INDEX SITES FOR AQUATIC ECOREGIONS OF BRITISH COLUMBIA

Submitted to

Ministry of Environment, Lands and Parks
Water Quality Branch
Victoria, B.C.

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January 29, 1999

Citation: Perrin, C.J. and C.A. Blyth. 1999. Index sites for aquatic Ecoregions of British Columbia. Prepared by Limnotek Research and Development Inc. and AXYS Environmental Consulting for Ministry of Environment, Lands and Parks. Water Quality Branch. Victoria, B.C. 56p plus map.

Figure 1. Index sites in aquatic ecoregions of British Columbia.

SUMMARY

The aquatic ecozone classification for British Columbia was further developed by selecting and assigning index lakes and streams to each aquatic Ecoregion. An index site was defined as:

1. a sampling location from which water quality data have been collected and can continue to be collected;
2. a location having ready access for routine sampling.
3. a location that is not affected by pollution sources or is affected less than other sites in the Ecoregion.
4. a location considered representative of general limnology and water quality in the Ecoregion in which it is present.

When maintained as an operational activity, compilation of data from index sites helps to:

- simplify searches via a graphical user interface for chemical characteristics of Ecoregions in B.C.
- provide zonal reference locations from around the Province that can be used in impact assessments, monitoring programs and Province-wide water management.

Three tasks were involved in selecting and mapping the index sites. First, the aquatic ecozone classification database (AECD) that was developed in phase 1 of the aquatic ecozone classification was searched to select candidate sites within each Ecoregion on the basis of data adequacy. A survey was then sent to water quality specialists in regional offices of BC Environment requesting recommendations on the selection of sites. Interactive discussion between the regional specialists and the project manager resulted in the final selection of sites. A colour themed map was then produced to display the distribution of index sites for streams and lakes throughout the Province.

A total of 55 index lakes and 50 index streams were selected among the 45 Ecoregions of British Columbia. With the exception of the very remote Hecate Lowland where only an index lake was selected, at least one stream and one lake or reservoir was selected from each Ecoregion. In some Ecoregions where large ecological variability existed, more than one lake or stream was selected. The sites are identified on a map that accompanies this report.

Sample sizes for each of the chemical attributes that characterised the sites in the existing AECD were generally small. 58% of the 170 lake site and attribute combinations had sample sizes $\leq$10. 50% of the 158 stream site and attribute combinations had sample sizes $\leq$10. Some sites where long term monitoring has been active had abundant data.

Water quality at 27% of the recommended lake sites and 28% of the stream sites was thought to be modified to some extent by land disturbance, point source discharges

or non-point source discharges of contaminants. All other sites were not affected by pollution sources. The impacted sites were thought to be least affected of all lakes and streams in the respective Ecoregions. Disturbance or pollution sources potentially affecting these sites included forest harvesting, agriculture, shoreline development (mainly cabins or houses on septic tanks), wastewater treatment plants, and low level metals transport from inactive mine sites.

Routine and standardised water monitoring is required to maintain index sites. It is recommended that water samples be collected seasonally and analysed for basic variables used in the aquatic ecozone classification plus variables of regional interest. Logistics of sample collections should be managed from regional offices, but data compilation should be organised centrally. Field costs may be reduced by using volunteers to collect samples under supervision of regional water quality specialists.

Some hard decisions are required for maintaining an index site network, particularly at times severe funding restrictions. There are great benefits to maintaining index sites but they come with some, albeit not large, direct and indirect costs associated with sample collection, lab services, data compilation, data management and ideally an interactive internet web site to facilitate access to information. The process will be highly cost effective in contributing to water management in B.C. over the long term, but there must be a sincere willingness to contribute and use the system to realise its greatest benefits and fully justify its costs.

ACKNOWLEDGEMENTS

This project was completed with the assistance of several people. Dr. Rick Nordin (Ministry of Environment Lands and Parks (MOELP)) recognized the need for index sites within the aquatic ecozone classification and he was instrumental in implementing the project and accessing funding. Dr. Nordin was the contract manager at MOELP and we thank him for our many technical discussions and for considerable latitude in defining the scope of work. We thank all respondents to the questionnaire and all people who contributed to the selection of index sites. Those people in regional MOELP offices included: Bruce Carmichael (MOELP/Prince George), Bob Grace (MOELP/Kamloops), Jim Bryan and Vic Jensen (MOELP/Penticton), Brent Moore (MOELP/Surrey), Ian Sharpe (MOELP/Smithers), John Deniseger (MOELP/Nanaimo), Jennifer Simpson and Norm Zirnhelt (MOELP/Williams Lake), Julia Beatty Spence (MOELP/Nelson), and Les McDonald (MOELP/Cranbrook). After index sites were selected, Lindsey Giles (AXYS Environmental Consulting) ran overlay analyses to produce a table of chemical attributes for each index site and Allison Peacock (AXYS Environmental Consulting) produced the hard copy maps.

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1.0 INTRODUCTION

In the first phase of the Aquatic Ecozone Classification for B.C. (Perrin and Blyth 1998) a hierarchical framework was developed to describe regional variation in chemical characteristics of aquatic ecosystems in British Columbia. It involved organizing water quality data for the whole Province in three spatial strata: 245 watershed groups within 45 Ecoregions within 9 Ecoprovinces (Appendix A). The classification was an updated version of the regional lake productivity map originally completed by Northcote and Larkin (1964). Unlike the original Northcote and Larkin (1964) work, the present classification is supported with a data base (called the aquatic ecozone classification data base or AECD) containing more than 300,000 records of wide ranging chemical characteristics in streams and lakes. Data summaries can be interactively explored and manipulated using a graphical user interface in ArcView, the standard GIS used by the British Columbia Ministry of Environment Lands and Parks (MOELP). The classification system and data base is suitable for periodic updates using GIS procedures and it was designed to compliment the existing terrestrial ecoregion classification (Demarchi 1995) and biogeoclimatic classification (Krajina 1965), that have become standards for mapping and understanding regional variation in ecosystem structure in British Columbia.

Within the aquatic ecozone classification, the basic and smallest unit is a Watershed Group. Several Watershed Groups are called Ecoregions and groups of Ecoregions are called Ecoprovinces. Definitions reported by Perrin and Blyth (1998) are as follows:

Ecoprovince: an area where there are consistent climatic processes, geology, lithology and relief that determine characteristics of aquatic ecosystems at the sub-continental level.

Ecoregion: an area within an Ecoprovince where there is minor macroclimatic variation, and a characteristic lithology and geomorphology that can influence morphometry and surface chemistry of aquatic ecosystems. Large lakes, reservoirs and rivers characterize an Ecoregion and biogeochemical processes within those systems are recognized to influence water quality.

Watershed Group: a precinct enclosing aquatic features at the sub-basin scale that is practical for detailed mapping of water quality characteristics.

Statistical attributes for a select list of water quality parameters were described and used by Perrin and Blyth (1998) to characterise the spatial variation in water quality across the Province. The short list of chemical parameters that was compiled quantitatively and by expert opinion included: TDS, alkalinity, pH, total phosphorus, colour,

and suspended solids or turbidity (streams only) (Perrin and Blyth 1998). The chemical attributes were used in combination with descriptions of climatic, geological, lithological, biogeochemical and limnological features to provide a general description of water quality among and within Ecoprovinces.

Potential applications of the aquatic ecozone classification and user interface to the AECD are as follows:

1. Provide data to assess the status and trends in the quality of surface-water resources in British Columbia;
2. Provides easy access to water quality data in British Columbia;
3. Provides a framework for setting water quality objectives to ecozones;
4. Provides information for establishing zonal reference sites for long term monitoring of key water quality variables;
5. Provides information to identify regional differences in the abundance of data pertaining to any variable of interest and thereby assist in planning data collection activities in the Province;
6. Provides descriptions of regional limnological and water quality characteristics;
7. Provides a data management system that will standardize data collection and improve data access for water quality assessments;
8. Provides a technical framework for preparation of an internet web site from which data can be examined and downloaded for optimizing time used for water quality assessments;
9. Provides for easy exchange of limnological information between scientists, resource managers, resource development companies, and resource interest groups.

In this phase 2 of the project, an index site will be selected for lakes and streams within each Ecoregion. Each site can be considered a location where typical water quality for an Ecoregion can be found. It is anticipated that the selection of these sites on the graphical user interface (GUI) will provide a quick reference to typical characteristics of water quality in any given Ecoregion. Objectives for the selection of index sites is to:

- simplify searches on the GUI for chemical characteristics of Ecoregions in B.C.
- provide zonal reference locations from around the Province that can be used in impact assessments and monitoring programs.
- provide quick reference to a summary of water quality data that is typical within any Ecoregion of B.C.

2.0 DEFINITION OF AN INDEX SITE

An index site can be defined as a location where typical water quality for an Ecoregion can be found and where water quality data can be routinely collected. To satisfy this definition, logistical and limnological criteria must be met as follows:

5. It is a sampling location from which water quality data have been collected and can continue to be collected;
6. It has ready access for routine sampling. Ready access in this respect means a site that has direct vehicle access and where necessary, a boat can be easily launched. Access by aircraft is generally not a criteria because the cost of routine sampling by air may be prohibitive. Ideally, most sites are close to routes that are regularly traveled and sampling can be completed by personnel from MOELP while en route to complete other tasks. Alternatively, sites are close to habitation where volunteers may be available or small contracts can be set up with local individuals to complete water sampling on an assigned frequency with little required travel time.
7. It is not affected by pollution sources. Where a very large number of sites in an Ecoregion are characterized by water affected by pollution, a site that is least affected is selected.
8. It is considered representative of general limnology and water quality in the Ecoregion in which it is present.

The viability of an index site is dependant on the existence of data that can be used to describe water quality. For present purposes of selecting index sites, immediate availability of data is an asset, but sites may also be accepted if there is intent to support data collection in the future or data exists for the site but it is not yet on the data base used for the Aquatic Ecozone Classification. For this reason, index sites that are listed in this report are only recommended sites. Those which are presently supported with adequate and available data, can be used as index sites immediately, but those which do not presently have adequate data or the data are not in the data base are only recommended. They could be accepted pending additional sample collection and data analysis. The potential use of a recommended site will be dependant on funding, available time for personnel to collect data and have it logged into the data base, and a willingness to adopt an index site system of water quality data by regional offices.

For some Ecoregions, water quality data are sparse or non-existent. Where these sites are encountered, the requirement of having a data history will obviously have to be compromised in favour of the other criteria. In these situations, reliance is placed on local knowledge of access, proximity to pollution sources and whether the site is representative from a limnological viewpoint.

A focus of the Ecoregion descriptions by Perrin and Blyth (1998) was to interpret chemical attributes within an Ecoregion with respect to known climatic, physiographic, geological, biogeochemical, and limnological processes that can determine zonal variation. Expert opinion from specialists at a workshop that was run to assist in delineating ecozones (Perrin and Blyth 1998) indicated that biological indices should be avoided in describing zones because those indices are subject to seasonal variation that

may confound zonal variation. For this reason, variables that are subject to biological control (e.g. chlorophyll a and dissolved oxygen concentrations) were not included in the variable list. This approach meant that zonal descriptions were mainly based on physical and inorganic chemical data.

To be sensitive to these dynamics, relatively small and moderate-sized streams and lakes are favoured in the selection of index sites within any one Ecoregion because they are more reactive to physico-chemical forces. Relatively large rivers and lakes were considered independent within an Ecoregion because their limnology is very different from that of small lakes and streams (e.g. Wetzel 1983, Vannote et al. 1980, Minshall et al. 1985). For this reason, a unique index site was established in a large lake, reservoir, or river if present in an Ecoregion in addition to the main index site being established on a representative smaller lake and stream. Applications of data collected from the large systems can be similar to those for the smaller steams and lakes as listed in Section 1.0 but they would be spatially limited to the large systems within Ecoregions. Examples of large systems include the Nechako Reservoir in the Nechako Plateau Ecoregion, Atlin Lake in the North Coastal Mountains Ecoregion, Babine Lake in the Babine Uplands Ecoregion, Okanagan Lake in the Okanagan Ecoregion, the Fraser River, and the Columbia River.

3.0 METHODS

Three tasks were involved in selecting and mapping the index sites. First, the AECD was searched to select candidate sites within each ecoregion having adequate chemical data. A survey was then sent to regional offices of BC Environment requesting input of local knowledge and recommendations on the selection of sites. Interactive discussion resulted in the final selection of sites and a colour themed map was then produced to display the distribution of index sites for streams and lakes throughout the Province.

3.1 Data Base Search

Using the AECD, standard sorting techniques in Visual dBase were used to select candidate stations within each Ecoregion. From the compiled data record, we selected the top 5 sites that had the greatest number of parameters sampled, the top 5 having the largest number of measurements, and the top 5 having the greatest data diversity in each Ecoregion. Diversity in this case was arbitrarily defined as number of measurements multiplied by number of parameters.

3.2 Survey of local knowledge from regional offices

A survey was sent to regional BC Environment offices requesting input and recommendations on the selection of index sites from all Ecoregions within the relevant management areas. Impact assessment specialists in BC Environment offices were selected specifically because they routinely deal with water quality issues and they are more familiar with water quality characteristics in lakes and streams than other people around the Province. Many of these people were familiar with the ecozone classification process, having attended the workshop that occurred in Phase 1 of the ecozone project during which the first delineation of ecozones was completed. After the survey had been distributed, telephone calls were made to the survey recipients to clarify uncertainties and address questions. The time for responses to be completed was initially set at two weeks but then it was extended to whatever time was required to ensure that responses were received from all recipients. People responding to the survey and those indirectly providing information through consultation with recipients in regional offices are listed in Table 1.

Table 1. Recipients and respondents of the survey in which opinion on the selection of index sites was requested.

Name	Office and Position	Management Area
Bruce Carmichael	MOELP, Prince George Impact Assessment Biologist	Omineca-Peace
Ian Sharpe	MOELP, Smithers Impact Assessment Biologist	Skeena
Brent Moore	MOELP, Surrey Environmental Impact Officer	Lower Mainland
John Deniseger	MOELP, Nanaimo Environmental Biologist	Vancouver Island
Jennifer Simpson	MEOLP, Williams Lake Impact Assessment Biologist	Caribou
Norm Zirnhelt	MOELP, Williams Lake Environmental Section Head	Caribou
Bob Grace	MOELP, Kamloops Impact Assessment Biologist	Southern Interior
Jim Bryan	MOELP, Penticton Head, Environmental Assessment	Southern Interior
Vic Jensen	MOELP, Penticton Impact Assessment Biologist	Southern Interior

Name	Office and Position	Management Area
Julia Beatty Spence	MOELP, Nelson Environment Section Head	Kootenays
Les McDonald	MOELP, Cranbrook Impact Assessment Biologist	Kootenays

The survey asked for one lake site and one stream site to be recommended for each Ecoregion. The survey was structured as a letter (sample given in Appendix B), first giving background on the development of aquatic ecozones in British Columbia, and then providing criteria (as described in section 2.0) for the selection of index sites. For each Ecoregion within the relevant management area, information was supplied to assist the regional specialist in recommending an index stream and index lake. The information included:

- Map of B.C. Ecoregions within Ecoprovinces.
- a sorting of the AECD as described in Section 3.1, with identification of the top five lake and stream sites based on data availability for the relevant Ecoregions.
- Colour-themed map of the relevant management area showing the enclosed ecozones and locations of the top 5 candidate streams and lakes that resulted from the data search.

Recipients were asked to recommend sites that met the criteria described in section 2.0. While the data base search provided a short list of sites based on data adequacy, it was not sensitive to local logistical constraints that had to be considered for data collection over the long term. Issues of access, whether sites on the short list were representative of the Ecoregion and proximity to pollution sources could only be dealt with by direct consultation with the regional water quality specialists who have the local experience. It was anticipated that in some cases this process would yield sites for which data have not been collected. For example, abundant data from disturbed sites may meet the requirement for data adequacy but not the requirement that sites not be contaminated or affected by pollution sources. Local input corrected this problem by recommending sites that are remote from impacts despite the fact that data for those sites may be limited or even absent from the digital data base. In this respect, location took precedence over data adequacy in cases where one criteria or the other had to be used for site selection.

3.3 Final Selection of Index Sites and Mapping

In the process of completing the survey, numerous discussions occurred between the regional water quality personnel and the project manager to resolve uncertainty and questions. Through this interactive process and from information

provided as written responses to the survey, the final selection of an index site for streams and one for lakes in each of the 45 Ecoregions was made.

In some cases, this discussion was not required. Criteria of data adequacy and proximity to pollution sources could be met and local input regarding access was all that was required to select sites from the short list of top 5 candidate sites. In these cases, the selection of sites by the regional people in the survey responses were accepted without discussion.

Using the digital map template that was used for production of maps showing Ecoprovinces, Ecoregions, and Watershed Groups in the first phase of the Ecozone classification, another map was produced showing the location and name of all index lakes and streams. The base map which delineates Provincial boundaries, shorelines, lakes and streams is the BC portion of a 1:1,000,000 digital chart of the world. Polygons outlining the ecozones were digitized onto the base map, where watershed groups were the same as those published in the BC Watershed Atlas. All index sites were placed on the map and labeled using georeference information from the sampling location. Map production was completed using ArcView.

4.0 RESULTS AND DISCUSSION

4.1 Data base Search

Amount of data compiled for the top five sites among Ecoregions varied greatly (Table 2). Among the top 5 lake sites within Ecoregions, as few as 4 chemical parameters and 8 samples per site are recorded in AECD, mainly from Ecoregions that are relatively remote (e.g. Upper Fraser Highlands, Omineca Mountains). In contrast, many of the top 5 lake sites that have been regularly sampled in Ecoregions closer to habitation have a data record of up to 35 chemical parameters measured from >3,000 sample collections per site (e.g. Puget Basin, Okanagan, Sayward). The same variation showed up in data from the top 5 stream sites: a minimum of 3 parameters from only 3 samples per site in the Southern Inlets and Kinbasket Ecoregions compared to a maximum of 28 parameters from more than 2,000 sample collections per site from each of the Columbia Mountains and Southern Rockies.

In some of the more remote Ecoregions, data was particularly sparse, even to the point where there were <5 available sites having data. The lack of data from stream sites was particularly prevalent (e.g. Hecate Lowland, Kinbasket, Liard Plateau, Nechako Plateau, Owikeno Ranges, Skeena Mountains, Taiga Plains, Takla/Manson Plateau). For those Ecoregions where the number of sites was limited or water quality records do not

appear in AECD, the criteria of having a data history was dropped. Logistics, access, and proximity to known pollution sources were the main criteria used in the selection of index sites for those Ecoregions. The expectation in these cases was that sample collection from selected sites could and would be implemented in the future as part of an index site sampling plan (see recommendations in section 5.0).

Table 2. Median and mean number of chemical parameters and number of samples in AECD for the five sites having most compiled data, by Ecoregion.

Ecoregion	Lakes				Streams				Comment
	# parameters per site		# samples per site		# parameters per site		# samples per site		
	median	mean	median	mean	median	mean	median	mean	
Babine Upland	16	19	231	373	15	12	86	61	
Bulkley Basin	18	19	195	324	18	18	1274	1433	
Caribou Plateau	22	22	48	49	24	24	178	327	
Cassiar Ranges	16	15	48	44	19	18	64	64	
Central Interior Plateau	21	20	176	222	21	21	530	640	
Chilcotin Ranges	18	21	33	40	17	18	102	101	
Columbia Mountains	25	24	1978	3548	16	16	2412	2061	
Dean River	13	12	24	22	18	16	31	32	
Eastern Pacific Ranges	12	13	12.5	25	26	26	145	210	
Exposed Fjords	20	22	32	35	13	13	310	464	
Georgia Basin	30	30	529	924	7	7	588	621	
Hecate Lowland	9	8	129	97					no stream sites
Kinbasket	13	14	26	194	3	3	3	3	1 stream site only
Liard Plateau	10	10	24.5	39	15	15	29	29	1 stream site only
Lower Nechako	21	21	170	200	13	13	255	349	
Muskwa Ranges	9	9	17	17					2 lake sites and no stream sites
Nass Basin	16	16	16	21	11	11	18	18	2 stream sites only
Nass Ranges	15	15	43	112	15	15	578	464	
Nechako Plateau	13	13	22	24	16	16	16	16	1 stream site only
Nimpkish	23	22	163	131	6	6	14	17	
North Coastal Mountains	24	24	29	168	20	20	519	477	
Northern Rockies	14	13	54	108	14	15	182	180	
Northern Pacific Ranges	12	10	12	13	21	17	36	35	
Okanagan	26	27	3120	3311	16	18	1853	1660	
Omineca Mountains	4	7	8	15	12.5	13	45	45	2 stream sites only
Owikeno Ranges	10	10	82.5	83					2 lake sites and no stream sites
Peace Plains	19	20	480	857	14	14	321	318	
Pothole Lakes	25	24	396	841	21	20	925	950	
Puget Basin	35	35	2473	3272	4	5	38	44	

Ecoregion	Lakes				Streams				Comment
	# parameters per site		# samples per site		# parameters per site		# samples per site		
	median	mean	median	mean	median	mean	median	mean	
Queen Charlotte Islands	25	24	129	112	6	7	45	67	
Quesnel Highlands	23	24	147	361	21	21	283	328	
Sayward	30	31	3114	3322	7	7	240	350	
Shuswap Highlands	26	26	1911	1745	24	24	1044	1039	
Skeena Mountains	14	14	43	40					no stream sites
Southern Inlets	20	18	22	22	3	3	3	3	3 stream sites only
Southern Pacific Ranges	30	29	393	696	28	28	433	439	
Southern Rockies	17	19	33	47	16	16	2568	2712	
Southern Selkirk Mountains	8	10	16	42	14	15	1211	1254	
Stikine Plateau	16	16	48	47	20	20	172	450	
Taiga Plains	8	8	14.5	15					no stream sites
Takla/Manson Plateau	10	9	10	15	9	9	38	38	1 stream site only
Thompson Plateau	21	21	165	173	21	21	789	1033	
Upper Fraser	26	24	453	625	14	14	550	566	
Upper Fraser Highlands	4	4	20	24	14	14	230	326	
Windward Island Mountains	30	29	778	1322	12	12	159	152	

4.2 Survey Results and Selection of Index Sites

The survey was distributed to the regional MOELP offices in March, 1998 and all written responses were received by the end of July, 1998. Thereafter, discussion of the selections continued by telephone and email. All sites were selected for mapping by the end of October, 1998.

In completing the survey, suggestions were made to change four Ecoregion names and one Ecoregion boundary as originally defined by Perrin and Blyth (1998). The changes were accepted as follows:

- The Upper Fraser Trench was changed to Upper Fraser Highlands to reflect its high elevation characteristics;
- The Thompson-Okanagan Plateau was changed to the Thompson Plateau because the Ecoregion does not include areas of the Okanagan which is in the Ecoregion to the south;
- The Central Rocky Mountains was changed to the Northern Rockies because there was no Ecoregion with a Rocky Mountain name further to the north;
- The Bute Inlets was renamed Southern Inlets to avoid using a name that favoured one inlet over another;

- The Ecoregion originally called South Pacific Ranges was actually one small watershed group called Jervis Inlet. There was little justification in keeping it as a small Ecoregion unto itself and from a climatic point of view it can be considered part of the Georgia Basin as has been done in recent papers describing regional water quality (e.g. Young 1996). For this reason, South Pacific Ranges was retained as a watershed group called Jervis Inlet but assigned to the Georgia Basin Ecoregion.

The revised listing of Ecoregion names is provided in Appendix A.

Recommended index lakes and streams are listed in Tables 3 and 4 respectively. With the exception of the Hecate Lowland Ecoregion, at least one lake and one stream site was selected for each of the 45 Ecoregions. Due to inaccessibility for routine sampling, a stream site was not selected in the Hecate Lowlands. Where a large reservoir and many smaller lakes were dominant aquatic features, one lake site and a reservoir site was selected (e.g. Chilcotin Ranges, Nechako Plateau, Sayward, Southern Selkirk Mountains, Kinbasket). A large and small lake were assigned index status in some Ecoregions where one or two large lakes were present with a larger number of much smaller lakes (e.g. Southern Inlets, Windward Island Mountains, Columbia Mountains, Shuswap Highlands, and Babine Upland). Two stream sites (high and low elevation) were assigned where elevational variation that can influence water chemistry was a strong feature of the Ecoregion (e.g. Chilcotin Ranges). Where there were large and small rivers present in the same Ecoregion (e.g. Columbia Mountains, Southern Selkirk Mountains, Southern Pacific Ranges), a small and large stream index site was selected. The Georgia Basin was unique by including an index stream and lake on each of the mainland and Vancouver Island sides of the Ecoregion. In total, 55 index lake sites and 50 index stream sites were selected. The distribution of index site names and numbers as they are presently logged into AECD are shown in Figure 1.

84% of the selected lake sites and 82% of the stream sites were well known to the regional biologists who completed the survey or project team members. Four lake sites and three stream sites that were selected using the data base search were completely unknown, having not been visited by any people who were contacted and had not been examined with respect to water quality issues, despite some data history. These lakes included site E206391 in the Nechako Plateau, DFOS_30 in the Hecate Lowland, DFOS_3 in the Queen Charlottes, and RL5_7 in the Upper Fraser Highland. The unknown streams included SROS_bscl in the Nass Basin, SROS_d2 in the Babine Upland, and SROS_rcw4 in the Omineca Mountains. Other streams and lakes within the unknown category were familiar to regional biologists or project members but there was little or no data history from which to assess general water quality. These lakes included Atlin Lake in the North Coastal Mountains (one of the largest pristine lakes in the Province but without a data history), Owikeno Lake in the Owikeno Ranges, Connor Lake in the Southern Rockies, Boomerang Lake in the Babine Upland, Germansen Lake in the Omineca Mountains. The stream sites included MacIvor Creek in the Nechako Plateau,

Chapman Creek in the Georgia Basin, Theodosia River in the Southern Inlets, and the Liard River in the Liard Plateau. Despite uncertainties about the selection of these unfamiliar sites, no other sites appeared to be better choices in the respective Ecoregions.

80% of the lake sites and 70% of the stream sites were those in the top 5 sites in AECD having greatest number of water quality parameters measured, greatest number of samples collected, or greatest data diversity of all sites examined in the respective Ecoregions (Tables 3 and 4). Where a top 5 site, in terms of available data, was not selected, it was known to be affected by an anomalous pollution source that had affected the site historically or could affect water quality in the future or it was not considered representative of the Ecoregion. Alternative sites that were selected were known from local knowledge to be representative of the Ecoregion and separated from effects of land disturbance or other pollution sources as much as was considered typical of least disturbed lakes and streams in the Ecoregion.

Despite many of the sites being data-rich compared to other locations in the AECD, greatest sample sizes for each of the chemical attributes that characterised the sites were generally small (Tables 5 and 6). 58% of the 170 lake site and attribute combinations had sample sizes $\leq$10 and 94% had sample sizes <100. Similarly, 50% of the 158 stream site and attribute combinations had sample sizes $\leq$10 and 82% had samples sizes <100. In contrast, a few sites where long term monitoring has been active had abundant data. These sites included:

- Kootenay Lake (long term enrichment studies and restoration),
- Okanagan Lake (wastewater treatment monitoring and basin planning),
- Buttle Lake (long term mine impact monitoring),
- Lizard Lake (acid rain trend analysis),
- Kootenay River at Picture Valley (Federal/Provincial monitoring program),
- St. Mary River (control site for past Cominco discharge monitoring),
- Nechako River at Fort Fraser (monitoring for Kemano Completion and mitigation activities),
- Similkameen River (long term agriculture and mine impact monitoring)
- Elk River (mine impact monitoring)
- Columbia River at Birchbank (Federal/Provincial monitoring program)
- Nicola River at Spences Bridge (agriculture impact monitoring)
- Fraser River at Hansard (Federal/Provincial monitoring program).

While the recommended index sites did meet the criterion of having data, it was clear that at more than half of the sites, the amount of data was small and not adequate with which to conduct statistical analysis that may be required for meeting objectives of an index site system (Section 1.0). Data ranges and median values for the measured parameters are listed in Tables 5 and 6 and descriptions of chemical characteristics of

ecozones where the index sites are located was prepared by Perrin and Blyth (1998). More robust and really useful analyses that may include time series or repeated measures analysis or spatial and temporal comparisons are generally not possible with the available data that is logged into AECD. For this reason, data precision must be improved with routine water sample collections and potentially with sources of data that were not originally logged into AECD but are known to exist in independent data bases. A possible strategy for doing this is outlined in Section 5.0.

Table 3. Recommended index lake and reservoir sites including site numbers that are shown on the accompanying map.

Management Area	Ecoprovince	Ecoregion	Lake/reservoir Name	Site Number	In Top 5 Sites having most data in AECD?
Skeena	Central Interior	Bulkley Basin	Tyhee Lake	1131009	yes
Caribou	Central Interior	Caribou Plateau	Crooked Lake near Center	1170017	yes
Southern Interior	Central Interior	Central Interior Plateau	Watch Lake	E220537	yes
Southern Interior	Central Interior	Chilcotin Ranges	Tyaughton Lake, centre	1131201	no
Southern Interior	Central Interior	Chilcotin Ranges	Seton Lake at dam	E231397	no
Caribou	Central Interior	Dean River	Nimpo Lk. At center	E206952	yes
Omineca-Peace	Central Interior	Lower Nechako	Fraser Lake deep stn	400411	yes
Skeena	Central Interior	Nechako Plateau	unknown	E206391	yes
Skeena	Central Interior	Nechako Plateau	Ootsa Lake at Ootsa		no
Caribou	Central Interior	Pothole Lakes	Lac La Hache off Emerald Is.	603015	yes
Lower Mainland	Coast and Mountains	Eastern Pacific Ranges	Kawkawa Lake	300150	yes
Skeena	Coast and Mountains	Exposed Fjords	Lachmach Lake	E206345	yes
Vancouver Island	Coast and Mountains	Georgia Basin	Stocking Lake	E206290	yes
Lower Mainland	Coast and Mountains	Georgia Basin	Sakinaw Lake		no
Skeena	Coast and Mountains	Hecate Lowland	unknown	DFOS_30	yes
Skeena	Coast and Mountains	Nass basin	Yellen L	E223605	yes
Skeena	Coast and Mountains	Nass Ranges	Lakelse Lake	400313	yes
Vancouver Island	Coast and Mountains	Nimpkish	Quatse Lake	E216693	yes
Skeena	Coast and Mountains	North Coastal Mountains	Atlin Lake		no
Caribou	Coast and Mountains	Northern Pacific Ranges	Horn Lk at Deepest Pt.	E206674	yes
Caribou	Coast and Mountains	Owikeno Ranges	Owikeno Lake		no
Vancouver Island	Coast and Mountains	Puget Basin	Maxwell Lake on Saltspring Island	1130022	yes
Skeena	Coast and Mountains	Queen Charlotte Islands	unknown	DFOS_3	yes
Vancouver Island	Coast and Mountains	Sayward	Buttle Lake north	130088	yes
Vancouver Island	Coast and Mountains	Sayward	Upper Quinsam Lake	1130098	no
Lower Mainland	Coast and Mountains	Southern Inlets	Powell Lake		no
Lower Mainland	Coast and Mountains	Southern Pacific Ranges	Harrison Lake	300044	yes
Vancouver Island	Coast and Mountains	Windward Island Mountains	Lizard Lake	E206283	yes
Vancouver Island	Coast and Mountains	Windward Island Mountains	Sproat Lake at outlet	E218226	no
Skeena	Northern Boreal Mountains	Cassiar Ranges	Jennings Lk.	1130689	yes
Omineca-Peace	Northern Boreal Mountains	Liard Plateau	Birches Lk.	1132217	yes
Omineca-Peace	Northern Boreal Mountains	Muskwa Ranges	Kluachesi Lk	1132051	yes
Skeena	Northern Boreal Mountains	Stikine Plateau	Butte Lake	E223362	yes
Omineca-Peace	Peace Plains	Peace Plains	Swan Lake	400935	yes
Southern Interior	Southern Interior	Okanagan	Okanagan Lake at Kelowna	500236	yes
Southern Interior	Southern Interior	Thomspon Plateau	Nicola Lake at deepest point	603006	yes

Management Area	Ecoprovince	Ecoregion	Lake/reservoir Name	Site Number	In Top 5 Sites having most data in AECD?
Kootenays	Southern Interior Mountains	Columbia Mountains	Kootenay lake	200034	yes
Kootenays	Southern Interior Mountains	Columbia Mountains	Windermere Lake	200051	yes
Kootenays	Southern Interior Mountains	Kinbasket	Mica behind dam	1100501	yes
Kootenays	Southern Interior Mountains	Kinbasket	Blackwater	1132233	yes
Caribou	Southern Interior Mountains	Quesnel Highlands	Quesnel Lake		yes
Southern Interior	Southern Interior Mountains	Shuswap Highlands	Mabel Lake at Tsuius Creek	500117	yes
Southern Interior	Southern Interior Mountains	Shuswap Highlands	Shuswap Lake west of Sorrento	500123	yes
Kootenays	Southern Interior Mountains	Southern Rockies	Connor Lake	E232242	no
Kootenays	Southern Interior Mountains	Southern Selkirk Mountains	Lower Arrow	200523	no
Kootenays	Southern Interior Mountains	Southern Selkirk Mountains	Slocan Lake Midlake-Silverton	200521	yes
Omineca-Peace	Southern Interior Mountains	Upper Fraser Highland	unknown	RL5_7	yes
Omineca-Peace	Sub-Boreal Interior	Babine Upland	Stuart Lake	E206957	yes
Skeena	Sub-Boreal Interior	Babine Upland	Boomerang Lake	11300334	yes
Omineca-Peace	Sub-Boreal Interior	Northern Rockies	Azouzetta Lake deep stn	E206655	yes
Omineca-Peace	Sub-Boreal Interior	Omineca Mountains	Germansen Lk	1134023	yes
Skeena	Sub-Boreal Interior	Skeena Mountains	Bob Quinn Lake	1130342	yes
Omineca-Peace	Sub-Boreal Interior	Takla Manson Plateau	Burden Lk	1134013	yes
Omineca-Peace	Sub-Boreal Interior	Upper Fraser	Bednesti Lk	400490	yes
Omineca-Peace	Taiga Plains	Taiga Plains	Marion Lake	1132029	yes

Table 4. Recommended index stream sites including site numbers that are shown on the accompanying map.

Management Area	Ecoprovince	Ecoregion	Stream Name	Site Number	In Top 5 Sites having most data in AECD?
Skeena	Central Interior	Bulkley Basin	Bulkley River at Quick	920088	yes
Caribou	Central Interior	Caribou Plateau	Canim R. above Canim Falls	600051	yes
Southern Interior	Central Interior	Central Interior Plateau	Bonaparte River u/s Clinton Cr.	600017	yes
Southern Interior	Central Interior	Chilcotin Ranges	Stein River near mouth	600027	yes
Southern Interior	Central Interior	Chilcotin Ranges	Cadwallader Creek u/s Bralorne	E217521	yes
Caribou	Central Interior	Dean River	Dean River u/s Lodge Cr.	600042	yes
Omineca-Peace	Central Interior	Lower Nechako	Nechako River u/s of Fort Fraser	400629	yes
Skeena	Central Interior	Nechako Plateau	MacIvor Creek inflow to Ootsa Lake		no
Caribou	Central Interior	Pothole Lakes	Bridge Creek at Horse Lake Rd.	600137	no

Management Area	Ecoprovince	Ecoregion	Stream Name	Site Number	In Top 5 Sites having most data in AECD?
Lower Mainland	Coast and Mountains	Eastern Pacific Ranges	Silverhope Creek	300048	yes
Skeena	Coast and Mountains	Exposed Fjords	Kitimat River at bridge	430025	yes
Vancouver Island	Coast and Mountains	Georgia Basin	Englishman River at highway	121580	yes
Lower Mainland	Coast and Mountains	Georgia Basin	Chapman Creek	300106	no
Skeena	Coast and Mountains	Hecate Lowland	unknown	DFOS_30	yes
Skeena	Coast and Mountains	Nass Basin	unknown	SROS_bscl	yes
Skeena	Coast and Mountains	Nass Ranges	Skeena River	920092	yes
Vancouver Island	Coast and Mountains	Nimpkish	Tsitika River	E207676	yes
Skeena	Coast and Mountains	North Coastal Mountains	Cascade Creek above Premier mine	E220201	no
Caribou	Coast and Mountains	Northern Pacific Ranges	McClinchy Creek	600304	yes
Caribou	Coast and Mountains	Owikeno Ranges	stream draining into Owikeno Lake		no
Vancouver Island	Coast and Mountains	Puget Basin	Shawnigan Creek at highway	127217	yes
Skeena	Coast and Mountains	Queen Charlotte Islands	Yakoun River	700173	yes
Vancouver Island	Coast and Mountains	Sayward	Salmon River at highway	127180	yes
Lower Mainland	Coast and Mountains	Southern Inlets	Theodosia River		no
Lower Mainland	Coast and Mountains	Southern Pacific Ranges	Norrish Creek	300029	yes
Lower Mainland	Coast and Mountains	Southern Pacific Ranges	Squamish River	300194	yes
Vancouver Island	Coast and Mountains	Windward Island Mountains	Gold River at highway	E207792	no
Omineca-Peace	Northern Boreal Mountains	Cassiar Ranges	Galen Creek	400403	yes
Omineca-Peace	Northern Boreal Mountains	Liard Plateau	Liard River at Liard R.		yes
Omineca-Peace	Northern Boreal Mountains	Muskwa Ranges	Toad River at highway		no
Skeena	Northern Boreal Mountains	Stikine Plateau	upper Bearskin Creek	E215755	no
Omineca-Peace	Peace Plains	Peace Plains	Peace River 3.2 KM u/s of FSJ	400134	yes
Southern Interior	Southern Interior	Okanagan	Similkameen River	500073	yes
Southern Interior	Southern Interior	Thomspon Plateau	Nicola River near Spences Bridge	0600007 or E216848	no
Kootenay	Southern Interior Mountains	Columbia Mountains	Kootenay River @ Picture Valley	200038	yes
Kootenay	Southern Interior Mountains	Columbia Mountains	St. Mary River near Cominco Pump house	200029	yes
Kootenay	Southern Interior Mountains	Kinbasket	Blackwater Creek	E206765	yes
Caribou	Southern Interior Mountains	Quesnel Highlands	Caribou R. at Keithly Cr. Rd. Bridge	600035	yes
Southern Interior	Southern Interior Mountains	Shuswap Highlands	Eagle River at Solsqua Road Bridge	500025	yes
Kootenay	Southern Interior Mountains	Southern Rockies	Elk River @ Phillips	200016	yes
Kootenay	Southern Interior Mountains	Southern Selkirk Mountains	Columbia River @ Birchbank	200003	yes
Kootenay	Southern Interior Mountains	Southern Selkirk Mountains	Slocan River near Passmore	E213060	no
Omineca-Peace	Southern Interior Mountains	Upper Fraser Highland	Fraser River at Hansard, midstream	E206580	yes
Skeena	Sub-Boreal Interior	Babine Upland	unknown name	SROS_d2	yes
Omineca-Peace	Sub-Boreal Interior	Northern Rockies	Murray River u/s of Quintette Coal	E206322	no
Omineca-Peace	Sub-Boreal Interior	Omineca Mountains	unknown	SROS_rcw4	yes

Management Area	Ecoprovince	Ecoregion	Stream Name	Site Number	In Top 5 Sites having most data in AECD?
Skeena	Sub-Boreal Interior	Skeena Mountains	Fulton River u/s hatchery		no
Omineca-Peace	Sub-Boreal Interior	Takla Manson Plateau	Nation River	E209686	yes
Omineca-Peace	Sub-Boreal Interior	Upper Fraser	Salmon River	400028	no
Omineca-Peace	Taiga Plains	Taiga Plains	Muskwa River u/s of Fort Nelson		no

Table 5. Scope of chemical attribute data in AECD for each index lake or reservoir. Chemical parameters are those used for descriptions of ecozones as described by Perrin and Blyth (1998).

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
Sub-Boreal Interior	Babine Upland	Boomerang Lake	11300334	no data in AECD				
Sub-Boreal Interior	Babine Upland	Stuart Lake	E206957	ALK	2	44.300	44.600	44.600
Sub-Boreal Interior	Babine Upland	Stuart Lake	E206957	PH	5	7.400	8.000	7.900
Sub-Boreal Interior	Babine Upland	Stuart Lake	E206957	TDS	2	66.000	68.000	68.000
Central Interior	Bulkley Basin	Tyhee Lake	1131009	ALK	4	131.000	137.000	135.000
Central Interior	Bulkley Basin	Tyhee Lake	1131009	COL	10	5.000	15.000	5.000
Central Interior	Bulkley Basin	Tyhee Lake	1131009	PH	15	7.500	8.500	8.100
Central Interior	Bulkley Basin	Tyhee Lake	1131009	TSS	4	1.000	2.000	1.000
Central Interior	Bulkley Basin	Tyhee Lake	1131009	TURB	14	0.400	1.400	1.000
Central Interior	Caribou Plateau	Crooked Lake	1170017	PH	3	7.000	7.600	7.000
Central Interior	Caribou Plateau	Crooked Lake	1170017	TDS	3	30.000	32.000	30.000
Northern Boreal Mountains	Cassiar Ranges	Jennings Lk.	1130689	PH	2	7.200	7.200	7.200
Northern Boreal Mountains	Cassiar Ranges	Jennings Lk.	1130689	TDS	2	24.000	24.000	24.000
Central Interior	Central Interior Plateau	Watch Lake	E220537	ALK	3	216.000	241.000	222.000
Central Interior	Central Interior Plateau	Watch Lake	E220537	PH	3	8.200	8.700	8.600
Central Interior	Chilcotin Ranges	Seton Lake at dam	E231397	no data in AECD				
Central Interior	Chilcotin Ranges	Tyaughton Lake	1131201	no data in AECD				
Southern Interior Mountains	Columbia Mountains	Kootenay lake	200034	ALK	694	16.200	87.000	65.900
Southern Interior Mountains	Columbia Mountains	Kootenay lake	200034	COL	90	5.000	20.000	5.000
Southern Interior Mountains	Columbia Mountains	Kootenay lake	200034	P_T	1028	0.003	0.121	0.005

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
Southern Interior Mountains	Columbia Mountains	Kootenay lake	200034	PH	1574	5.500	9.400	8.000
Southern Interior Mountains	Columbia Mountains	Kootenay lake	200034	TDS	536	64.000	144.000	100.000
Southern Interior Mountains	Columbia Mountains	Kootenay lake	200034	TSS	265	1.000	4.000	1.000
Southern Interior Mountains	Columbia Mountains	Kootenay lake	200034	TURB	921	0.100	22.000	0.400
Southern Interior Mountains	Columbia Mountains	Windermere Lake	0200051	ALK	31	51.000	135.000	99.000
Southern Interior Mountains	Columbia Mountains	Windermere Lake	0200051	COL	20	5.000	10.000	5.000
Southern Interior Mountains	Columbia Mountains	Windermere Lake	0200051	PH	70	8.000	8.990	8.400
Southern Interior Mountains	Columbia Mountains	Windermere Lake	0200051	TDS	35	110.000	444.000	166.000
Southern Interior Mountains	Columbia Mountains	Windermere Lake	0200051	TSS	14	1.000	3.000	1.000
Southern Interior Mountains	Columbia Mountains	Windermere Lake	0200051	TURB	38	0.400	7.100	0.900
Central Interior	Dean River	Nimpo Lk.	E206952	ALK	3	98.900	100.000	99.100
Central Interior	Dean River	Nimpo Lk.	E206952	PH	3	7.800	8.100	8.000
Coast and Mountains	Eastern Pacific Ranges	Kawkawa Lake	0300150	ALK	4	36.145	40.348	37.269
Coast and Mountains	Eastern Pacific Ranges	Kawkawa Lake	0300150	COL	3	5.000	5.000	5.000
Coast and Mountains	Eastern Pacific Ranges	Kawkawa Lake	0300150	PH	4	7.498	7.862	7.780
Coast and Mountains	Eastern Pacific Ranges	Kawkawa Lake	0300150	TDS	4	56.000	65.863	61.241
Coast and Mountains	Eastern Pacific Ranges	Kawkawa Lake	0300150	TSS	2	1.442	1.710	1.710
Coast and Mountains	Eastern Pacific Ranges	Kawkawa Lake	0300150	TURB	2	0.374	0.749	0.749
Coast and Mountains	Exposed Fjords	Lachmach Lake	E206345	PH	1	6.000	6.000	6.000
Coast and Mountains	Exposed Fjords	Lachmach Lake	E206345	TDS	3	10.000	10.000	10.000
Coast and Mountains	Exposed Fjords	Lachmach Lake	E206345	TURB	1	0.500	0.500	0.500
Coast and Mountains	Georgia Basin	Stocking Lake	E206290	ALK	13	6.900	11.100	9.900
Coast and Mountains	Georgia Basin	Stocking Lake	E206290	COL	43	5.000	20.000	5.000
Coast and Mountains	Georgia Basin	Stocking Lake	E206290	PH	79	5.700	7.600	7.027
Coast and Mountains	Georgia Basin	Stocking Lake	E206290	TDS	82	12.000	42.000	24.000
Coast and Mountains	Georgia Basin	Stocking Lake	E206290	TSS	7	1.000	2.000	1.000
Coast and Mountains	Georgia Basin	Stocking Lake	E206290	TURB	39	0.200	1.200	0.400
Coast and Mountains	Hecate Lowland		DFOS_30	TDS	5	13.300	21.000	14.000
Southern Interior Mountains	Kinbasket	Blackwater	1132233	PH	2	8.200	8.200	8.200
Southern Interior Mountains	Kinbasket	Blackwater	1132233	TDS	2	150.000	150.000	150.000
Southern Interior Mountains	Kinbasket	Mica behind dam	1100501	ALK	18	58.300	82.600	74.400
Southern Interior Mountains	Kinbasket	Mica behind dam	1100501	PH	36	7.000	8.200	7.900
Southern Interior Mountains	Kinbasket	Mica behind dam	1100501	TDS	12	82.000	96.000	86.000
Southern Interior Mountains	Kinbasket	Mica behind dam	1100501	TURB	30	0.400	2.400	0.800

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
Northern Boreal Mountains	Liard Plateau	Birches Lk.	1132217	PH	1	8.600	8.600	8.600
Northern Boreal Mountains	Liard Plateau	Birches Lk.	1132217	TDS	1	392.000	392.000	392.000
Central Interior	Lower Nechako	Fraser Lake deep stn	0400411	COL	4	5.000	5.000	5.000
Central Interior	Lower Nechako	Fraser Lake deep stn	0400411	PH	29	7.300	8.200	7.800
Central Interior	Lower Nechako	Fraser Lake deep stn	0400411	TDS	10	62.000	77.000	70.000
Central Interior	Lower Nechako	Fraser Lake deep stn	0400411	TSS	10	1.000	3.000	2.000
Central Interior	Lower Nechako	Fraser Lake deep stn	0400411	TURB	3	0.400	0.700	0.700
Northern Boreal Mountains	Muskwa Ranges	Kluachesi Lk	1132051	PH	2	8.300	8.400	8.400
Northern Boreal Mountains	Muskwa Ranges	Kluachesi Lk	1132051	TDS	2	206.000	206.000	206.000
Coast and Mountains	Nass Basin	Yellen L	E223605	ALK	1	15.100	15.100	15.100
Coast and Mountains	Nass Basin	Yellen L	E223605	PH	1	6.700	6.700	6.700
Coast and Mountains	Nass Basin	Yellen L	E223605	TDS	1	38.000	38.000	38.000
Coast and Mountains	Nass Basin	Yellen L	E223605	TSS	1	1.000	1.000	1.000
Coast and Mountains	Nass Ranges	Lakelse Lake	0400313	ALK	5	16.500	22.500	19.300
Coast and Mountains	Nass Ranges	Lakelse Lake	0400313	COL	7	5.000	30.000	15.000
Coast and Mountains	Nass Ranges	Lakelse Lake	0400313	PH	10	7.200	7.500	7.400
Coast and Mountains	Nass Ranges	Lakelse Lake	0400313	TDS	2	36.000	40.000	40.000
Coast and Mountains	Nass Ranges	Lakelse Lake	0400313	TSS	7	1.000	9.000	1.000
Coast and Mountains	Nass Ranges	Lakelse Lake	0400313	TURB	7	0.600	11.000	0.900
Central Interior	Nechako Plateau	Ootsa Lake at Ootsa		no data in AECD				
Central Interior	Nechako Plateau		E206391	TDS	2	60.000	60.000	60.000
Central Interior	Nechako Plateau		E206391	TURB	2	0.900	1.100	1.100
Coast and Mountains	Nimpkish	Quatse Lake	E216693	ALK	3	5.500	5.900	5.700
Coast and Mountains	Nimpkish	Quatse Lake	E216693	COL	10	55.000	100.000	80.000
Coast and Mountains	Nimpkish	Quatse Lake	E216693	PH	3	6.100	6.300	6.200
Coast and Mountains	Nimpkish	Quatse Lake	E216693	TSS	9	1.000	13.000	1.000
Coast and Mountains	Nimpkish	Quatse Lake	E216693	TURB	9	0.400	1.600	0.600
Coast and Mountains	North Coastal Mountains	Atlin Lake		no data in AECD				
Coast and Mountains	Northern Pacific Ranges	Horn Lk	E206674	ALK	2	124.000	128.000	128.000
Coast and Mountains	Northern Pacific Ranges	Horn Lk	E206674	PH	2	8.200	8.200	8.200
Sub-Boreal Interior	Northern Rockies	Azouzetta Lake	E206655	ALK	1	82.700	82.700	82.700
Sub-Boreal Interior	Northern Rockies	Azouzetta Lake	E206655	PH	3	7.800	8.000	7.800
Sub-Boreal Interior	Northern Rockies	Azouzetta Lake	E206655	TDS	1	100.000	100.000	100.000
Southern Interior	Okanagan	Okanagan Lake at	0500236	ALK	23	106.000	112.000	110.000

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
		Kelowna						
Southern Interior	Okanagan	Okanagan Lake at Kelowna	0500236	COL	4	5.000	5.000	5.000
Southern Interior	Okanagan	Okanagan Lake at Kelowna	0500236	PH	275	3.900	9.500	8.100
Southern Interior	Okanagan	Okanagan Lake at Kelowna	0500236	TDS	29	156.000	170.000	162.000
Southern Interior	Okanagan	Okanagan Lake at Kelowna	0500236	TSS	2	2.000	2.000	2.000
Southern Interior	Okanagan	Okanagan Lake at Kelowna	0500236	TURB	54	0.200	0.900	0.500
Sub-Boreal Interior	Omineca Mountains	Germansen Lk	1134023	PH	2	7.500	7.600	7.600
Sub-Boreal Interior	Omineca Mountains	Germansen Lk	1134023	TDS	2	56.000	58.000	58.000
Peace Plains	Peace Plains	Swan Lake	0400935	ALK	11	91.900	141.000	103.000
Peace Plains	Peace Plains	Swan Lake	0400935	PH	18	7.300	8.300	8.000
Peace Plains	Peace Plains	Swan Lake	0400935	TDS	11	150.000	206.000	160.000
Peace Plains	Peace Plains	Swan Lake	0400935	TSS	2	4.000	4.000	4.000
Peace Plains	Peace Plains	Swan Lake	0400935	TURB	9	3.900	8.200	7.400
Central Interior	Pothole Lakes	Lac La Hache	0603015	ALK	15	247.000	263.000	252.000
Central Interior	Pothole Lakes	Lac La Hache	0603015	COL	7	5.000	5.000	5.000
Central Interior	Pothole Lakes	Lac La Hache	0603015	PH	79	8.100	8.800	8.500
Central Interior	Pothole Lakes	Lac La Hache	0603015	TDS	22	260.000	486.000	284.000
Central Interior	Pothole Lakes	Lac La Hache	0603015	TSS	8	1.000	3.000	1.000
Central Interior	Pothole Lakes	Lac La Hache	0603015	TURB	17	0.200	2.800	0.700
Coast and Mountains	Puget Basin	Maxwell Lake on Saltspring Island	1130022	ALK	23	12.400	16.700	13.600
Coast and Mountains	Puget Basin	Maxwell Lake on Saltspring Island	1130022	COL	39	5.000	20.000	5.000
Coast and Mountains	Puget Basin	Maxwell Lake on Saltspring Island	1130022	PH	115	5.910	7.800	7.100
Coast and Mountains	Puget Basin	Maxwell Lake on Saltspring Island	1130022	TDS	91	16.000	56.000	40.000
Coast and Mountains	Puget Basin	Maxwell Lake on Saltspring Island	1130022	TSS	17	1.000	3.000	1.000
Coast and Mountains	Puget Basin	Maxwell Lake on Saltspring Island	1130022	TURB	49	0.200	1.800	0.600

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
Coast and Mountains	Queen Charlotte Islands		DFOS_3	TDS	5	23.300	35.100	30.000
Southern Interior Mountains	Quesnel Highlands	Quesnel Lake		no data in AECD				
Coast and Mountains	Sayward	Buttle Lake north	0130088	ALK	17	22.900	25.200	24.000
Coast and Mountains	Sayward	Buttle Lake north	0130088	COL	10	5.000	5.000	5.000
Coast and Mountains	Sayward	Buttle Lake north	0130088	PH	592	5.200	7.980	7.340
Coast and Mountains	Sayward	Buttle Lake north	0130088	TSS	27	1.000	2.000	1.000
Coast and Mountains	Sayward	Buttle Lake north	0130088	TURB	18	0.200	1.100	0.600
Coast and Mountains	Sayward	Upper Quinsam Lake	1130098	ALK	8	8.300	22.100	20.800
Coast and Mountains	Sayward	Upper Quinsam Lake	1130098	COL	11	5.000	10.000	5.000
Coast and Mountains	Sayward	Upper Quinsam Lake	1130098	PH	53	6.140	7.400	7.060
Coast and Mountains	Sayward	Upper Quinsam Lake	1130098	TSS	14	1.000	2.000	1.000
Coast and Mountains	Sayward	Upper Quinsam Lake	1130098	TURB	12	0.200	1.000	0.400
Southern Interior Mountains	Shuswap Highlands	Mabel Lake at Tsuius Creek	0500117	ALK	15	32.500	44.900	43.000
Southern Interior Mountains	Shuswap Highlands	Mabel Lake at Tsuius Creek	0500117	COL	6	5.000	10.000	5.000
Southern Interior Mountains	Shusw ap Highlands	Mabel Lake at Tsuius Creek	0500117	PH	196	6.690	8.500	7.500
Southern Interior Mountains	Shuswap Highlands	Mabel Lake at Tsuius Creek	0500117	TDS	25	50.000	72.000	62.000
Southern Interior Mountains	Shuswap Highlands	Mabel Lake at Tsuius Creek	0500117	TSS	3	1.000	2.000	2.000
Southern Interior Mountains	Shuswap Highlands	Mabel Lake at Tsuius Creek	0500117	TURB	27	0.300	1.900	0.500
Southern Interior Mountains	Shuswap Highlands	Shuswap Lake west of Sorrento	0500123	ALK	16	29.000	38.000	35.100
Southern Interior Mountains	Shuswap Highlands	Shuswap Lake west of Sorrento	0500123	COL	11	5.000	10.000	5.000
Southern Interior Mountains	Shuswap Highlands	Shuswap Lake west of Sorrento	0500123	PH	71	7.000	8.900	7.700
Southern Interior Mountains	Shuswap Highlands	Shuswap Lake west of Sorrento	0500123	TDS	44	38.000	62.000	56.000
Southern Interior Mountains	Shuswap Highlands	Shuswap Lake west of Sorrento	0500123	TSS	8	0.900	2.000	1.400
Southern Interior Mountains	Shuswap Highlands	Shuswap Lake west of Sorrento	0500123	TURB	33	0.300	3.700	0.500
Sub-Boreal Interior	Skeena Mountains	Bob Quinn Lake	1130342	TDS	2	154.000	166.000	166.000

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
Coast and Mountains	Southern Inlets	Powell Lake		no data in AECD				
Coast and Mountains	Southern Inlets	Sakinaw Lake		no data in AECD				
Coast and Mountains	Southern Pacific Ranges	Harrison Lake	0300044	ALK	13	14.097	16.397	15.060
Coast and Mountains	Southern Pacific Ranges	Harrison Lake	0300044	COL	5	5.000	5.000	5.000
Coast and Mountains	Southern Pacific Ranges	Harrison Lake	0300044	PH	13	7.100	7.840	7.583
Coast and Mountains	Southern Pacific Ranges	Harrison Lake	0300044	TDS	13	26.000	56.000	31.000
Coast and Mountains	Southern Pacific Ranges	Harrison Lake	0300044	TSS	11	1.000	3.000	1.000
Coast and Mountains	Southern Pacific Ranges	Harrison Lake	0300044	TURB	4	0.300	17.000	2.700
Southern Interior Mountains	Southern Rockies	Connor Lake	E232242	no data in AECD				
Southern Interior Mountains	Southern Selkirk Mountains	Lower Arrow	200523	no data in AECD				
Southern Interior Mountains	Southern Selkirk Mountains	Slocan Lake Midlake-Silverton	0200521	ALK	6	35.800	39.100	38.400
Southern Interior Mountains	Southern Selkirk Mountains	Slocan Lake Midlake-Silverton	0200521	PH	6	7.400	7.800	7.600
Southern Interior Mountains	Southern Selkirk Mountains	Slocan Lake Midlake-Silverton	0200521	TDS	6	48.000	62.000	60.000
Southern Interior Mountains	Southern Selkirk Mountains	Slocan Lake Midlake-Silverton	0200521	TSS	6	1.000	1.000	1.000
Northern Boreal Mountains	Stikine Plateau	Butte Lake	E223362	ALK	3	26.200	26.500	26.300
Northern Boreal Mountains	Stikine Plateau	Butte Lake	E223362	PH	3	7.600	7.600	7.600
Northern Boreal Mountains	Stikine Plateau	Butte Lake	E223362	TDS	3	36.000	68.000	48.000
Northern Boreal Mountains	Stikine Plateau	Butte Lake	E223362	TSS	3	1.000	1.000	1.000
Taiga Plains	Taiga Plains	Marion Lake	1132029	PH	2	8.700	8.800	8.800
Taiga Plains	Taiga Plains	Marion Lake	1132029	TDS	2	144.000	146.000	146.000
Sub-Boreal Interior	Takla Manson Plateau	Burden Lk	1134013	TDS	2	110.000	138.000	138.000
Southern Interior	Thomspon Plateau	Nicola Lake	0603006	ALK	2	94.000	95.100	95.100
Southern Interior	Thomspon Plateau	Nicola Lake	0603006	PH	4	7.700	8.000	8.000
Southern Interior	Thomspon Plateau	Nicola Lake	0603006	TDS	2	128.000	136.000	136.000
Sub-Boreal Interior	Upper Fraser	Bednesti Lk	0400490	COL	1	5.000	5.000	5.000
Sub-Boreal Interior	Upper Fraser	Bednesti Lk	0400490	PH	13	7.300	8.000	7.600
Sub-Boreal Interior	Upper Fraser	Bednesti Lk	0400490	TDS	1	107.000	107.000	107.000
Sub-Boreal Interior	Upper Fraser	Bednesti Lk	0400490	TSS	1	3.000	3.000	3.000
Sub-Boreal Interior	Upper Fraser	Bednesti Lk	0400490	TURB	1	0.800	0.800	0.800
Southern Interior Mountains	Upper Fraser Highland		RL5_7	TDS	1	338.000	338.000	338.000

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
Coast and Mountains	Windward Island Mountains	Lizard Lake	E206283	ALK	14	8.900	16.500	11.200
Coast and Mountains	Windward Island Mountains	Lizard Lake	E206283	PH	123	5.990	8.000	7.070
Coast and Mountains	Windward Island Mountains	Lizard Lake	E206283	TDS	99	12.000	54.000	24.000
Coast and Mountains	Windward Island Mountains	Lizard Lake	E206283	TSS	7	1.000	2.000	1.000
Coast and Mountains	Windward Island Mountains	Lizard Lake	E206283	TURB	6	0.300	0.400	0.400
Coast and Mountains	Windward Island Mountains	Sproat Lake at outlet	E218226	alk	28	3.600	31.900	14.900
Coast and Mountains	Windward Island Mountains	Sproat Lake at outlet	E218226	col	6	5.000	15.000	8.000
Coast and Mountains	Windward Island Mountains	Sproat Lake at outlet	E218226	T_P	15	0.003	0.012	0.004
Coast and Mountains	Windward Island Mountains	Sproat Lake at outlet	E218226	PH	44	5.900	8.400	7.000
Coast and Mountains	Windward Island Mountains	Sproat Lake at outlet	E218226	TDS	42	18.100	122.000	34.000

Table 6. Scope of chemical attribute data in AECD for each index stream. Chemical parameters are those used for descriptions of ecozones as described by Perrin and Blyth (1998).

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
Sub-Boreal Interior	Babine Upland		SROS_d2	ALK	7	24.000	110.000	51.000
Sub-Boreal Interior	Babine Upland		SROS_d2	PH	7	6.500	8.200	7.300
Sub-Boreal Interior	Babine Upland		SROS_d2	TSS	7	69.000	129.000	88.000
Sub-Boreal Interior	Babine Upland		SROS_d2	TURB	7	0.200	4.400	0.600
Central Interior	Bulkley Basin	Bulkley River at Quick	0920088	PH	146	6.300	7.900	7.400
Central Interior	Bulkley Basin	Bulkley River at Quick	0920088	TDS	22	32.000	108.000	42.000
Central Interior	Bulkley Basin	Bulkley River at Quick	0920088	TSS	63	1.000	178.000	5.000

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
Central Interior	Bulkley Basin	Bulkley River at Quick	0920088	TURB	141	0.100	85.000	2.300
Central Interior	Caribou Plateau	Canim R. above Canim Falls	0600051	ALK	2	65.500	76.100	76.100
Central Interior	Caribou Plateau	Canim R. above Canim Falls	0600051	PH	2	8.000	8.100	8.100
Central Interior	Caribou Plateau	Canim R. above Canim Falls	0600051	TDS	2	94.000	100.000	100.000
Central Interior	Caribou Plateau	Canim R. above Canim Falls	0600051	TURB	2	1.300	1.400	1.400
Northern Boreal Mountains	Cassiar Ranges	Galen Creek	0400403	PH	6	6.600	7.800	7.300
Northern Boreal Mountains	Cassiar Ranges	Galen Creek	0400403	TDS	2	78.000	88.000	88.000
Northern Boreal Mountains	Cassiar Ranges	Galen Creek	0400403	TSS	5	1.000	1.000	1.000
Northern Boreal Mountains	Cassiar Ranges	Galen Creek	0400403	TURB	2	0.200	0.400	0.400
Central Interior	Central Interior Plateau	Bonaparte River u/s Clinton Cr.	0600017	PH	97	7.800	8.800	8.200
Central Interior	Central Interior Plateau	Bonaparte River u/s Clinton Cr.	0600017	TDS	36	90.000	244.000	150.000
Central Interior	Central Interior Plateau	Bonaparte River u/s Clinton Cr.	0600017	TSS	45	1.000	23.000	10.000
Central Interior	Central Interior Plateau	Bonaparte River u/s Clinton Cr.	0600017	TURB	62	0.200	9.100	1.100
Central Interior	Chilcotin Ranges	Cadwallader Creek u/s Bralorne	E217521	PH	13	6.800	7.900	7.400
Central Interior	Chilcotin Ranges	Cadwallader Creek u/s Bralorne	E217521	TSS	13	1.000	212.000	7.000
Central Interior	Chilcotin Ranges	Cadwallader Creek u/s Bralorne	E217521	TURB	13	0.800	91.000	3.200
Central Interior	Chilcotin Ranges	Stein River near mouth	0600027	PH	17	7.100	7.900	7.500
Central Interior	Chilcotin Ranges	Stein River near mouth	0600027	TDS	9	22.000	72.000	44.000
Central Interior	Chilcotin Ranges	Stein River near mouth	0600027	TSS	3	2.000	2.000	2.000
Central Interior	Chilcotin Ranges	Stein River near mouth	0600027	TURB	9	0.600	21.000	1.300
Southern Interior Mountains	Columbia Mountains	Kootenay River @ Picture Valley	0200038	PH	353	7.100	9.100	8.100
Southern Interior Mountains	Columbia Mountains	Kootenay River @ Picture Valley	0200038	TDS	286	66.000	262.000	172.000
Southern Interior Mountains	Columbia Mountains	Kootenay River @ Picture Valley	0200038	TSS	293	1.000	462.000	6.000

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
Southern Interior Mountains	Columbia Mountains	Kootenay River @ Picture Valley	0200038	TURB	181	0.800	230.000	5.600
Southern Interior Mountains	Columbia Mountains	St. Mary River near Cominco Pump house	0200029	TDS	97	18.000	60.000	46.000
Southern Interior Mountains	Columbia Mountains	St. Mary River near Cominco Pump house	0200029	TSS	59	1.000	102.000	1.000
Southern Interior Mountains	Columbia Mountains	St. Mary River near Cominco Pump house	0200029	TURB	89	0.250	694.000	0.700
Southern Interior Mountains	Columbia Mountains	St. Mary River near Cominco Pump house	0200029	PH	340	5.900	8.900	7.500
Central Interior	Dean River	Dean River u/s Lodge Cr.	0600042	PH	10	7.500	8.200	8.000
Central Interior	Dean River	Dean River u/s Lodge Cr.	0600042	TDS	7	78.000	156.000	146.000
Central Interior	Dean River	Dean River u/s Lodge Cr.	0600042	TSS	1	4.000	4.000	4.000
Central Interior	Dean River	Dean River u/s Lodge Cr.	0600042	TURB	7	0.700	2.600	1.300
Coast and Mountains	Eastern Pacific Ranges	Silverhope Creek	0300048	ALK	7	16.294	21.280	16.696
Coast and Mountains	Eastern Pacific Ranges	Silverhope Creek	0300048	COL	1	10.000	10.000	10.000
Coast and Mountains	Eastern Pacific Ranges	Silverhope Creek	0300048	PH	7	7.225	7.924	7.524
Coast and Mountains	Eastern Pacific Ranges	Silverhope Creek	0300048	TDS	7	26.552	36.000	32.181
Coast and Mountains	Eastern Pacific Ranges	Silverhope Creek	0300048	TSS	5	2.060	7.243	3.500
Coast and Mountains	Eastern Pacific Ranges	Silverhope Creek	0300048	TURB	2	0.693	2.477	2.477
Coast and Mountains	Exposed Fjords	Kitimat River at bridge	0430025	PH	83	6.500	7.900	7.000
Coast and Mountains	Exposed Fjords	Kitimat River at bridge	0430025	TDS	22	17.000	50.000	34.000
Coast and Mountains	Exposed Fjords	Kitimat River at bridge	0430025	TSS	95	1.000	321.000	5.000
Coast and Mountains	Exposed Fjords	Kitimat River at bridge	0430025	TURB	94	0.700	220.000	3.700
Coast and Mountains	Georgia Basin	Englishman River at highway	0121580	PH	7	6.600	7.700	7.000
Coast and Mountains	Hecate Lowland			no data in AECD				
Southern Interior Mountains	Kinbasket	Blackwater Creek	E206765	PH	1	8.200	8.200	8.200
Northern Boreal Mountains	Liard Plateau	Liard River	Liard River	ALK	2	23.000	29.000	29.000
Northern Boreal Mountains	Liard Plateau	Liard River	Liard River	P_T	2	0.003	0.010	0.010
Northern Boreal Mountains	Liard Plateau	Liard River	Liard River	PH	2	6.900	7.200	7.200
Northern Boreal Mountains	Liard Plateau	Liard River	Liard River	TSS	2	1.000	1.000	1.000
Northern Boreal Mountains	Liard Plateau	Liard River	Liard River	TURB	2	1.000	1.200	1.200
Central Interior	Lower Nechako	Nechako River u/s of Fort Fraser	0400629	PH	117	6.800	8.200	7.600

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
Central Interior	Lower Nechako	Nechako River u/s of Fort Fraser	0400629	TDS	21	36.000	54.000	42.000
Central Interior	Lower Nechako	Nechako River u/s of Fort Fraser	0400629	TSS	16	2.000	56.000	3.000
Central Interior	Lower Nechako	Nechako River u/s of Fort Fraser	0400629	TURB	25	0.400	18.000	1.400
Northern Boreal Mountains	Muskwa Ranges	Toad River at highway		no data in AECD				
Coast and Mountains	Nass Basin	unknown	SROS_bsc1	ALK	2	39.000	67.000	67.000
Coast and Mountains	Nass Basin	unknown	SROS_bsc1	PH	2	7.600	7.800	7.800
Coast and Mountains	Nass Basin	unknown	SROS_bsc1	TSS	2	47.000	93.000	93.000
Coast and Mountains	Nass Basin	unknown	SROS_bsc1	TURB	2	0.500	4.300	4.300
Coast and Mountains	Nass Ranges	Skeena River	0920092	PH	166	7.200	8.100	7.700
Coast and Mountains	Nass Ranges	Skeena River	0920092	TDS	24	1.000	86.000	64.000
Coast and Mountains	Nass Ranges	Skeena River	0920092	TSS	149	1.000	1840.000	10.000
Coast and Mountains	Nass Ranges	Skeena River	0920092	TURB	85	0.300	124.000	7.500
Central Interior	Nechako Plateau	MacIvor Creek inflow to Ootsa Lake		no data in AECD				
Coast and Mountains	Nimpkish	Tsitika River	E207676	PH	10	6.200	7.700	6.900
Coast and Mountains	North Coastal Mountains	Cascade Creek above Premier mine	E220201	PH	1	7.600	7.600	7.600
Coast and Mountains	North Coastal Mountains	Cascade Creek above Premier mine	E220201	TSS	1	1.000	1.000	1.000
Coast and Mountains	Northern Pacific Ranges	McClinchy Creek	0600304	ALK	1	39.531	39.531	39.531
Coast and Mountains	Northern Pacific Ranges	McClinchy Creek	0600304	PH	1	7.539	7.539	7.539
Coast and Mountains	Northern Pacific Ranges	McClinchy Creek	0600304	TDS	1	60.368	60.368	60.368
Coast and Mountains	Northern Pacific Ranges	McClinchy Creek	0600304	TSS	1	2.289	2.289	2.289
Coast and Mountains	Northern Pacific Ranges	McClinchy Creek	0600304	TURB	1	0.632	0.632	0.632
Sub-Boreal Interior	Northern Rockies	Murray River u/s of Quintette Coal	E206322	PH	1	8.100	8.100	8.100
Sub-Boreal Interior	Northern Rockies	Murray River u/s of Quintette Coal	E206322	TSS	3	1.000	54.000	50.000
Sub-Boreal Interior	Northern Rockies	Murray River u/s of	E206322	TURB	1	1.200	1.200	1.200

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
		Quintette Coal						
Southern Interior	Okanagan	Similkameen River	0500073	PH	254	5.500	9.200	8.000
Southern Interior	Okanagan	Similkameen River	0500073	TDS	4	62.000	130.000	128.000
Southern Interior	Okanagan	Similkameen River	0500073	TSS	166	1.000	412.000	2.000
Southern Interior	Okanagan	Similkameen River	0500073	TURB	50	0.300	55.000	1.000
Sub-Boreal Interior	Omineca Mountains	unknown	SROS_rcw4	ALK	4	94.800	122.000	118.000
Sub-Boreal Interior	Omineca Mountains	unknown	SROS_rcw4	PH	4	7.920	8.100	8.050
Sub-Boreal Interior	Omineca Mountains	unknown	SROS_rcw4	TDS	4	154.000	203.000	199.000
Sub-Boreal Interior	Omineca Mountains	unknown	SROS_rcw4	TSS	4	1.000	2.000	2.000
Sub-Boreal Interior	Omineca Mountains	unknown	SROS_rcw4	TURB	4	0.310	2.680	0.690
Peace Plains	Peace Plains	Peace River 3.2 KM u/s of FSJ	0400134	PH	44	7.900	8.300	8.200
Peace Plains	Peace Plains	Peace River 3.2 KM u/s of FSJ	0400134	TDS	8	104.000	134.000	114.000
Peace Plains	Peace Plains	Peace River 3.2 KM u/s of FSJ	0400134	TSS	29	1.000	770.000	16.000
Peace Plains	Peace Plains	Peace River 3.2 KM u/s of FSJ	0400134	TURB	40	0.800	160.000	3.800
Central Interior	Pothole Lakes	Bridge Creek at Horse Lake Rd.	0600137	PH	57	7.300	9.200	8.100
Central Interior	Pothole Lakes	Bridge Creek at Horse Lake Rd.	0600137	TDS	19	160.000	326.000	176.000
Central Interior	Pothole Lakes	Bridge Creek at Horse Lake Rd.	0600137	TSS	23	1.000	14.000	1.000
Central Interior	Pothole Lakes	Bridge Creek at Horse Lake Rd.	0600137	TURB	109	0.100	2.000	0.600
Coast and Mountains	Puget Basin	Shawnigan Creek at highway	0127217	PH	12	6.700	7.900	7.300
Coast and Mountains	Queen Charlotte Islands	Yakoun River	0700173	PH	9	6.400	7.000	6.600
Coast and Mountains	Queen Charlotte Islands	Yakoun River	0700173	TDS	8	36.000	64.000	44.000
Coast and Mountains	Queen Charlotte Islands	Yakoun River	0700173	TSS	9	2.000	56.000	3.000
Coast and Mountains	Queen Charlotte Islands	Yakoun River	0700173	TURB	9	0.700	17.000	1.200
Southern Interior Mountains	Quesnel Highlands	Caribou R. at Keithly Cr. Rd. Bridg	0600035	PH	8	7.700	8.100	8.000
Southern Interior Mountains	Quesnel Highlands	Caribou R. at Keithly Cr. Rd. Bridg	0600035	TDS	2	64.000	80.000	80.000

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
Southern Interior Mountains	Quesnel Highlands	Caribou R. at Keithly Cr. Rd. Bridg	0600035	TSS	5	1.000	62.000	5.000
Southern Interior Mountains	Quesnel Highlands	Caribou R. at Keithly Cr. Rd. Bridg	0600035	TURB	3	0.900	2.900	1.900
Southern Interior Mountains	Quesnel Highlands	Caribou R. at Keithly Cr. Rd. Bridge	0600035	ALK	3	45.100	61.600	53.600
Coast and Mountains	Sayward	Salmon River at highway	0127180	PH	2	7.000	7.000	7.000
Southern Interior Mountains	Shuswap Highlands	Eagle River at Solsqua Road Bridge	0500025	PH	182	6.700	8.600	7.500
Southern Interior Mountains	Shuswap Highlands	Eagle River at Solsqua Road Bridge	0500025	TDS	27	20.000	61.000	46.000
Southern Interior Mountains	Shuswap Highlands	Eagle River at Solsqua Road Bridge	0500025	TSS	162	1.000	175.000	4.000
Southern Interior Mountains	Shuswap Highlands	Eagle River at Solsqua Road Bridge	0500025	TURB	19	0.300	14.000	1.900
Sub-Boreal Interior	Skeena Mountains	Fulton River u/s hatchery		no data in AECD				
Coast and Mountains	Southern Inlets	Chapman Creek	0300106	PH	28	5.900	7.400	6.800
Coast and Mountains	Southern Inlets	Chapman Creek	0300106	TDS	22	10.000	52.000	26.000
Coast and Mountains	Southern Inlets	Chapman Creek	0300106	TSS	20	1.000	49.000	1.000
Coast and Mountains	Southern Inlets	Chapman Creek	0300106	TURB	15	0.100	14.000	0.500
Coast and Mountains	Southern Inlets	Theodosia River		no data in AECD				
Coast and Mountains	Southern Pacific Ranges	Norrish Creek	0300029	ALK	16	5.500	13.300	9.200
Coast and Mountains	Southern Pacific Ranges	Norrish Creek	0300029	COL	2	5.000	6.300	6.300
Coast and Mountains	Southern Pacific Ranges	Norrish Creek	0300029	PH	16	6.200	7.397	6.565
Coast and Mountains	Southern Pacific Ranges	Norrish Creek	0300029	TDS	7	18.504	26.533	19.812
Coast and Mountains	Southern Pacific Ranges	Norrish Creek	0300029	TSS	14	1.000	13.000	1.442
Coast and Mountains	Southern Pacific Ranges	Norrish Creek	0300029	TURB	2	0.650	1.200	1.200
Coast and Mountains	Southern Pacific Ranges	Squamish River	0300194	ALK	13	2.946	16.800	8.427
Coast and Mountains	Southern Pacific Ranges	Squamish River	0300194	COL	4	5.000	12.247	8.660

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
Coast and Mountains	Southern Pacific Ranges	Squamish River	0300194	PH	13	6.349	7.425	6.900
Coast and Mountains	Southern Pacific Ranges	Squamish River	0300194	TDS	13	12.000	44.000	21.878
Coast and Mountains	Southern Pacific Ranges	Squamish River	0300194	TSS	9	1.000	28.928	2.000
Coast and Mountains	Southern Pacific Ranges	Squamish River	0300194	TURB	4	0.400	32.000	2.900
Southern Interior Mountains	Southern Rockies	Elk River @ Phillips	0200016	PH	374	6.600	9.000	8.300
Southern Interior Mountains	Southern Rockies	Elk River @ Phillips	0200016	TDS	301	103.000	228.000	178.000
Southern Interior Mountains	Southern Rockies	Elk River @ Phillips	0200016	TSS	292	0.000	713.000	4.000
Southern Interior Mountains	Southern Rockies	Elk River @ Phillips	0200016	TURB	205	0.200	190.000	3.300
Southern Interior Mountains	Southern Selkirk Mountains	Columbia River @ Birchbank	0200003	PH	324	5.500	8.500	7.900
Southern Interior Mountains	Southern Selkirk Mountains	Columbia River @ Birchbank	0200003	TDS	111	45.000	155.000	80.000
Southern Interior Mountains	Southern Selkirk Mountains	Columbia River @ Birchbank	0200003	TSS	331	1.000	11.000	1.000
Southern Interior Mountains	Southern Selkirk Mountains	Columbia River @ Birchbank	0200003	TURB	124	0.200	9.000	0.600
Southern Interior Mountains	Southern Selkirk Mountains	Slocan River near Passmore	E213060	PH	2	7.600	7.600	7.600
Southern Interior Mountains	Southern Selkirk Mountains	Slocan River near Passmore	E213060	TURB	4	0.200	0.400	0.400
Northern Boreal Mountains	Stikine Plateau	upper Bearskin Creek	E215755	PH	24	6.920	8.090	7.640
Northern Boreal Mountains	Stikine Plateau	upper Bearskin Creek	E215755	TSS	23	1.000	773.000	43.000
Taiga Plains	Taiga Plains	Muskwa River u/s of Fort Nelson		no data in AECD				
Sub-Boreal Interior	Takla Manson Plateau	Nation River	E209686	PH	5	7.600	7.900	7.600
Sub-Boreal Interior	Takla Manson Plateau	Nation River	E209686	TDS	5	68.000	82.000	72.000
Sub-Boreal Interior	Takla Manson Plateau	Nation River	E209686	TURB	4	0.800	1.000	1.000
Southern Interior	Thomspon Plateau	Nicola River near Spences Bridge	0600007 or E216848	alk	3	159.000	237.000	233.000
Southern Interior	Thomspon Plateau	Nicola River near Spences	0600007 or	col	2	5.000	40.000	40.000

ECOPROVINCE	ECOREGION	SITE NAME	SITE NUMBER	PARAMETER	SAMPLE SIZE	MIN	MAX	MEDIAN
		Bridge	E216848					
Southern Interior	Thomspon Plateau	Nicola River near Spences Bridge	0600007 or E216848	P_T	117	0.003	0.680	0.020
Southern Interior	Thomspon Plateau	Nicola River near Spences Bridge	0600007 or E216848	PH	185	7.100	8.700	7.900
Southern Interior	Thomspon Plateau	Nicola River near Spences Bridge	0600007 or E216848	TDS	25	36.000	426.000	78.000
Southern Interior	Thomspon Plateau	Nicola River near Spences Bridge	0600007 or E216848	TSS	162	1.000	77.000	4.000
Southern Interior	Thomspon Plateau	Nicola River near Spences Bridge	0600007 or E216848	TURB	16	0.160	6.100	1.500
Sub-Boreal Interior	Upper Fraser	Salmon River	0400028	PH	18	7.200	8.200	7.700
Sub-Boreal Interior	Upper Fraser	Salmon River	0400028	TDS	9	86.000	128.000	112.000
Sub-Boreal Interior	Upper Fraser	Salmon River	0400028	TSS	14	2.000	163.000	5.000
Sub-Boreal Interior	Upper Fraser	Salmon River	0400028	TURB	13	1.100	42.000	4.500
Southern Interior Mountains	Upper Fraser Highland	Fraser River at Hansard	E206580	PH	71	7.400	8.300	7.900
Southern Interior Mountains	Upper Fraser Highland	Fraser River at Hansard	E206580	TDS	209	40.000	342.000	102.000
Southern Interior Mountains	Upper Fraser Highland	Fraser River at Hansard	E206580	TSS	227	1.000	893.000	27.000
Southern Interior Mountains	Upper Fraser Highland	Fraser River at Hansard	E206580	TURB	2	1.600	18.000	18.000
Coast and Mountains	Windward Island Mountains	Gold River at highway	E207792	PH	18	7.000	7.800	7.500

Most index sites are easily accessible by vehicle and boat. Specific details of access are noted for many of the sites in Tables 7 and 8. Where a boat is required, these notes indicate the appropriate size of boat that should be used based on local knowledge of lake or reservoir surface conditions that can occur during inclement weather. In most regions, appropriate sized and fitted boats are available in MOELP inventory or through local charters.

Although we attempted to avoid sites that required aircraft support or long driving and boat time, even from closest communities, difficult logistics may limit routine access to at least three index lakes and one index stream which are located in some of the most remote Ecoregions. The only access to the Hecate lowland (lake site DFOS_30) is by aircraft or long boat ride from Kitimat or Prince Rupert. There is no index stream assigned in this Ecoregion that has data or is known as representative for water monitoring which means only the one lake site is identified for any sampling. Given its remote location and the fact that sampling has not been active in the area in the past, future sampling may have to be restricted to opportunities of travel through the area for other purposes, perhaps even combining efforts with seasonal coast guard cruises. Another difficult site may be the small lake station, E206391, located in the south eastern portion of the Nechako Plateau Ecoregion. It represents a small lake to contrast with Ootsa Lake in the Nechako Reservoir but is not close to any community and routine access may prove difficult. It may have to be dropped as an index site if sampling is logistically unreliable. Owikeno Lake and its inflow streams in the Owikeno Ranges are easily accessible by air from Bella Coola although a First Nations community, the Owikeno Band, is established at the lake outflow. An agreement with the Band may facilitate sample collection and shipment but if this option is not possible, water sampling may have to be opportunistically completed on irregular and potentially infrequent visits to the lake for other purposes.

Water quality at 27% of the recommended lake sites and 28% of the stream sites is potentially modified by land disturbance, point source discharges or non-point source discharges of contaminants (Tables 7 and 8). The degree of disturbance is undefined but it is thought to be small and may not be detectable in the short list of water quality parameters that was used for Ecozone delineation (Section 1.0). Potential modification of water quality is identified only because the sites were downstream of known disturbance from land uses. In all cases, the sites were thought to be least affected of all lakes and streams in the respective Ecoregions.

Tables 7 and 8 provide notes indicating sources of pollution where it is thought to be present. Six of the affected lake sites and 9 of the affected stream sites were downstream of areas where forest harvesting, agriculture, or both have been or are presently active. Shoreline development including cabins or houses on septic tanks potentially affected 6 of the lake sites and one stream site (Caribou River). Okanagan Lake and 2 stream sites are downstream of discharges of treated wastewater from

treatment plants, however, Okanagan Lake receives treated wastewater from highly efficient tertiary treatment plants which may be contributing to nutrient depletion in the lake rather than enrichment. Buttle Lake which is the representative large lake in the Sayward Ecoregion is affected by metals transport from the Westmin Mine. The index site on Cadwallader Creek, the index stream of the Chilcotin Ecoregion, is upstream of Bralorne where mining was historically active. Anomalous metals concentrations may be present in Cadwallader Creek but in all other respects water quality is thought to be similar to that of other streams in the Ecoregion which are all exposed to glacial outwash and high weathering rates of the volcanic parent materials containing mineral deposits that are typical of the area.

Many of the index sites were important to include because of their past history as sites used for long term data collection or current importance as regional reference sites for more than just water quality purposes. Long term swings in the trophic status and water quality in Kootenay Lake (Ashley et al. 1997) and Okanagan Lake has been cause for long term study of the limnology, water quality, and processes supporting fish populations in those lakes, resulting in a compilation of extensive data over several decades which can be used as ideal index data. A large scale fishery restoration project has begun on the Arrow Lakes (K. Ashley, Ministry of Fisheries, Research, UBC, pers. comm.) which involves routine water quality monitoring, making it an ideal index location for the Southern Selkirk Ecoregion. As an important producer of sockeye salmon, long term water quality data have been compiled for Shuswap Lake (E. McIsaac, Dept. Fisheries and Oceans, SFU, pers. comm.). Water monitoring in Stocking Lake and Lizard Lake on Vancouver Island was part of the acid rain trend analysis for southern Vancouver Island because of their remote locations, unaffected by anthropogenic activities (J. Deniseger, MOELP, Nanaimo, pers. comm.). Resulting long term water quality data were collected from both lakes. Monitoring continues in Stocking Lake because it is a water supply for the community of Ladysmith. Stuart Lake (Babine Upland Ecoregion) is an important index location because of the long term fish-forestry research project that is active in the area (E. McIsaac, Dept. Fisheries and Oceans, SFU, pers. comm.). Ootsa Lake near Ootsa is an important reference location for monitoring as part of assessments of effects of underwater logging on water quality in large reservoirs (Perrin and McDevitt 1997). The Kootenay River at Picture Valley (Columbia Mountains), the Columbia River at Birchbank (Southern Selkirk Mountains), and the Fraser River at Hansard (Upper Fraser Highland) has been as active in the Federal/Provincial water monitoring program, having a long term data set that is valuable as a long term reference. The Salmon River in the Sayward Ecoregion has been the site of long term salmon restoration initiatives since the mid-1980's for which annual water quality monitoring has been a part (C. Wightman, MOELP, Nanaimo, pers. comm.). The Dean River site is a control monitoring location for assessment of effects of the discharge of treated wastewater to the Dean River from a wetland treatment system installed for the Ulkatcho Indian Band at Anahim Lake (Perrin 1998). Clearly it was

important to include these reference sites to take advantage of water quality data already collected to incorporate into the index site system.

Comments relevant to other sites are listed in Tables 9 and 10. This information provides additional insight into characteristics of the index sites over and above the criteria that were considered for site selection.

Table 7. General access to recommended index lake and reservoir sites and proximity to potential pollution sources.

Ecoprovince	Ecoregion	Lake/reservoir Name	Access	Pollution*
Central Interior	Bulkley Basin	Tyhee Lake		
Central Interior	Caribou Plateau	Crooked Lake near Center	by road 120 km east of Williams L.	NPS from forest harvesting
Central Interior	Central Interior Plateau	Watch Lake	via Hwy 97 and Green lake Road	no pollution but some lakeside residences
Central Interior	Chilcotin Ranges	Tyaughton Lake, centre	Bridge R. road to Tyax Mountain Resort	no pollution except there is ground disposal of sewage from Tyax
Central Interior	Chilcotin Ranges	Seton Lake at dam	from hydro dam at Lillooet	no pollution
Central Interior	Dean River	Nimpo Lk. At center	off Hwy 20	limited NPS from forestry and agriculture. Resorts on septic fields present
Central Interior	Lower Nechako	Fraser Lake deep stn	multiple launches	limited shore line development
Central Interior	Nechako Plateau	E206391		
Central Interior	Nechako Plateau	Ootsa Lake at Ootsa	>18' boat lauched from Ootsa	MeHg bioaccumulation remains active but no other water quality problem
Central Interior	Pothole Lakes	Lac La Hache off Emerald Is.	from Hwy 97	some NPS from ranching
Coast and Mountains	Eastern Pacific Ranges	Kawkawa Lake	drive to/small boat	resort development around shorezone
Coast and Mountains	Exposed Fjords	Lachmach Lake		no pollution
Coast and Mountains	Georgia Basin	Stocking Lake	gravel road	minimal
Coast and Mountains	Georgia Basin	Sakinaw Lake	drive to boat launch	cabin development around shore
Coast and Mountains	Hecate Lowland	DFOS_30		
Coast and Mountains	Nass basin	Yellen L	small boat	no pollution
Coast and Mountains	Nass Ranges	Lakelse Lake		no pollution
Coast and Mountains	Nimpkish	Quatse Lake	road and boat ramp	historic logging activities - this lake is used as drinking water by the Mt Waddington Regional District
Coast and Mountains	North Coastal Mountains	Atlin Lake	at Atlin	no pollution
Coast and Mountains	Northern Pacific Ranges	Horn Lk at Deepest Pt.	off Westbranch Rd. from Hwy 20	limited NPS from forestry
Coast and Mountains	Owikeno Ranges	Owikeno Lake	by air from Bella Coola	no pollution
Coast and Mountains	Puget Basin	Maxwell Lake on Saltspring Island	ferry and road on Salt Spring Is.	no pollution
Coast and Mountains	Queen Charlotte Islands	DFOS_3	road from Port Clements	no pollution
Coast and Mountains	Sayward	Buttle Lake north	boat and approx 2.5 km from nearest boat ramp	within Strathcona Park but is subject to metal pollution from Westmin Resources copper/zinc mine. However, with the exception of elevated metals (well below water quality

Ecoprovince	Ecoregion	Lake/reservoir Name	Access	Pollution*
				criteria at this site), water quality is very good.
Coast and Mountains	Sayward	Upper Quinsam Lake	logging road and boat ramp	forestry activity within the watershed, an old abandoned iron mine is within the watershed but is not considered a threat to water quality
Coast and Mountains	Southern Inlets	Powell Lake	drive to/small boat	no
Coast and Mountains	Southern Pacific Ranges	Harrison Lake	>16' boat	resort development at south end but may not be apparent in water chem
Coast and Mountains	Windward Island Mountains	Lizard Lake	by public logging road	small Forest Service campground has been expanded slightly and rebuilt recently
Coast and Mountains	Windward Island Mountains	Sproat Lake at outlet	logging road and a short trail	upstream activities include semi rural development around the eastern end of Sproat Lake, and forestry activities
Northern Boreal Mountains	Cassiar Ranges	Jennings Lk.		no pollution
Northern Boreal Mountains	Liard Plateau	Birches Lk.		no pollution
Northern Boreal Mountains	Muskwa Ranges	Kluachesi Lk		no pollution
Northern Boreal Mountains	Stikine Plateau	Butte Lake		
Peace Plains	Peace Plains	Swan Lake	road, boat at park launch	
Southern Interior	Okanagan	Okanagan Lake at Kelowna	>16' boat	shoreline development but tertiary treatment at major urban centres
Southern Interior	Thomspon Plateau	Nicola Lake at deepest point	via Hwy 5a north of Merritt; lots of launch sites	no PS but substantial agricultural NPS and some forestry NPS like all lakes in the ecoregion. <100 residences around the lake.
Southern Interior Mountains	Columbia Mountains	Kootenay lake	>16' boat	no
Southern Interior Mountains	Columbia Mountains	Windermere Lake	drive to/small boat	NPS from urban development
Southern Interior Mountains	Kinbasket	Mica behind dam	drive to/small boat	no
Southern Interior Mountains	Kinbasket	Blackwater	drive to/small boat	no
Southern Interior Mountains	Quesnel Highlands	Quesnel Lake		
Southern Interior Mountains	Shuswap Highlands	Mabel Lake at Tsuius Creek	drive to/small boat	least of medium size lakes in Okanagan
Southern Interior Mountains	Shuswap Highlands	Shuswap Lake west of Sorrento	launch from Scotch Creek Prov. Park or west of Sorrento	extensive NPS from all Shuswap Highlands but may not detectable: Bothwell data shows the site is highly P-deficient
Southern Interior Mountains	Southern Rockies	Connor Lake	drive to	
Southern Interior Mountains	Southern Selkirk Mountains	Lower Arrow	>16' boat	no pollution
Southern Interior Mountains	Southern Selkirk Mountains	Slocan Lake Midlake-Silverton	>16' boat	no pollution
Southern Interior Mountains	Upper Fraser Highland	RL5_7		
Sub-Boreal Interior	Babine Upland	Stuart Lake	launch from Ft. St. James	no pollution
Sub-Boreal Interior	Babine Upland	Boomerang Lake	unknown	no pollution
Sub-Boreal Interior	Northern Rockies	Azouzetta Lake deep stn	>16' boat	no pollution
Sub-Boreal Interior	Omineca Mountains	Germansen Lk	>16' boat	no pollution

Ecoprovince	Ecoregion	Lake/reservoir Name	Access	Pollution*
Sub-Boreal Interior	Skeena Mountains	Bob Quinn Lake	drive to/small boat	no pollution
Sub-Boreal Interior	Takla Manson Plateau	Burden Lk		no pollution
Sub-Boreal Interior	Upper Fraser	Bednesti Lk	launch facilities	seasonal residential homes on septic fields
Taiga Plains	Taiga Plains	Marion Lake		no pollution

*NPS refers to non-point source
PS refers to point source

Table 8. General access to recommended index stream sites and proximity to potential pollution sources

Ecoprovince	Ecoregion	Stream Name	Access	Proximity to Pollution*
Central Interior	Bulkley Basin	Bulkley River at Quick		
Central Interior	Caribou Plateau	Canim R. above Canim Falls	on road to Mahood L.	little NPS, possible Mo in Boss Cr./Eagle Cr. Trib to Canim Lake
Central Interior	Central Interior Plateau	Bonaparte River u/s Clinton Cr.	via Hwy 97 to Clinton down Mound road to bridge u/s Clinton Creek	no PS pollution but there is sewage discharge to Clinton Cr. And at Cache Cr. Some agricultural and forestry NPS but much less than at other sites
Central Interior	Chilcotin Ranges	Stein River near mouth	by road in Prov. Park	no pollution
Central Interior	Chilcotin Ranges	Cadwallader Creek u/s Bralorne	to Bralorne from Lillooet	some forestry and residual mining impacts
Central Interior	Dean River	Dean River u/s Lodge Cr.	Hwy 20	cattle and small feedlot operations, runoff from the community of Anahim Lk
Central Interior	Lower Nechako	Nechako River u/s of Fort Fraser	gravel road from Hwy	no pollution
Central Interior	Nechako Plateau	MacIvor Creek infow to Ootsa Lake	boat from Ootsa	no pollution
Central Interior	Pothole Lakes	Bridge Creek at Horse Lake Rd.	on Horse Lk. Rd. at 100 mile House	some agriculture upstream
Coast and Mountains	Eastern Pacific Ranges	Silverhope Creek	drive to	no pollution
Coast and Mountains	Exposed Fjords	Kitimat River at bridge	drive to	no pollution
Coast and Mountains	Georgia Basin	Englishman River at highway	from the highway in Parksville	main sources of contamination are upstream land use such as agriculture and logging which lead to elevated suspended solids during storm events
Coast and Mountains	Georgia Basin	Chapman Creek	drive to	no pollution

Ecoprovince	Ecoregion	Stream Name	Access	Proximity to Pollution*
Coast and Mountains	Hecate Lowland	no streams sampled in this ecoregion		
Coast and Mountains	Nass basin	SROS_bscl	drive to	no pollution
Coast and Mountains	Nass Ranges	Skeena River	drive to	forestry activities in watershed
Coast and Mountains	Nimpkish	Tsitika River	highway and short trail	forestry activities in watershed
Coast and Mountains	North Coastal Mountains	Cascade Creek above Premier mine	from Premier Mine	upstream of mine effects
Coast and Mountains	Northern Pacific Ranges	McClinchy Creek	Hwy 20	some agriculture and forest harvesting upstream
Coast and Mountains	Owikeno Ranges	inflow to Owikeno Lake	by air from Bella Coola	
Coast and Mountains	Puget Basin	Shawnigan Creek at highway	from the highway 1 crossing	upstream urban development and land disturbance
Coast and Mountains	Queen Charlotte Islands	Yakoun River	road from Port Clements	upstream of Cinola but must check position
Coast and Mountains	Sayward	Salmon River at highway	at the highway	no pollution
Coast and Mountains	Southern Inlets	Theodosia River	drive to	no pollution
Coast and Mountains	Southern Pacific Ranges	Norrish Creek	drive to	no pollution
Coast and Mountains	Southern Pacific Ranges	Squamish River	drive to	forestry activities in watershed
Coast and Mountains	Windward Island Mountains	Gold River at highway	highway and bridge access	on the outskirts of the town of Gold River
Northern Boreal Mountains	Cassiar Ranges	Galen Creek	remote road access	control site u/s of old mine
Northern Boreal Mountains	Liard Plateau	Liard River at Liard R.		
Northern Boreal Mountains	Muskwa Ranges	Toad River at highway		no pollution
Northern Boreal Mountains	Stikine Plateau	upper Bearskin Creek		above influence of goldenbear mine
Peace Plains	Peace Plains	Peace River 3.2 KM u/s of FSJ	boat from Taylor launch	upstream of Taylor, d/s of Williston Res
Southern Interior	Okanagan	Similkameen River	drive to	mine drainage, channelisation, agricultural runoff
Southern Interior	Thomspon Plateau	Nicola River near Spences Bridge	at Spences Bridge	NPS agricultural pollution as is typical of all streams in the ecoregion. Small mine seepage
Southern Interior Mountains	Columbia Mountains	Kootenay River @ Picture Valley	drive to	no pollution
Southern Interior Mountains	Columbia Mountains	St. Mary River near Cominco Pump house	drive to	u/s Sullivan: no pollution
Southern Interior Mountains	Kinbasket	Blackwater Creek	drive to	no pollution
Southern Interior Mountains	Quesnel Highlands	Caribou R. at Keithly Cr. Rd. Bridge	from the likely Rd.	possible NPS from scattered septic fields
Southern Interior Mountains	Shuswap Highlands	Eagle River at Solsqua Road Bridge	Hwy 1 at Solsqua Road	no pollution except Sicamous WTP discharges downstream of site
Southern Interior Mountains	Southern Rockies	Elk River @ Phillips	drive to	very far field from NPS and PS mining areas
Southern Interior Mountains	Southern Selkirk Mountains	Columbia River @ Birchbank	drive to	d/s Celgar but very far field
Southern Interior Mountains	Southern Selkirk Mountains	Slocan River near Passmore	drive to	no pollution

Ecoprovince	Ecoregion	Stream Name	Access	Proximity to Pollution*
Southern Interior Mountains	Upper Fraser Highland	Fraser River at Hansard, midstream	Upper Fraser Road	no pollution
Sub-Boreal Interior	Babine Upland	SROS_d2		no pollution
Sub-Boreal Interior	Northern Rockies	Murray River u/s of Quintette Coal	road access	upstream of all mining disturbance downstream
Sub-Boreal Interior	Omineca Mountains	SROS_rcw4		
Sub-Boreal Interior	Skeena Mountains	Fulton River u/s hatchery	upstream of hatchery	no pollution
Sub-Boreal Interior	Takla Manson Plateau	Nation River		no pollution
Sub-Boreal Interior	Upper Fraser	Salmon River	road access	no pollution
Taiga Plains	Taiga Plains	Muskwa River u/s of Fort Nelson	boat or road	upstream of municipal and industrial sources

*NPS refers to non-point source
PS refers to point source

Table 9. General descriptive comments compiled for selected index lakes and reservoirs from survey responses.

Ecoregion	Lake/reservoir Name	Site Number	General Comment
Bulkley Basin	Tyhee Lake	1131009	
Caribou Plateau	Crooked Lake near Center	1170017	
Central Interior Plateau	Watch Lake	E220537	several years of data and collections are ongoing: not a Marl lake and not eutrophic from agricultural runoff
Chilcotin Ranges	Tyaughton Lake, centre	1131201	good representative small lake that is relatively easy to get to in what is a remote area.
Chilcotin Ranges	Seton Lake at dam	E231397	receives drainage from the Seton and Bridge systems and thereby covers a wide area of the ecoregion. It is a large reservoir with little draw down
Dean River	Nimpo Lk. At center	E206952	typical mesotrophic lake of the ecoregion, high recreational value, some data, easy to sample
Lower Nechako	Fraser Lake deep stn	400411	high water quality and high recreational values
Nechako Plateau		E206391	small lake typical of the ecoregion south of Nechako Reservoir
Nechako Plateau	Ootsa Lake off of Ootsa		central in the largest reservoir of the ecoregion and 2nd largest in the Province
Pothole Lakes	Lac La Hache off Emerald Is.	603015	influence of ranching is present but less so than at other lakes of the ecoregion
Eastern Pacific Ranges	Kawkawa Lake	300150	NPS nutrients from resort development are possible, high angler use
Exposed Fjords	Lachmach Lake	E206345	salmon escapement monitoring site at outlet
Georgia Basin	Sakinaw Lake		saline at depth
Georgia Basin	Stocking Lake	E206290	oligotrophic lake that was part of the Acid Rain/Trend Lake program on southern Vancouver Is land. It is relatively

Ecoregion	Lake/reservoir Name	Site Number	General Comment
			isolated and is part of Ladysmith's drinking water supply. Thus, it is likely to retain good water quality over the long term.
Hecate Lowland		DFOS_30	remote area unknown
Nass basin	Yellen L	E223605	small lake typical of the upper Nass
Nass Ranges	Lakelse Lake	400313	
Nimpkish	Quatse Lake	E216693	data set is limited to 1992 data which focuses on metals, nutrients and plankton. Small lake that is fairly typical of the coloured low productivity lake in the Nimpkish Ecoregion. It is poorly buffered, has low alkalinity and hardness and a low mean pH.
North Coastal Mountains	Atlin Lake		no site established but is recommended because of easy access and pristine water quality (expected). It is also one of the largest lakes in the Province with no data!
Northern Pacific Ranges	Horn Lk at Deepest Pt.	E206674	
Owikeno Ranges	Owikeno Lake		
Puget Basin	Maxwell Lake on Saltspring Island	1130022	894 samples from 1984 thru 1998, a solid database on a wide variety of parameters including metals, general ions, phytoplankton, zooplankton, dissolved oxygen etc.Small to moderate sized oligotrophic lake was part of the Acid Rain/Trend Lake program on southern Vancouver Island. It is not subject to locally generated eutrophication as are many of the lake in this ecoregion (e.g. Langford, Quamichan, St. Mary's)
Queen Charlotte Islands		DFOS_3	
Sayward	Buttle Lake north	130088	The lake lies in a glaciated U shaped valley, which drains the central Vancouver Island mountains. Snowmelt is considerable during the spring and early summer months. The lake level was raised by 9 meters in the 1950's and acts as a reservoir for hydroelectric power generation. Cannot be covered by any other lake within the ecoregion.
Sayward	Upper Quinsam Lake	1130098	small to moderate sized oligotrophic lake located away from pollution sources.
Southern Inlets	Powell Lake		high salinity at depth, high recreational value and it is in a community watershed. No EMS[1] data but there are no other EMS lakes in the ecoregion.
Southern Pacific Ranges	Harrison Lake	300044	oligatrophic large lake typical of the ecoregion, no development occurring or anticipated north of Hot Springs Hotel
Windward Island Mountains	Lizard Lake	E206283	This small to moderate sized oligotrophic lake was part of the Acid Rain/Trend Lake program on southern Vancouver Island. It is relatively isolated and is typical of the small to moderate sized lakes in this ecoregion. The watershed is subject to high rainfall, the lake is stocked with rainbow trout, and receives recreational use. It is not subject to locally generated eutrophication
Windward Island Mountains	Sproat Lake at outlet	E218226	One of several large lakes in the ecoregion including Great Central Lake, Sproat Lake, Kennedy Lake, Alice Lake and Victoria Lake. Each of these lakes with the exception of Kennedy Lake lies in a glaciated U shaped valley. These lakes are oligotrophic, subject to high precipitation and minimal disturbance other than forestry activity.
Cassiar Ranges	Jennings Lk.	1130689	
Liard Plateau	Birches Lk.	1132217	

Ecoregion	Lake/reservoir Name	Site Number	General Comment
Muskwa Ranges	Kluachesi Lk	1132051	
Stikine Plateau	Butte Lake	E223362	
Peace Plains	Swan Lake	400935	all ecoregion lakes are eutrophic
Okanagan	Okanagan Lake at Kelowna	500236	Long term data record
Thomspon Plateau	Nicola Lake at deepest point	603006	substantial data history to 1970's and monitoring continues. Second largest lake in the ecoregion
Columbia Mountains	Kootenay lake	200034	long term data avail: site for Koot L. fertilization
Columbia Mountains	Windermere Lake	200051	NPS present but may not be detectable in water chem data
Kinbasket	Mica behind dam	1100501	representative of reservoir
Kinbasket	Blackwater	1132233	data collected prior to Mica
Quesnel Highlands	Quesnel Lake		
Shuswap Highlands	Mabel Lake at Tsuius Creek	500117	recommended as a 2nd lake site to capture low impact medium sized lake
Shuswap Highlands	Shuswap Lake west of Sorrento	500123	data record over several decades; present sampling 2 times per year
Southern Rockies	Connor Lake	E232242	new site but thought to best represent the ecoregion
Southern Selkirk Mountains	Lower Arrow	200523	Site is used for the future Arrow fertilization: ultraoligotrophic. Pretreatment water quality monitoring is ongoing.
Southern Selkirk Mountains	Slocan Lake Midlake-Silverton	200521	
Upper Fraser Highland		RL5_7	unknown
Babine Upland	Stuart Lake	E206957	one of several large lakes and it receives drainage from most of the ecoregion which is unpolluted and relatively pristine. Large fish-forestry research project in the Stuart-Takla system
Babine Upland	Boomerang Lake	11300334	smaller lake than Stuart. Thought to have high water quality but little data which is typical of all unpolluted lakes in the ecoregion
Northern Rockies	Azouzetta Lake deep stn	E206655	oligotrophic lake typical of ecoregion
Omineca Mountains	Germansen Lk	1134023	little information but considered typical of ecoregion
Skeena Mountains	Bob Quinn Lake	1130342	
Takla Manson Plateau	Burden Lk	1134013	
Upper Fraser	Bednesti Lk	400490	mesotrophic typical, with relatively low development.
Taiga Plains	Marion Lake	1132029	

*NPS refers to non-point source

PS refers to point source

[1]EMS refers to the Environmental Management System which is a data base used to compile water quality information in B.C.

Table 10. General descriptive comments compiled for selected index streams from survey responses.

Ecoregion	Stream Name	Site Number	General Comment
Bulkley Basin	Bulkley River at Quick	920088	
Caribou Plateau	Canim R. above Canim Falls	600051	
Central Interior Plateau	Bonaparte River u/s Clinton Cr.	600017	substantial data history but no recent data:
Chilcotin Ranges	Stein River near mouth	600027	Only 31 data points from past monitoring but this is better than most other sites
Chilcotin Ranges	Cadwallader Creek u/s Bralorne	E217521	good high elevation site weathering volcanics which produce high TP and high glacial turbidity which is typical of this part of the ecoregion
Dean River	Dean River u/s Lodge Cr.	600042	site is relatively contaminated with nutrients but is being monitored (May-Oct.) as part of assessment of lagoon-wetland treatment system for the Ulkatcho band. May want to change this site but no other could be recommended
Lower Nechako	Nechako River u/s of Fort Fraser	400629	substantial data outside of EMS[1] exists because of ongoing fisheries work for Kemano settlement. Drains large part of the ecoregion
Nechako Plateau	MacIvor Creek inflow to Ootsa Lake		remote but is an ideal pristine stream draining a large elevation range in Tweedsmuir Provincial Park
Pothole Lakes	Bridge Creek at Horse Lake Rd.	600137	agricultural influence is typical throughout the ecoregion but effects are relatively small here compared to other streams.
Eastern Pacific Ranges	Silverhope Creek	300048	typical of most streams draining Cascades; steep slopes, logging active or previously active
Exposed Fjords	Kitimat River at bridge	430025	
Georgia Basin	Chapman Creek	300106	sampled during the 1970's, but no recent data. No other stream has data.
Georgia Basin	Englishman River at highway	121580	typical of the majority of the rivers in the area in that it is not headed by a large lake. While it does receive snow melt, it is a rain dominated river. This site was selected 2 to 3 years ago as a continuous monitoring site for flow, TSS, pH and conductance and as such is a relatively high priority location
Hecate Lowland	no streams sampled in this ecoregion	DFOS_30	very small short streams draining to numerous small lakes. No stream monitoring in the ecoregion
Nass basin	unknown	SROS_bscl	site unknown
Nass Ranges	Skeena River	920092	main river that drains the whole ecoregion. Smaller rivers do not have data.
Nimpkish	Tsitika River	E207676	typical north Island stream, highly coloured , rainfall dominated hydrology, with no large lake in the headwaters
North Coastal Mountains	Cascade Creek above Premier mine	E220201	
Northern Pacific Ranges	McClinchy Creek	600304	
Owikeno Ranges	stream draining into Owikeno Lake		
Puget Basin	Shawnigan Creek at highway	127217	Drains a semi-rural area headed by a moderate sized lake: Upstream disturbance is limited to semi rural development. The hydrology of the creek is typical of the area.
Queen Charlotte Islands	Yakoun River	700173	typical coloured nutrient-deficient river of the QCI

Ecoregion	Stream Name	Site Number	General Comment
Sayward	Salmon River at highway	127180	drains a large area of the ecoregion. Typical nutrient-deficient water. Fertilization active in headwaters for salmon restoration
Southern Inlets	Theodosia River		
Southern Pacific Ranges	Norrish Creek	300029	good small stream site. sample taken from the east bank on the downstream side of Hawkins Pickle Road
Southern Pacific Ranges	Squamish River	300194	high sediment load medium size river. Headwaters affected by logging. Extensive restoration work ongoing
Windward Island Mountains	Gold River at highway	E207792	drains the central Vancouver Island mountains. Snowmelt is significant during the spring months, while rainfall dominates flows during the w inter months.
Cassiar Ranges	Galen Creek	400403	typical mountain habitat, small stream
Liard Plateau	Liard River at Liard R.		Liard R. drains most of the ecoregion
Muskwa Ranges	Toad River at highway		
Stikine Plateau	upper Bearskin Creek	E215755	
Peace Plains	Peace River 3.2 KM u/s of FSJ	400134	representative on a regional large river basis
Okanagan	Similkameen River	500073	
Thomspon Plateau	Nicola River near Spences Bridge	0600007 or E216848	substantial data history and actively monitored
Columbia Mountains	Kootenay River @ Picture Valley	200038	long term Fed and Prov. Site
Columbia Mountains	St. Mary River near Cominco Pump house	200029	representative small river
Kinbasket	Blackwater Creek	E206765	data collected prior to Mica
Quesnel Highlands	Caribou R. at Keithly Cr. Rd. Bridge	600035	
Shuswap Highlands	Eagle River at Solsqua Road Bridge	500025	substantial data history but no recent data: Highly representative of Shuswap Highlands
Southern Rockies	Elk River @ Phillips	200016	major river of the ecoregion. As unaffected from pollution as a river gets in the region
Southern Selkirk Mountains	Columbia River @ Birchbank	200003	u/s site for objectives monitoring: Fed and Prov. Site
Southern Selkirk Mountains	Slocan River near Passmore	E213060	mesocosm studies by Gerry Oliver completed near this site
Upper Fraser Highland	Fraser River at Hansard, midstream	E206580	control site for fed/prov water quality trend network. Drains the entire ecoregion
Babine Upland		SROS_d2	
Northern Rockies	Murray River u/s of Quintette Coal	E206322	
Omineca Mountains	unknown	SROS_rcw 4	

Ecoregion	Stream Name	Site Number	General Comment
Skeena Mountains	Fulton River u/s hatchery		no established Provincial site but data have been collected by DFO for hatchery operations (contact is Colin Harrison)
Takla Manson Plateau	Nation River	E209686	drains large area of ecoregion. Integrated measure of ecoregion water quality
Upper Fraser	Salmon River	400028	mesotrophic typical, with relatively low development.
Taiga Plains	Muskwa River u/s of Fort Nelson		ecoregion contains several similar sized rivers

*NPS refers to non-point source
PS refers to point source
[1]EMS refers to the Environmental Management System which is a data base used to compile water quality information in B.C.

5.0 RECOMMENDATIONS

In Section 4.0 we showed that sample sizes of water quality data for the index sites, as it is presently logged into AECD, is generally small and needs to be increased to make the index sites useful in all areas of the Province. There are two tasks that can achieve this goal. First is compilation of existing data from the selected sites that may reside in sources outside of the EMS (EMS refers to the Environmental Management System which is a data base used to compile water quality information in B.C.) and AECD. Second is implementation of simple routine water sampling across all areas of the Province. This second task is a basic requirement of maintaining index sites and thus must be implemented regardless of whether the addition of data to AECD from the various existing sources is pursued. To make these activities happen in the present time of cut backs and general lack of funding, innovative strategies must be implemented. Some ideas are as follows.

We will first deal with routine sample collections. This process is a basic requirement of an index site system. To optimise MOELP personnel time and make the plan workable under the present regime of tight budgets, volunteers in communities close to some of the more remote sites should complete sample collections. This is a suggestion that was initially proposed by Bruce Carmichael (Omineca-Peace Management Region) in his response to the index site survey (Appendix A). Little training is required for collection of water samples for the analysis of the required parameters which makes the use of volunteers realistic. These people may be from rod and gun clubs, environment round table committees, and other local interest groups who would find participation with data collection rewarding as a contribution to a process that supports their own interests. BC Environment staff are familiar with the people in these groups and could name several people in their respective regions who would live near the sampling sites and be candidates to complete the sampling. BC Environment staff should complete the collections that are close to their places of work and they should direct the volunteer sample collections. A possible sampling frequency may be quarterly (e.g. once in each of spring, summer, fall and winter) which means that 5 to 12 streams and lakes would have to be sampled once in each season from each management area. The parameter list may be limited to the short list that was used in this project although others would ideally be added for site specific requirements considered important by regional MOELP water quality specialists if the lab budget is available to cover the added cost. An index site lab budget may have to be allocated if the fees cannot be covered within existing lab budgets. All data collected from index sites may be compiled into EMS at the lab (as part of the lab fee) and downloaded directly into AECD for improved characterisation of Ecoregion water quality over time. While the download is presently not a direct process, it could be simplified by writing some software dedicated to the task. This compilation, updated analysis, and overall coordination should happen centrally,

while the collection of data from the index sites may be a regional responsibility. Coordination would involve QAQC to ensure that the stream of selected data from regions is occurring according to the planned schedule, that samples are being handled correctly, and that the data is compiled correctly and made available Province wide, primarily through a dedicated internet web site having file download capability. An example of a site having related capabilities is the NAWQA (national water quality assessment program) that is managed by the US Geological Survey (www.usgs.gov) in the United States. After as little as 5 years of routine field sampling at each index site, there will 20 data points (4 seasons x 5 years) to add to the existing data summarised here in Tables 5 and 6. That is something with which to have confidence in running spatial and temporal analyses in various applications of the index site system across all areas of the Province and a major step forward in developing an index site system. Direct costs would be mainly limited to lab fees, assuming that coordination would remain within BC Environment.

The access and compilation of data into AECD from sources that have not yet been accessed may be considered optional. Of the index sites that have been selected, few or none may have been sampled outside of BC Environment activities. These sites are unlike a much larger number of sites where large project developments (e.g. mines and pulp mills) have occurred and data has been compiled by private and public companies usually via contractors or consultants for regulatory requirements. While data from control or reference sites at these locations may contribute to ecozone descriptions, no index sites recommended in this report are associated with major resource developments. For this reason, there may be little benefit in spending what could be substantial time on searching for data from private sources to improve precision of water quality data at the index sites. Notwithstanding this comment, there is an exception. Lower Arrow Lake was one of the large lake index sites for which no data are compiled in AECD (which also means there are no data for Lower Arrow in EMS). We know, however, that a multiyear fish restoration project has been initiated in Lower Arrow and basic water sampling has been part of that work. The studies are being managed by the Fisheries Research Section of the Ministry of Fisheries at UBC. Data compiled by that office should be accessed and logged into AECD.

In the course of completing the index site survey, a frequent comment from the regional personnel was that time was a premium and that work load is so high that any added task that the index site project may bring to their schedules may not get done. Herein lies a dilemma with maintaining index sites. If the sites are to be recognised, maintained, and used, there is a cost to meeting that objective. There are direct lab costs. There are direct costs or time commitments required for data organisation, regular updating of information and for distribution of that data, ideally by maintaining an internet web site. There are also costs or time required from personnel in regional offices for maintaining sample collections from the field. If time is at a premium that does not allow for these extra tasks but there is a real willingness to develop index sites in aquatic

ecozones, another option is to privitise the process. There are not enough clients in B.C. for a company to take over the management of index sites and associated data bases and charge useage or access fees, but under contract, a company could assume all managerial, technical, and logistical tasks. This option would relieve work loads of BC Environment staff and provide ready access to water quality information that is routinely updated in all regions of the Province via the internet.

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APPENDIX A: Names of Watershed Groups, Ecoregions and Ecoprovinces showing revisions through January, 1999.

WATERSHED GROUP	ECOREGION (as of Jan'99) (new names in bold)	ECOREGION (previously reported by Perrin and Blyth (1998))	ECOPROVINCE
BULKLEY RIVER	Bulkley Basin	Bulkley Basin	Central Interior
MORICE RIVER	Bulkley Basin	Bulkley Basin	Central Interior
HORSEFLY RIVER	Caribou Plateau	Caribou Plateau	Central Interior
MAHOOD LAKE	Caribou Plateau	Caribou Plateau	Central Interior
EUCHINIKO RIVER	Central Interior Plateau	Central Interior Plateau	Central Interior
BLACKWATER RIVER	Central Interior Plateau	Central Interior Plateau	Central Interior
EUCHINIKO LAKE	Central Interior Plateau	Central Interior Plateau	Central Interior
UPPER CHILCOTIN RIVER	Central Interior Plateau	Central Interior Plateau	Central Interior
LOWER CHILCOTIN RIVER	Central Interior Plateau	Central Interior Plateau	Central Interior
BIG CREEK	Central Interior Plateau	Central Interior Plateau	Central Interior
DOG CREEK	Central Interior Plateau	Central Interior Plateau	Central Interior
GREEN LAKE	Central Interior Plateau	Central Interior Plateau	Central Interior
BIG BAR CREEK	Central Interior Plateau	Central Interior Plateau	Central Interior
BONAPARTE RIVER	Central Interior Plateau	Central Interior Plateau	Central Interior
DEADMAN RIVER	Central Interior Plateau	Central Interior Plateau	Central Interior
CHILKO RIVER	Chilcotin Ranges	Chilcotin Ranges	Central Interior
TASEKO RIVER	Chilcotin Ranges	Chilcotin Ranges	Central Interior
SETON LAKE	Chilcotin Ranges	Chilcotin Ranges	Central Interior
LOWER DEAN RIVER	Dean River	Dean River	Central Interior
UPPER DEAN RIVER	Dean River	Dean River	Central Interior
FRANCOIS LAKE	Lower Nechako	Lower Nechako	Central Interior
NECHAKO RIVER	Lower Nechako	Lower Nechako	Central Interior
CHESLATTA RIVER	Lower Nechako	Lower Nechako	Central Interior
CHILAKO RIVER	Lower Nechako	Lower Nechako	Central Interior
UPPER NECHAKO RESERVOIR	Nechako Plateau	Nechako Plateau	Central Interior
LOWER EUTSUK LAKE	Nechako Plateau	Nechako Plateau	Central Interior
LOWER NECHAKO RESERVOIR	Nechako Plateau	Nechako Plateau	Central Interior
UPPER EUTSUK LAKE	Nechako Plateau	Nechako Plateau	Central Interior
NAZKO RIVER	Pothole Lakes	Pothole Lakes	Central Interior
NARCOSLI CREEK	Pothole Lakes	Pothole Lakes	Central Interior
TWAN CREEK	Pothole Lakes	Pothole Lakes	Central Interior
MIDDLE FRASER	Pothole Lakes	Pothole Lakes	Central Interior
SAN JOSE RIVER	Pothole Lakes	Pothole Lakes	Central Interior
BRIDGE CREEK	Pothole Lakes	Pothole Lakes	Central Interior
KNIGHT INLET	Southern Inlets	Bute Inlets	Coast and Mountains
TOBA INLET	Southern Inlets	Bute Inlets	Coast and Mountains
SEYMOUR INLET	Southern Inlets	Bute Inlets	Coast and Mountains
FRASER CANYON	Eastern Pacific Ranges	Eastern Pacific Ranges	Coast and Mountains
SKAGIT RIVER	Eastern Pacific Ranges	Eastern Pacific Ranges	Coast and Mountains
KSHWAN RIVER	Exposed Fjords	Exposed Fjords	Coast and Mountains
LOWER NASS RIVER	Exposed Fjords	Exposed Fjords	Coast and Mountains
LOWER SKEENA RIVER	Exposed Fjords	Exposed Fjords	Coast and Mountains
KITIMAT RIVER	Exposed Fjords	Exposed Fjords	Coast and Mountains
TSAYTIS RIVER	Exposed Fjords	Exposed Fjords	Coast and Mountains
KHUTZE RIVER	Exposed Fjords	Exposed Fjords	Coast and Mountains
KITLOPE RIVER	Exposed Fjords	Exposed Fjords	Coast and Mountains
NASCALL RIVER	Exposed Fjords	Exposed Fjords	Coast and Mountains
NECLEETSCONNAY RIVER	Exposed Fjords	Exposed Fjords	Coast and Mountains
COMOX	Georgia Basin	Georgia Basin	Coast and Mountains
PARKSVILLE	Georgia Basin	Georgia Basin	Coast and Mountains
COWICHAN	Georgia Basin	Georgia Basin	Coast and Mountains

WATERSHED GROUP	ECOREGION (as of Jan'99) (new names in bold)	ECOREGION (previously reported by Perrin and Blyth (1998))	ECOPROVINCE
JERVIS INLET	Georgia Basin	South Pacific Ranges	Coast and Mountains
WORK CHANNEL	Hecate Lowland	Hecate Lowland	Coast and Mountains
PORCHER ISLAND	Hecate Lowland	Hecate Lowland	Coast and Mountains
KUMOWDAH RIVER	Hecate Lowland	Hecate Lowland	Coast and Mountains
NORTH BANKS ISLAND	Hecate Lowland	Hecate Lowland	Coast and Mountains
MIDDLE BANKS ISLAND	Hecate Lowland	Hecate Lowland	Coast and Mountains
KEECHA CREEK	Hecate Lowland	Hecate Lowland	Coast and Mountains
LAREDO INLET	Hecate Lowland	Hecate Lowland	Coast and Mountains
KITASU BAY	Hecate Lowland	Hecate Lowland	Coast and Mountains
NASCALL RIVER	Hecate Lowland	Hecate Lowland	Coast and Mountains
NECLEETSCONNAY RIVER	Hecate Lowland	Hecate Lowland	Coast and Mountains
LOWER BELL-IRVING RIVER	Nass Basin	Nass Basin	Coast and Mountains
NASS RIVER	Nass Basin	Nass Basin	Coast and Mountains
KINSKUCH RIVER	Nass Basin	Nass Basin	Coast and Mountains
KISPIOX RIVER	Nass Ranges	Nass Ranges	Coast and Mountains
KALUM RIVER	Nass Ranges	Nass Ranges	Coast and Mountains
ZYMOETZ RIVER	Nass Ranges	Nass Ranges	Coast and Mountains
LAKELSE	Nass Ranges	Nass Ranges	Coast and Mountains
NORTHEAST VANCOUVER ISLAND	Nimpkish	Nimpkish	Coast and Mountains
NIMPKISH RIVER	Nimpkish	Nimpkish	Coast and Mountains
TSITIKA RIVER	Nimpkish	Nimpkish	Coast and Mountains
TATSHENSHINI RIVER	North Coastal Mountains	North Coastal Mountains	Coast and Mountains
KUSAWA RIVER	North Coastal Mountains	North Coastal Mountains	Coast and Mountains
TUTSHI RIVER	North Coastal Mountains	North Coastal Mountains	Coast and Mountains
ATLIN LAKE	North Coastal Mountains	North Coastal Mountains	Coast and Mountains
INKLIN RIVER	North Coastal Mountains	North Coastal Mountains	Coast and Mountains
BARRINGTON RIVER	North Coastal Mountains	North Coastal Mountains	Coast and Mountains
LOWER STIKINE RIVER	North Coastal Mountains	North Coastal Mountains	Coast and Mountains
LOWER ISKUT RIVER	North Coastal Mountains	North Coastal Mountains	Coast and Mountains
UNUK RIVER	North Coastal Mountains	North Coastal Mountains	Coast and Mountains
BELLA COOLA RIVER	Northern Pacific Ranges	Northern Pacific Ranges	Coast and Mountains
ATNARKO RIVER	Northern Pacific Ranges	Northern Pacific Ranges	Coast and Mountains
KLINAKLINI RIVER	Northern Pacific Ranges	Northern Pacific Ranges	Coast and Mountains
HOMATHCO RIVER	Northern Pacific Ranges	Northern Pacific Ranges	Coast and Mountains
OWIKENO LAKE	Owikeno Ranges	Owikeno Ranges	Coast and Mountains
NIEL CREEK	Owikeno Ranges	Hecate Lowland	Coast and Mountains
VICTORIA	Puget Basin	Puget Basin	Coast and Mountains
GRAHAM ISLAND	Queen Charlotte Islands	Queen Charlotte Islands	Coast and Mountains
MORSBY ISLAND	Queen Charlotte Islands	Queen Charlotte Islands	Coast and Mountains
SALMON RIVER	Sayward	Sayward	Coast and Mountains
CAMPBELL RIVER	Sayward	Sayward	Coast and Mountains
LILLOOET	Southern Pacific Ranges	Southern Pacific Ranges	Coast and Mountains
SQUAMISH	Southern Pacific Ranges	Southern Pacific	Coast and Mountains

WATERSHED GROUP	ECOREGION (as of Jan'99) (new names in bold)	ECOREGION (previously reported by Perrin and Blyth (1998))	ECOPROVINCE
		Ranges	
HARRISON RIVER	Southern Pacific Ranges	Southern Pacific Ranges	Coast and Mountains
LOWER FRASER	Southern Pacific Ranges	Southern Pacific Ranges	Coast and Mountains
CHILLIWACK RIVER	Southern Pacific Ranges	Southern Pacific Ranges	Coast and Mountains
HOLBERG	Windward Island Mountains	Windward Island Mountains	Coast and Mountains
BROOKS PENINSULA	Windward Island Mountains	Windward Island Mountains	Coast and Mountains
TAHSIS	Windward Island Mountains	Windward Island Mountains	Coast and Mountains
GOLD RIVER	Windward Island Mountains	Windward Island Mountains	Coast and Mountains
CLAYOQUOT	Windward Island Mountains	Windward Island Mountains	Coast and Mountains
ALBERNI INLET	Windward Island Mountains	Windward Island Mountains	Coast and Mountains
SAN JUAN RIVER	Windward Island Mountains	Windward Island Mountains	Coast and Mountains
SWIFT RIVER	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
LITTLE RANCHERIA RIVER	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
BLUE RIVER	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
JENNINGS RIVER	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
UPPER JENNINGS RIVER	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
DEASE LAKE	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
MIDDLE DEASE RIVER	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
UPPER KECHIKA RIVER	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
CRY LAKE	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
TURNAGAIN RIVER	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
FROG RIVER	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
TOODOGGONE RIVER	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
CHUKACHIDA RIVER	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
INGENIKA RIVER	Cassiar Ranges	Cassiar Ranges	Northern Boreal Mountains
UPPER LIARD RIVER	Liard Plateau	Liard Plateau	Northern Boreal Mountains
COAL RIVER	Liard Plateau	Liard Plateau	Northern Boreal Mountains
LIARD RIVER	Liard Plateau	Liard Plateau	Northern Boreal Mountains
DEASE RIVER	Liard Plateau	Liard Plateau	Northern Boreal Mountains
LOWER KECHIKA RIVER	Liard Plateau	Liard Plateau	Northern Boreal Mountains
DUNEDIN RIVER	Muskwa Ranges	Muskwa Ranges	Northern Boreal Mountains
BEAVER RIVER	Muskwa Ranges	Muskwa Ranges	Northern Boreal Mountains
TOAD RIVER	Muskwa Ranges	Muskwa Ranges	Northern Boreal Mountains
MIDDLE MUSKWA RIVER	Muskwa Ranges	Muskwa Ranges	Northern Boreal Mountains
GATAGA RIVER	Muskwa Ranges	Muskwa Ranges	Northern Boreal Mountains
UPPER MUSKWA RIVER	Muskwa Ranges	Muskwa Ranges	Northern Boreal Mountains
FOX RIVER	Muskwa Ranges	Muskwa Ranges	Northern Boreal Mountains
UPPER PROPHET RIVER	Muskwa Ranges	Muskwa Ranges	Northern Boreal Mountains
FINLAY RIVER	Muskwa Ranges	Muskwa Ranges	Northern Boreal Mountains
GLADYS RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
TESLIN RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
NAKINA RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
TUYA RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
NAHLIN RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
SHESLAY RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
TAHLTAN RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
MIDDLE STIKINE RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains

WATERSHED GROUP	ECOREGION (as of Jan'99) (new names in bold)	ECOREGION (previously reported by Perrin and Blyth (1998))	ECOPROVINCE
PITMAN RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
STIKINE RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
KAKIDDI CREEK	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
MESS CREEK	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
KLAPPAN RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
UPPER STIKINE RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
UPPER ISKUT RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
SPATZIZI RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
FIRESTEEL RIVER	Stikine Plateau	Stikine Plateau	Northern Boreal Mountains
MILLIGAN CREEK	Peace Plains	Peace Plains	Peace Plains
UPPER BEATTON RIVER	Peace Plains	Peace Plains	Peace Plains
LOWER BEATTON RIVER	Peace Plains	Peace Plains	Peace Plains
UPPER HALFWAY RIVER	Peace Plains	Peace Plains	Peace Plains
LOWER HALFWAY RIVER	Peace Plains	Peace Plains	Peace Plains
LOWER PEACE RIVER	Peace Plains	Peace Plains	Peace Plains
UPPER PEACE RIVER	Peace Plains	Peace Plains	Peace Plains
KISKATINAW RIVER	Peace Plains	Peace Plains	Peace Plains
OKANAGAN RIVER	Okanagan	Okanagan	Southern Interior
KETTLE RIVER	Okanagan	Okanagan	Southern Interior
SIMILKAMEEN RIVER	Okanagan	Okanagan	Southern Interior
THOMPSON RIVER	Thompson Plateau	Thompson-Okanagan Plateau	Southern Interior
SOUTH THOMPSON RIVER	Thompson Plateau	Thompson-Okanagan Plateau	Southern Interior
GUICHON CREEK	Thompson Plateau	Thompson-Okanagan Plateau	Southern Interior
LOWER NICOLA RIVER	Thompson Plateau	Thompson-Okanagan Plateau	Southern Interior
NICOLA RIVER	Thompson Plateau	Thompson-Okanagan Plateau	Southern Interior
REVELSTOKE LAKE	Columbia Mountains	Columbia Mountains	Southern Interior Mountains
UPPER ARROW LAKE	Columbia Mountains	Columbia Mountains	Southern Interior Mountains
DUNCAN LAKE	Columbia Mountains	Columbia Mountains	Southern Interior Mountains
COLUMBIA RIVER	Columbia Mountains	Columbia Mountains	Southern Interior Mountains
BULL RIVER	Columbia Mountains	Columbia Mountains	Southern Interior Mountains
ST. MARY RIVER	Columbia Mountains	Columbia Mountains	Southern Interior Mountains
KOOTENAY LAKE	Columbia Mountains	Columbia Mountains	Southern Interior Mountains
CANOE REACH	Kinbasket	Kinbasket	Southern Interior Mountains
COLUMBIA REACH	Kinbasket	Kinbasket	Southern Interior Mountains
WILLOW RIVER	Quesnel Highlands	Quesnel Highlands	Southern Interior Mountains
BOWRON	Quesnel Highlands	Quesnel Highlands	Southern Interior Mountains
CARIBOO RIVER	Quesnel Highlands	Quesnel Highlands	Southern Interior Mountains
QUESNEL RIVER	Quesnel Highlands	Quesnel Highlands	Southern Interior Mountains
CLEARWATER RIVER	Quesnel Highlands	Quesnel Highlands	Southern Interior Mountains
MURTLE LAKE	Quesnel Highlands	Quesnel Highlands	Southern Interior Mountains
UPPER NORTH THOMPSON RIVER	Shuswap Highlands	Shuswap Highlands	Southern Interior Mountains
ADAMS RIVER	Shuswap Highlands	Shuswap Highlands	Southern Interior Mountains
LOWER NORTH THOMPSON RIVER	Shuswap Highlands	Shuswap Highlands	Southern Interior Mountains
SHUSWAP LAKE	Shuswap Highlands	Shuswap Highlands	Southern Interior Mountains
UPPER SHUSWAP	Shuswap Highlands	Shuswap Highlands	Southern Interior Mountains
KICKING HORSE RIVER	Southern Rockies	Southern Rockies	Southern Interior Mountains
KOOTENAY RIVER	Southern Rockies	Southern Rockies	Southern Interior Mountains
ELK RIVER	Southern Rockies	Southern Rockies	Southern Interior Mountains
SLOCAN RIVER	Southern Selkirk Mountains	Southern Selkirk Mountains	Southern Interior Mountains
LOWER ARROW LAKE	Southern Selkirk Mountains	Southern Selkirk Mountains	Southern Interior Mountains

WATERSHED GROUP	ECOREGION (as of Jan'99) (new names in bold)	ECOREGION (previously reported by Perrin and Blyth (1998))	ECOPROVINCE
MORKILL RIVER	Upper Fraser Highlands	Upper Fraser Trench	Southern Interior Mountains
UPPER FRASER RIVER	Upper Fraser Highlands	Upper Fraser Trench	Southern Interior Mountains
BABINE LAKE	Babine Upland	Babine Upland	Sub-Boreal Interior
MIDDLE RIVER	Babine Upland	Babine Upland	Sub-Boreal Interior
LOWER TREMBLEUR LAKE	Babine Upland	Babine Upland	Sub-Boreal Interior
UPPER TREMBLEUR LAKE	Babine Upland	Babine Upland	Sub-Boreal Interior
STUART LAKE	Babine Upland	Babine Upland	Sub-Boreal Interior
OSPIKA RIVER	Northern Rockies	Central Rocky Mountains	Sub-Boreal Interior
PEACE ARM	Northern Rockies	Central Rocky Mountains	Sub-Boreal Interior
PINE RIVER	Northern Rockies	Central Rocky Mountains	Sub-Boreal Interior
PARSNIP ARM	Northern Rockies	Central Rocky Mountains	Sub-Boreal Interior
MURRAY RIVER	Northern Rockies	Central Rocky Mountains	Sub-Boreal Interior
SMOKY RIVER	Northern Rockies	Central Rocky Mountains	Sub-Boreal Interior
PARSNIP RIVER	Northern Rockies	Central Rocky Mountains	Sub-Boreal Interior
HERRICK CREEK	Northern Rockies	Central Rocky Mountains	Sub-Boreal Interior
MCGREGOR RIVER	Northern Rockies	Central Rocky Mountains	Sub-Boreal Interior
UPPER SKEENA RIVER	Omineca Mountains	Omineca Mountains	Sub-Boreal Interior
FINLAY ARM	Omineca Mountains	Omineca Mountains	Sub-Boreal Interior
SUSTUT RIVER	Omineca Mountains	Omineca Mountains	Sub-Boreal Interior
MESILINKA RIVER	Omineca Mountains	Omineca Mountains	Sub-Boreal Interior
LOWER OMINECA RIVER	Omineca Mountains	Omineca Mountains	Sub-Boreal Interior
ISKUT RIVER	Skeena Mountains	Skeena Mountains	Sub-Boreal Interior
UPPER BELL-IRVING RIVER	Skeena Mountains	Skeena Mountains	Sub-Boreal Interior
UPPER NASS RIVER	Skeena Mountains	Skeena Mountains	Sub-Boreal Interior
TAYLOR RIVER	Skeena Mountains	Skeena Mountains	Sub-Boreal Interior
MIDDLE SKEENA RIVER	Skeena Mountains	Skeena Mountains	Sub-Boreal Interior
BABINE RIVER	Skeena Mountains	Skeena Mountains	Sub-Boreal Interior
UPPER OMINECA RIVER	Takla/Manson Plateau	Takla/Manson Plateau	Sub-Boreal Interior
DRIFTWOOD RIVER	Takla/Manson Plateau	Takla/Manson Plateau	Sub-Boreal Interior
TAKLA LAKE	Takla/Manson Plateau	Takla/Manson Plateau	Sub-Boreal Interior
NATION RIVER	Takla/Manson Plateau	Takla/Manson Plateau	Sub-Boreal Interior
CARP LAKE	Upper Fraser	Upper Fraser	Sub-Boreal Interior
SALMON RIVER	Upper Fraser	Upper Fraser	Sub-Boreal Interior
CROOKED RIVER	Upper Fraser	Upper Fraser	Sub-Boreal Interior
MUSKEG RIVER	Upper Fraser	Upper Fraser	Sub-Boreal Interior
LOWER SALMON RIVER	Upper Fraser	Upper Fraser	Sub-Boreal Interior
STUART RIVER	Upper Fraser	Upper Fraser	Sub-Boreal Interior
TABOR RIVER	Upper Fraser	Upper Fraser	Sub-Boreal Interior
LOWER CHILAKO RIVER	Upper Fraser	Upper Fraser	Sub-Boreal Interior
COTTONWOOD RIVER	Upper Fraser	Upper Fraser	Sub-Boreal Interior
UPPER PETITOT RIVER	Taiga Plains	Taiga Plains	Taiga Plains
TSEA RIVER	Taiga Plains	Taiga Plains	Taiga Plains
LOWER PETITOT RIVER	Taiga Plains	Taiga Plains	Taiga Plains
SAHDOANAH CREEK	Taiga Plains	Taiga Plains	Taiga Plains
LOWER FORT NELSON RIVER	Taiga Plains	Taiga Plains	Taiga Plains
SHEKILIE RIVER	Taiga Plains	Taiga Plains	Taiga Plains
SAHTANEH RIVER	Taiga Plains	Taiga Plains	Taiga Plains
MIDDLEW FORT NELSON RIVER	Taiga Plains	Taiga Plains	Taiga Plains

WATERSHED GROUP	ECOREGION (as of Jan'99) (new names in bold)	ECOREGION (previously reported by Perrin and Blyth (1998))	ECOPROVINCE
KOTCHO LAKE	Taiga Plains	Taiga Plains	Taiga Plains
LOWER MUSKWA RIVER	Taiga Plains	Taiga Plains	Taiga Plains
HAY RIVER	Taiga Plains	Taiga Plains	Taiga Plains
UPPER FORT NELSON RIVER	Taiga Plains	Taiga Plains	Taiga Plains
LOWER PROPHET RIVER	Taiga Plains	Taiga Plains	Taiga Plains
FONTAS RIVER	Taiga Plains	Taiga Plains	Taiga Plains
KAHNTAH RIVER	Taiga Plains	Taiga Plains	Taiga Plains
MIDDLE PROPHET RIVER	Taiga Plains	Taiga Plains	Taiga Plains
LOWER SIKANNI CHIEF RIVER	Taiga Plains	Taiga Plains	Taiga Plains
UPPER SIKANNI CHIEF RIVER	Taiga Plains	Taiga Plains	Taiga Plains

APPENDIX B: Example of the survey distributed to request recommendations for the selection of Index Sites.

March 19, 1998

Mr. R. Grace
Environmental Protection
Ministry of Environment Lands and Parks
1259 Dalhousie Drive
Kamloops, B.C.
V2C 5Z5

Dear Mr. Grace;

This letter is a request for a small amount of your time to contribute to the selection of index water quality sites in your management region.

As you are aware, a hierarchical framework was developed for describing regional variation in chemical characteristics of aquatic ecosystems in British Columbia as the first phase of the Aquatic Ecozone Classification for B.C. (Perrin and Blyth 1998). It involved organizing water quality data for the whole province in three spatial strata: 245 watershed groups within 45 Ecoregions within 9 Ecoprovinces. These strata have been used in the production of maps, organization of a dedicated data base that supports the classification system, and in a graphical user interface that allows searches of data in large or small zones of interest. The map and GUI can now support searches of summary data in any region to provide information on background chemical characteristics for an area of interest. A map of Ecoregions within Ecoprovinces is enclosed for your reference. In phase 2 of the project, which is presently underway, we intend to select one index site for lakes and one for streams in each Ecoregion. The identification of these sites on the GUI will provide a quick reference to typical characteristics of water quality in any given Ecoregion. All of this work is being completed by Limnotek Research and Development Inc and AXYS Environmental Consulting under contract to the Water Management Branch (Dr. Rick Nordin is the contract manager).

Outline of Index Site Selection

Each index site is a location where typical water quality for an Ecoregion can be found. An index site can be defined by four criteria:

9. it is a sampling location from which water quality data have been collected over several years and can continue to be collected;
10. it has ready access for routine sampling;
11. it is not affected by pollution sources and;
12. it is considered representative of general limnology and water quality in the Ecoregion in which it is present.

Using these criteria, we want to select, with your assistance, two sites for each Ecoregion within your management area. One site will be representative of lakes and one will be for streams. If an Ecoregion includes a very large lake or reservoir and many other

smaller water bodies, the establishment of an index site in that large system may also be warranted in addition to one other lake index site and a stream index site. This is because that large system may have unique chemical characteristics determined by internal control processes which are not found in the other lakes and streams. Examples may be the Nechako Reservoir to be representative of the Nechako Plateau Ecoregion, Atlin Lake in the North Coastal Mountains Ecoregion, Babine Lake in the Babine Uplands Ecoregion, or Okanagan Lake in the Okanagan Ecoregion.

The viability of an index site is dependant on the existence of data that can be used to describe details of water quality characteristics. For an index site to be accepted, that data must presently be available. A site may also be accepted if routine data collections are ongoing or there is intent and available funding to support data collection in the near future or data exists for the site but it is not yet on the data base used for the Aquatic Ecozone Classification. For this reason, index sites that are selected in this project are only recommended sites. Those which are presently supported with adequate and available data, can be used as index sites immediately, but those which do not presently have adequate data or the data are not in the data base will only be recommended and accepted pending additional work. The potential use of a recommended site will be dependant on funding, available time for personnel to collect data and have it logged into the data base, and a willingness to adopt an index site system of water quality data by regional offices.

Four tasks are involved in the establishment and description of the index sites:

1. **Database Search**: This task is now complete. Using the summary database that was developed by Perrin and Blyth (1998), a search revealed sampling sites for each of lakes and streams in all Ecoregions that have long term data records for a wide range of chemical parameters. We selected the top 5 sites that have the greatest number of parameters sampled, the top 5 that have the largest number of measurements, and the top 5 that have the greatest data diversity in each Ecoregion. Diversity in this case was arbitrarily defined as number of measurements multiplied by number of parameters. A print-out of the results of the survey for your management area is enclosed for your reference.
2. **Survey of Local Knowledge from Regional Offices:** This is where you come in. We request input of local knowledge in the selection of sites. In terms of the above criteria used to define an index site, the data base search only dealt with aspects of existing data adequacy. Issues of access, whether the site is representative of the Ecoregion, and proximity to pollution sources can only be dealt with by direct consultation with regional water quality personnel who have the local experience.
3. **Site Mapping**: A colour map will be produced that shows the distribution and names of all stream and lake index sites. It will be formatted to accompany the map of aquatic ecozones produced in Phase 1 by Perrin and Blyth (1998).
4. **Description and Reporting of Index Sites**: For all selected sites that are supported with data, summary statistics will be downloaded from the Phase 1 database and compiled as a data report. That report will be supported with brief descriptions that outline characteristics of water quality for each index site.

Here is our Request

Using the above criteria and a short list of sites that we have already prepared, we request that you select one index site for lakes and one for streams that you believe is representative of each Ecoregion of your management area. Where your management area divides an Ecoregion, we request that you discuss the selection of a site in that Ecoregion with your counterpart in the adjacent management area.

Enclosed material is supplied to assist you with the selection:

- Map of B.C. showing Ecoregions within Ecoprovinces
- Map of your management area showing the enclosed Ecoregions. Your management area is outlined in red. Ecoregions are outlined in green. Ecoprovince boundaries are outlined in blue. The top five lake and stream sites that are listed in the print-out from the data base search are located on this map.
- Listing of top 5 stream and lake sites for each Ecoregion in your management area. This listing is based on the data base search described above.

Ecoregions in your management area are as follows:

1. Shuswap Highlands
2. Quesnel Highlands (southern portion)
3. Central Interior Plateau (southern portion)
4. Thompson-Okanagan Plateau
5. Chilcotin Ranges (southern portion)

We request that you select one index lake site and one index stream site for each of these Ecoregions.

Each of your selections can be drawn as a circle right onto the map that is supplied or you can list them separately. Unless you know of extensive data that we have not considered which would rank a site in the top five in terms of data availability, please limit your choice from the short list that is enclosed and marked on the map. Remember that a criterion for an index site is that a history of water quality data is presently available. If you believe that none of the short listed sites are appropriate as index sites, you must supply data to describe an alternative. For each selection, we request a short rationale for why you selected that location. Criteria for that rationale should include but is not limited to the following list:

1. **Data history**. We already know about electronic data that has been compiled from EMS. We have records for all sites that are labeled on the map. Only make a comment about the extent of other data that does not show up on the enclosed short list. Where you identify other data, please provide a brief description of water quality for your selected site using the other data or send a summary of the data for us to prepare an interpretation.
2. **Site access**. An index site should have easy access. Describe road or air access, launch facilities, and distance from a location where sampling would be based, and number of times per year that the site could be sampled assuming funding was available to do so.
3. **Proximity to pollution sources that you aware of**. An index site should not be affected by pollution sources. Where a very large number of sites in an Ecoregion are characterized by water affected by pollution, please attempt to select a site that is

least affected. Identify pollution sites, indicate the approximate distance the index site is away from those pollution sources and indicate the type of pollution that is found near the index site (e.g. point source mine water discharge or non-point source agricultural drainage).

4. **Is the selected index site representative of the Ecoregion?** Criteria to note in particular are lake or stream size and trophic status relative to most others in the Ecoregion (don't recommend an oligotrophic lake in an Ecoregion where mesotrophic or eutrophic lakes are typical and unrelated to pollution) .

For some Ecoregions, water quality data are sparse or non-existent. If you encounter one of these areas, the requirement of having a data history for a selected site will obviously have to be compromised in favour of the other criteria. In these situations, please rely on your local knowledge of access, proximity to pollution sources and whether the site is representative from a limnological viewpoint to make your selection. It is expected, however, that to have any idea of whether a site is representative, at least some water quality data will have been collected. For this reason, we do not expect that a site will be recommended without any data and a rationale from you to support that selection.

How to do it

You can make your selections by circling the sites on the map sheet and returning it to us along with a table of notes justifying your selection. Alternatively, keep the map and just make up a table for each index site on which the site is identified. A table of notes should include but is not limited to the following items:

- Name of management area
- Ecoregion name
- Name of person who prepared the response
- Name of the stream or lake site
- Site number as indicated on the map
- Data history (if the site is not already on the map, please provide data and an interpretation to support your selection of the site)
- Site access (brief notes)
- proximity to pollution sources (brief notes)
- reasons why the site is representative (lake or stream size and trophic status relative to others in the Ecoregion).

Dates, Deadlines and Questions

I understand that your time is very limited and for that reason, keep the responses short and concise. I expect that most of the information that is required here is in your head and you should not have to look up reference material.

I would appreciate receiving your site selections by March 31, 1998. If you cannot provide all information by that date, just identify the sites and get them back to me so that maps

which locate the index sites can be produced. I will then follow up either by phone or email to get the outstanding information.

Because time is of the essence, please return the information either by email or courier. The email address is cperrin@istar.ca. The Limnotek street address is:

Limnotek
4035 West 14 Avenue
Vancouver, B.C. V6R 2X3

With your response, let me know if you have not yet received a copy of the Aquatic Ecozone map for B.C. If not, I will arrange to have one sent to you.

If you have any questions related to this survey, please call Chris Perrin at Limnotek (604-222-3546 or email cperrin@istar.ca) or Ann Blyth at AXYS Environmental Consulting (250-656-0881 or email ablyth@axys.com). Chris Perrin is managing the project and will prepare the final site selections while Ann Blyth is providing the GIS and mapping requirements. Chris Perrin will be away from his office for 3 days from March 23 through 25 but will be able to address any questions thereafter. During that period, please call Ann Blyth with any questions.

Finally, I greatly appreciate you taking the time to contribute to this selection of index sites. Your input is essential and most important in making the project successful.

Thanks again!

Yours truly;
LIMNOTEK RESEARCH AND DEVELOPMENT INC.

C. J. Perrin, MSc, (RPBio)
Senior Systems Ecologist

cc. Ann Blyth, AXYS Environmental Consulting, Sidney, B.C. (604-656-0881)