	32,600	32,600
• Hydrometric Costs (Tsolum River)	0	8,800
• Priority Ecosystem Initiative	60,000	29,300
• Fraser River Buoy	6,000	6,000
• Equipment	9,000	9,000
Subtotal	**336,000**	**339,400**
Quality Assurance (QA) & Safety		
• Laboratory Services (included in Routine Water Quality Monitoring)	0	0
• Staff (includes staff time for audits, data approvals & QAWG)	20,000	5,000
• Contracts for QA consulting	0	6,250
• Travel	1,500	1,250
Subtotal	**21,500**	**12,500**
Biological (Benthic Invertebrate) Monitoring		
• CABIN sampling at FP stations (O&M)	12,000	24,600
Subtotal	**12,000**	**24,600**
Data Assessment		
Staff Time		
• Kootenay Basin/Elk River journal article	4,000	5,000
• Fraser Basin Report	18,000	5,000
• Bear River journal article	5,500	10,000
• Regional WQI Report	8,000	2,000
• **Travel**	3,000	1,500
Subtotal	**38,500**	**23,500**
Data Exchange & Management		
• Data transfer ENVIRODAT to EMS	0	8,000
Subtotal	**0**	**8,000**
TOTALS	**408,000**	**408,000**