

***Identification and Collection of
Existing Marine Nutrient and
Biological Data***

for the Purpose of

***Evaluating Nutrient and Biological
Conditions in Nearshore Canadian
Marine Environments.***

A study conducted on behalf of

Environment Canada

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1 Background for the Project

1.1 Objectives

The purpose of this contract was to identify and collect existing Canadian nearshore marine nutrient and biological data from various government and non-government sources. The sources of data could include, but would not be limited to, federal departments, provincial ministries, academia, scientific literature, consultants, research institutes, conference proceedings, and industry.

1.2 Scope of Work

Based on the following conditions, the project was to identify and to collect existing nutrient concentrations and biological data in nearshore marine waters from various government and non-government sources across Canada:

1. The Scientific Authority and Project Team would provide to the consultant a complete list of approximately 25 parameters for collection (i.e., temperature, NO₃, NO₂, NH₃, TN, TP, chl a, fluorescence, pheophytin, DOC, and DO). (Table 1. Received 06 December 2004).
2. The consultant would identify potential data sources and collect existing data for all of these parameters, where available (Initial Contact List submitted to client December, 2004).
3. In addition, date of collection and geo-referencing coordinates, where available, would be obtained for each data entry.
4. In the search for data, it was recognized that it could be necessary for the consultant, or the Scientific Authority or Project team to make additions to this list, depending on what parameters have been measured in the past.

Table 1. Database Template

Field Title	Description of Information
Sample and site information	
Province/Territory	Names are spelled out in full.
Name of Water body	Name only (i.e., Northumberland Strait). Use Canadian Geographical Names Database to ensure consistency.
Water Body Type	Estuary, Bay, Channel, etc. Use Canadian Geographical Names Database to ensure consistency.
Longitude Degrees	-99 represents unknown or missing values
Longitude Minutes	-99 represents unknown or missing values
Longitude Seconds	0 may represent unknown or missing values
OR	
Longitudinal coordinates	Decimal degrees; -99 represents unknown or missing values
Latitude Degrees	-99 represents unknown or missing values
Latitude Minutes	-99 represents unknown or missing values
Latitude Seconds	0 may represent unknown or missing values
OR	
Latitudinal coordinates	Decimal degrees; -99 represents unknown or missing values
OR	
UTM Grid Zone	UTM - Universal Transverse Mercator Geographic Coordinate System
Easting	longitudinal projection zones (1-60)
Northing	latitudinal zones (C-X)
Frequency of collection	Annual, monthly, once, N/A represents missing or unknown data
Year	Year during which data were collected; N/A represents missing or unknown data
Month	Month (spelled out in full- e.g., January) during which data were collected; N/A represents missing or unknown data
Day	Day during which data were collected; N/A represents missing or unknown data
Time	Time which data were collected; N/A represents missing or unknown data
Depth (m)	Depth of water sample; -99 represents unknown or missing values
General Water Conditions	
Temperature (° C)	Temperature; -99 represents unknown or missing values
Salinity (psu)	Salinity concentration; -99 represents unknown or missing values
Water Residence time (d)	Water residence time; -99 represents unknown or missing values
Secchi depth (m)	Secchi Disk Readings; -99 represents unknown or missing values
Oxygen	
Dissolved Oxygen (mg·L ⁻¹) concentration	DO concentration; -99 represents unknown or missing values
Nutrients	
Nitrate (NO ₃) Concentration (mg·L ⁻¹)	Nitrate concentration; -99 represents unknown or missing values
Nitrite (NO ₂) Concentration (mg·L ⁻¹)	Nitrite concentration; -99 represents unknown or missing values
Nitrate + Nitrite (NO ₃ +NO ₂) Concentration (mg·L ⁻¹)	Nitrate + nitrite concentration; -99 represents unknown or missing values
Ammonia (NH ₃) Concentration	Ammonia concentration; -99 represents unknown or missing values

Field Title	Description of Information
(mg·L ⁻¹)	
Total Nitrogen (TN) Concentration (mg·L ⁻¹)	Total Nitrogen concentration; -99 represents unknown or missing values
Dissolved Inorganic Nitrogen (DIN) (mg L ⁻¹)	Dissolved Inorganic Nitrogen concentration; -99 represents unknown or missing values (= NH ₃ + NO ₃ +NO ₂)
Total Phosphorus (TP) Concentration (mg·L ⁻¹)	Total Phosphorus concentration; -99 represents unknown or missing values
Orthophosphate (PO ₄) Concentration (mg·L ⁻¹)	Orthophosphate concentration; -99 represents unknown or missing values
Silicate (SiO ₄) concentration (mg·L ⁻¹)	Silicate concentration; -99 represents unknown or missing values
Carbon and other parameters	
Total Inorganic Carbon (TIC) concentration (mg·L ⁻¹)	Total Inorganic Carbon concentration; -99 represents unknown or missing values
Dissolved Organic Carbon (DOC) concentration (mg·L ⁻¹)	Dissolved Organic concentration; -99 represents unknown or missing values
Total Organic Carbon (TOC) concentration (mg·L ⁻¹)	Total Organic Carbon concentration; -99 represents unknown or missing values
Total Suspended Solids (mg·L ⁻¹)	TSS concentration; -99 represents unknown or missing values
Measures of algal biomass or production	
Chlorophyll a (chl a) Concentration (mg·L ⁻¹)	Chlorophyll a concentration; -99 represents unknown or missing values
Fluorescence (mg ·m ⁻³)	Fluorescence; -99 represents unknown or missing
Phytoplankton counts and cell counts (cells·L ⁻¹)	Will vary depending on what was measured (e.g., picoplankton, microflagellates, total cells, number of species, etc.); -99 represents unknown or missing
Pheophytin (µg·L ⁻¹)	Extractable pheophytin (algal pigments); -99 represents unknown or missing values
Information on data source	
Analytical method reference	Analytical method used and detection limit
Comments Section	N/A represents missing or unknown data
Original Dataset	Original file name from which data was derived
Contact Person	Name and/or e-mail address of individual to contact regarding dataset;
Reference	For data extracted from published reports
Original dataset comments	Comments

2 Methodology

2.1 Review of Existing Information

Prior to initiating the work, the team reviewed the Zaloum (2003) draft report, and other documentation related to this initiative. Included within this review were metadata databases such as that compiled by the Atlantic Coastal Zone Information Steering Committee (ACZISC) and the GeoConnections Discovery Portal.

2.2 Contact with Key Research and Data Management Persons

Beginning in December 2004, and continuing through January and February 2005, the team identified a list of persons believed to have access to marine nutrient and biological data on either the Canadian east or west coasts, and in the north (Hudson and James Bay). Where possible detailed contact information for each person on the list was obtained and recorded (Appendix A).

Each of the persons on the list was contacted by email, and asked to provide information on the data resources to which they had access. This initial request for information was based on the list of parameters provided by the Scientific Authority (06 December 2004).

The list of persons contacted continues to increase as initial contacts referred us to other organizations, programs and individuals. In some instances the chains of persons contacted are now at their fourth to fifth level, and new information continues to arrive daily.

We have also met by telephone, and in person, with key individuals on both the East and West coasts to obtain a better understanding of the condition of existing data, the opportunities for access to these resources, and to identify other individuals whose work is of interest to the project. Relationships have been developed with key scientists and data managers for the major repositories of data located within Environment Canada and Fisheries and Oceans Canada.

2.3 Compilation of Relevant Materials

During the course of the investigations, a number of relevant documents, in either hard copy or electronic format were collected. While some of this information contains actual data related to the context of this project, other reports provide summary information on findings of environmental quality in coastal and/or estuarine environments. A bibliography of these materials is included in Appendix C.

3 Summary of Findings to Date

To better understand the situation with regard to data sources and management within the country, we have provided a brief summary of findings to date, organized by coast.

3.1 Eastern Coast

It would appear that the Eastern Coast of Canada has the largest repository of data on nutrient and related parameters. Most of this data has been collected by scientists at Fisheries and Oceans Canada, although the Province of Prince Edward Island has a considerable and relevant data base of nutrification information taken from the estuaries of major rivers located throughout the Province.

We have not as yet identified any provincial sources of relevant data within the governments of Nova Scotia, Newfoundland or New Brunswick. With the exception of the Ocean Sciences Centre at Memorial University in Newfoundland, we have not identified any sources of data from academic institutions on the east coast. The MUN data is available in hard copy only and although it has been requested, it has not been provided to this date.

3.1.1 *Fisheries and Oceans Canada (Atlantic Provinces and Quebec)*

It is important to note that although there has been a considerable amount of nutrification related data collected by the DFO along the Eastern coast, the majority of this data was collected from water samples taken by offshore cruises. With few exceptions, the sample locations would be at a minimum several kilometres offshore of the headlands of major bays, and therefore might not be considered to have validity as coastal data. In a few localized areas (bays and fiords), highly relevant coastal data sets have been acquired by a number of scientists at the DFO, but only a portion of that data has been ratified and loaded into departmental data bases.

Historically, most of the data obtained by the DFO on the East coast had been loaded into the national Marine Environmental Information Database (MEDS). For the past few years, DFO scientists and data managers have conducted a rigorous program of data acquisition intended to identify all DFO resources of both historic and current chemical and biological data. Prior to its inclusion within a newly developed database known as BIOCHEM, this data has undergone a thorough quality control review. Within the next few months the final pieces of marine environmental quality data obtained by the DFO in this Region will have been processed and entered into BIOCHEM.

Data obtained in Quebec by DFO scientists at the St Lawrence Observatory and the Institute de Montagne is currently being assessed and loaded into BIOCHEM. It is anticipated that this information will be available through BIOCHEM within a month.

Data used in the Zaloum (2003) study was a snapshot of information obtained from the DFO community some time in 2002. Since that time additional data have become available, and quality control changes have been made to some of the data originally supplied to Zaloum. As well, the overall appropriateness of some of the data originally supplied has come into question.

Despite these limitations it is apparent that, on the East coast, the DFO has the largest amount of data relevant to the Environment Canada study. DFO scientists and data managers have been cooperative and endorse Environment Canada's initiative in obtaining a better understanding of the process of nitrification in Canadian coastal waters. Both local, and national managers of MEDS and BIOCHEM are prepared to provide Environment Canada with such data as necessary to meet the demands of this initiative.

However, strong recommendations have been made by the DFO that instead of providing a snapshot of data currently resident in these databases, department staff would greatly prefer to work with the Environment Canada team to develop direct linkages to BIOCHEM/MEDS so that continuing research in this area will always deal with the most recent changes to the database and will reflect decisions related to quality control and data management.

Should Environment Canada's use of this data be limited to a discrete modeling exercise that is not expected to continue into the future, the MEDS and BIOCHEM managers are prepared to assist EC in downloading the parameters in an appropriate and efficient context, and to provide such assistance as might be necessary to improve the understanding of the modellers on the opportunities and constraints associated with each data set.

Should EC determine that it would prefer to download data rather than create linkages to the DFO systems, it is recommended that the request for data be delayed as long as is practical. New data is being uploaded daily into BIOCHEM, including some of the more relevant data from the Atlantic and Quebec regions.

3.1.2 Prince Edward Island

Based on our findings to date, the Province of Prince Edward Island has the most comprehensive database of information on nitrification parameters in coastal waters. To comply with a Canada- Prince Edward Island agreement, much of this data has been loaded into the Environment Canada ENVIRODAT database (Atlantic Region), and as is the case with the DFO, the Province would prefer that we obtain the data from that source directly, to ensure ongoing continuity.

Prince Edward Island data managers, though willing to supply a more up to date version of their information than was used in Zaloum (2003) also have concerns as to the how the data will be used once transferred to EC, the potential for further proliferation of the data to other internal users in government and the accessibility of the data to the public.

3.2 Northern Coast (James Bay and Hudson Bays)

Although we have contacted numerous agencies and organizations at work in these areas, we have not yet identified any additional sources of nutrification information other than that which may be resident within MEDS. DFO scientists at work in data acquisition for these areas are experiencing similar difficulties.

3.3 Western Coast

The majority of marine environmental quality information taken on the West coast has been undertaken by the DFO, and has largely been focussed on the southwestern region of the Province (Straits of Georgia and waters off Vancouver Island). More localized data is available from areas being monitored by Environment Canada, the Greater Vancouver Regional Municipality and Victoria. Although we have contacted a number of departments in the Government of British Columbia, as well as scientists at several universities, we have not identified any additional sources of relevant data.

3.3.1 Fisheries and Oceans Canada

Data collected by scientists of the Institute of Oceans Science (Sydney) would appear to be the most appropriate to this initiative. Most of this information was collected during scientific cruises, and is again, largely offshore in context. Although it is intended that this data will be included within the BIOCHEM database, it currently resides within MEDS, pending loading to BIOCHEM at some point in the future.

DFO data managers have requested that all data be obtained from MEDS.

We have not identified any other sources of data collected by other branches of the DFO within the Province.

3.3.2 Environment Canada

Environment Canada staff at the Environmental Monitoring office in Vancouver were exceptionally helpful in identifying sources of data and providing access to their online database. Information collected through pulp and paper industry monitoring programs has been uploaded to a publicly available web site. Unfortunately, as data collected under these programs are supplied by the industry and/or associated consulting firms, there can be differences in both the methods of collection and reporting. As an example,

nitrogen, which is expressed as a carbon-nitrogen ratio in the web site data, may be calculated from a range of methods that could include Kjeldhal nitrogen.

3.3.3 *Greater Vancouver Regional District (GRVD)*

The GRVD have been monitoring nutrient parameters in coastal or estuarine environments near Vancouver for a number of years. The information is largely related to monitoring of sewage treatment plant outlets. This data may have been supplied to Environment Canada at some point prior to the Zaloum report. As we have not been able to locate the original files, and the information would be dated, we have requested that the GVRD send us new data.

3.3.4 *Victoria Central District*

The Victoria Central District have also been monitoring nutrient parameters in coastal environments near Victoria for a number of years, largely to monitor sewage outfalls. This data was supplied to Environment Canada at some point prior to the Zaloum report. As we have not been able to locate the original files, and the information would be dated, we have requested new data from staff of the Central District.

3.3.5 *Additional Contacts*

Additional contacts have been made with a number of departments within the Province of British Columbia, as well as researchers at the University of British Columbia and the University of Victoria. Although some of these persons have yet to respond to our query, to date no additional information has been identified.

4 Data Acquisition

Data acquisition efforts have been complicated by the time frame of the project, the movement of data into managed national and regional databases such as MEDS, BIOCHEM and ENVIRODAT, and in some instances, by concerns as to the ultimate use and disposition of the data by Environment Canada. Despite these factors data is available and has been, or can be collected from a wide range of sources of information. In cases where the selection parameters for download may have filtered out information appropriate to this initiative, we have downloaded files that contain all the data recorded on water quality, as well as files selected for parameters such as nutrients.

4.1 The Marine Environmental Database MEDS/BIOCHEM

As noted earlier in this report, and in response to strong recommendations from DFO staff and managers, data from MEDS/BIOCHEM have not been acquired. It is recommended that Environment Canada discuss the opportunities and constraints

associated with the development of linkages to these databases prior to making a request for the relevant information.

Data contained within MEDS and BIOCHEM will include all information collected by the Department of Fisheries and Oceans on the west and eastern coasts. This will include all the data originally acquired by Zaloum (2003), except where those data sets have been determined to have quality control issues. The BIOCHEM database also includes helpful notations as to sampling conditions, analysis, and record keeping.

4.2 ENVIRODAT (Atlantic Region)

Environment Canada's data managers from the Moncton offices have been working with us to assist downloading of this information from their web sites. In addition to the data from Prince Edward Island, we have acquired information from a wide array of marine, estuary, and harbour sampling sites located throughout New Brunswick, Nova Scotia, and Newfoundland.

4.3 National Environmental Effects Monitoring Data

Data from the Environmental Effects Monitoring program at Environment Canada were downloaded from the website, and include Cycle 1 and 2 data sets. Cycle 3 data is available as yet in hard copy only. In addition to information from British Columbia (11 sites), this website provided data from an array of pulp and paper sites monitored in New Brunswick (7 sites), Newfoundland (2 sites), Nova Scotia (6 sites), and Quebec (8 sites).

5 DATA Format

Digital data has been acquired in Excel compatible formats and provided on compact disc. Where possible electronic copies of appropriate reports and papers have also been include on the CD. One copy of all paper reports referenced is provided.

Appendix A

Contacts

Appendix B

Summary of Results of Contact Efforts

Table of Contacts and Responses to 22 February 2005.

Contact	Organization	Phone	Email	Contacted	Responded	Data Available	Ongoing Followup
National Data Bases							
Fung, Lily	Meteorological Service of Canada, Environment Canada	(416) 739-4441	lily.fung@ec.gc.ca	Y	Y	ENVIRODAT	
Keeley, Robert	Fisheries and Oceans Canada	(613) 990-0246	keeley@meds-sdmm.dfo-mpo.gc.ca	Y	Y	MEDS/BIOCHEM	Primary Contact
Kent, Robert	Environment Canada	(819) 953-1554	Robert.Kent@ec.gc.ca	Y	Query		
Robarts, Richard D.	Environment Canada	(306) 975-6047	robarts@nhrc.sk.ec.gc.ca	Y	Y	No/GEMS	
West Coast							
Allen, Susan	University of British Columbia	(604) 822-2828	sallen@eos.ubc.ca	Y			
Bishay, Farida	Greater Vancouver Regional District	(604) 451-6005	Farida.Bishay@gvrd.bc.ca	Y	Y	Y	Requested
Bothwell, Max	Fisheries and Oceans Canada	(250) 756-7037	Bothwellm@pac.dfo-mpo.gc.ca	Y	Y	N	
Boyd, Janice	Environment Canada	(604) 666-5908	janice.boyd@ec.gc.ca	Y	Y	EEMS	Obtained
Davies, Martin	Hatfield Consultants Ltd.	(604) 926-3261	mdavies@hatfieldgroup.com	Y	Y	N	
Dower, John	University of Victoria	(250) 472-5010	dower@uvic.ca	Y	Y	N	
Gilkeson, Linda	BC Ministry of Water, Land & Air Protection	(250) 387-9410	Linda.Gilkeson@gems3.gov.bc.ca	Y	Y	In Progress	
Harrison, Paul	University of British Columbia	(604) 822-3659	zmar@interchange.ubc.ca	Y	Y		
Jamieson, Glen	Fisheries and Oceans Canada	(250) 756-7223	jamiesong@pac.dfo-mpo.gc.ca	Y	Y	N	
Lewis, Alan G.	University of British Columbia	(604) 822-3626	alewis@eos.ubc.ca	Y			
Linquanti, Joe	Fisheries and Oceans Canada	(250) 363-6586	linguantij@pac.dfo-mpo.gc.ca	Y	Y	MEDS	
Lowe, Chris	Capital Regional District	(250) 360-3296	clowe@crd.bc.ca	Y	Y	Y	REQUESTED
McGreer, Eric	Ministry of Water, Land and Air Protection	(250) 751-7245	Eric.Mcgreer@gems9.gov.bc.ca	Y	Y	Referred	
McLean, Laura	Environment Canada	(604) 666-2241	laura.maclean@ec.gc.ca	Y			

Contact	Organization	Phone	Email	Contacted	Responded	Data Available	Ongoing Followup
Perrin, Chris	Limnotek Research and Development	(604) 222-3546	cperrin@limnotek.com	Y	Y	N	
Shortreed, Ken S.	Fisheries and Oceans Canada	(604) 824-4707	shortreedk@pac.dfo-mpo.gc.ca	Y			
Whitney, Frank	Fisheries and Oceans Canada	(250) 363-6816	whitneyf@pac.dfo-mpo.gc.ca	Y	Referred	MEDS	
Northern Coast (Hudson and James Bay)							
Baddaloo, Earle	Government of Nunavut	(867) 975-5910	ebaddaloo@gov.nu.ca	Y	Y	N	
Bielak, Alex T.	Environment Canada	(905) 336-4503	alex.bielak@ec.gc.ca	Y	Referred		
Carey, John	Environment Canada	(905) 336-4625	John.Carey@ec.gc.ca	Y	Referred		
Girard, Nathalie	Kathavik Environmental Advisory Committee		ngirard@krg.ca	Y			
Godin, Benoit	Environment Canada	(867) 667-3402	benoit.godin@ec.gc.ca	Y			
McGuire, R. James	Environment Canada	(905) 336-4927	jim.maguire@ec.gc.ca	Y	Y	N	
Rowes, Ken	Fisheries and Oceans Canada	(204) 984-7835	rowesk@dfo-mpo.gc.ca	Y			
Warwick, Vincent F.	Université Laval	(418) 656-2131 poste 5644	warwick.vincent@bio.ulaval.ca	Y	Y	N	
East Coast							
Arsenault, Edmond	Canadian Food Inspection Agency	(506) 851-2617	arsenault.ej@inspection.gc.ca	Y	Referred	N	
Atkinson, Bruce	Fisheries and Oceans Canada	(709) 722-2420	AtkinsonB@dfo-mpo.gc.ca	Y	Referred		
Bates, Stephen S.	Fisheries and Oceans Canada	(506) 851-3982	batesS@dfo-mpo.gc.ca	Y	Referred	Phytoplankton	
Bewers, Jim	Fisheries and Oceans Canada	(902) 426-2371	bewersm@dfo-mpo.gc.ca	Y	Y	N	
Brylinski, Mike	Acadia University	(902) 585-1509	mike.brylinsky@acadiau.ca	Y	Y	META Database	Obtained
Butler, Michael J. A.	Oceans Institute of Canada	(902) 494-1977	Michael.Butler@dal.ca	Y	Referred	META Database	Obtained
Caillet, Alain	Environment Canada	(416) 739-4440	alain.caillet@ec.gc.ca	Y	Referred	ENVIRODAT	

Contact	Organization	Phone	Email	Contacted	Responded	Data Available	Ongoing Followup
Caverhill, Carla	Fisheries and Oceans Canada	(902) 416-3255	caverhillc@mar.dfo-mpo.gc.ca	Y			
Chopin, Thierry	University of New Brunswick -Saint John	(506) 648-5507	tchopin@unbsj.ca	Y	Query		
Clement, Pierre	Fisheries and Oceans Canada	(902) 426-9802	ClementP@mar.dfo-mpo.gc.ca	Y	Referred	BIOCHEM	
Courtenay, Simon C.	University of New Brunswick	(506) 851-6709	courtenays@dfo-mpo.gc.ca	Y	Referred		
Crane, Cynthia	PEI Department of Environment and Energy	(902) 368-5179	cscrane@gov.pe.ca	Y	Y	ENVIRODAT	Obtained
Cranford, Peter	Fisheries and Oceans Canada		crandordp@mar.dfo-mpo.gc.ca	Y		BIOCHEM	
Crocker, Joe	Fisheries and Oceans Canada		crockerj@mar-dfo-mpo.gc.ca	Y	Referred	BIOCHEM	
Daborn, Graham	Acadia University	(902) 542-2201	graham.daborn@acadiau.ca	Y			
Davidson, Jeff	University of Prince Edward Island		davidson@upei.ca	Y			
De Young, Brad	Memorial University of Newfoundland	(709) 737-8839	bdeyoung@physics.mun.ca	Y			
Deibel, Don	Memorial University	(709) 737-3241	ddeibel@mun.ca	Y	Y	Y- Hard Copy	Requested
Gallant, Robert	PEI Fisheries, Aquaculture and Forestry		rkgallant@gov.pe.ca	Y			
Gregory, Doug	Fisheries and Oceans Canada	(902) 426-8931	Gregoryd@mar.dfo-mpo.gc.ca	Y	Referred	BIOCHEM	
Hargrave, Barry	Fisheries and Oceans Canada	(902) 426-3188	hargraveb@dfo-mpo.gc.ca	Y		BIOCHEM	
Harrison, Glen	Fisheries and Oceans Canada	(902) 426-3879	harrisong@mar.dfo-mpo.gc.ca	Y	Referred	BIOCHEM	
Haya, Kats	Fisheries and Oceans Canada	(506) 529-8854	haya@sta.dfo.ca	Y	Referred	BIOCHEM	
Kennedy, Mary	Fisheries and Oceans Canada	(902) 426-3263	KennedyM@mar.dfo-mpo.gc.ca	Y	Y	BIOCHEM	
Li, William	Fisheries and Oceans Canada	(902) 426-6349	William.Li@ec.gc.ca		Y	BIOCHEM	
Lipsett, Kim	NB Agriculture, Fisheries and Aquaculture	(506) 457-6924	Kim.Lipsett@gnb.ca	Y	Referred	BIOCHEM	
Locke, Andrea	Fisheries and Oceans Canada	(506) 851-6248		Y		BIOCHEM	
MacKinnon, Anne-Margaret	Fisheries and Oceans Canada	(506) 851-6081	mackinnona@dfo-mpo.gc.ca	Y		BIOCHEM	

Contact	Organization	Phone	Email	Contacted	Responded	Data Available	Ongoing Followup
Martin, Jennifer L.	Fisheries and Oceans Canada, Maritimes Region	(506) 529-5921	martinjl@mar.dfo-mpo.gc.ca	Y		BIOCHEM	
McCallum, Barry	Fisheries and Oceans Canada			Y		BIOCHEM	
McKenzie, Cynthia	Fisheries and Oceans Canada NFL	(709) 772-6984	mckenziec@dfo-mpo.gc.ca	Y		BIOCHEM	
Mercier, Vincent	Environment Canada	(506) 851-6244	Vincent.Mercier@ec.gc.ca	Y	Y	ENVIRODAT	Obtained
Miron, Giles	Université de Moncton	(506) 858-4542	mirong@UMoncton.ca	Y	Y	N	
Murphy, Lea	Fisheries and Oceans Canada		murphyl@dfo-mpo.gc.ca	Y	Y	BIOCHEM	
Parker, Edward Vincent	NB Environment and Local Government	(506) 658-2558	Ed.Parker@gnb.ca	Y	Y	N	
Percy, Jonathan	Clean Annapolis River Project	(902) 532-5129	jpercy@auracom.com	Y	Y	N	
Pett, Robert	NS Transportation and Public Works	902-424-4082		Y	N		
Raymond, Bruce	PE Fisheries Aquaculture and Environment	(902) 368-5054	bgraymond@gov.pe.ca	Y	Referred	ENVIRODAT	
Roberts, Christopher	Environment Canada	(902) 426-4485	NPRI_ATL@ec.gc.ca	Y	Y	N	
Saunders, Gary W.	University of New Brunswick	(506) 452-6216	gws@unb.ca	Y	Y	N	
Sinclair, Mike	Fisheries and Oceans Canada	(902) 426-4890	sinclairm@mar.dfo-mpo.gc.ca	Y	Referred	BIOCHEM	
Smith, John C.	Fisheries and Oceans Canada	(506) 851-3827	smithj@mar.dfo-mpo.gc.ca	Y			
Strain, Peter M.	Fisheries and Oceans Canada	(902) 426-3639	strainp@mar.dfo-mpo.gc.ca	Y	Y	BIOCHEM	
Tremblay, Gilles H.	Fisheries and Oceans Canada	(418) 775-0593	tremblayGH@dfo-mpo.gc.ca	Y	Y	BIOCHEM	
Wells, Peter	Environment Canada	(902) 426-1426	pwells@ac.dal.ca	Y	Y	N	
Westhead, Maxine	Fisheries and Oceans Canada	(902) 426-4215	westheadm@mar.dfo-mpo.gc.ca	Y	Y	Sediments	Requested
Whitney, Frank A.	Fisheries and Oceans Canada	(613) 991-6850				BIOCHEM	
Wildish, David J.	Fisheries and Oceans Canada	(506) 529-5894				BIOCHEM	
Wroblewski, Joe	Memorial University of Newfoundland	(709) 737-2410	jwroblew@mun.ca	Y			
Yeats, Phil	Fisheries and Oceans Canada	(902) 426-9802	yeatsp@mar.dfo-mpo.gc.ca	Y	Y	BIOCHEM	

Appendix C

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Appendix D

Summary of Data Collected

ENVIRODAT Atlantic Region Database

(from the MEDS internet site)

ENVIRODAT Internet Data Extraction Site

http://map.ns.ec.gc.ca/envirodat/root/main/en/main_e.asp

Data stored in the ENVIRODAT database in Atlantic Canada can be retrieved by the public from the web site noted above. ENVIRODAT has over the past decade undergone a number of transformations, and currently is overseen by Environment Canada staff located in Moncton New Brunswick. Data on ENVIRODAT includes information collected not only by Environment Canada, but also through Federal Provincial agreements. Information included in these ENVIRODAT files cover data collected from *harbours*, *estuaries* and *marine* sampling stations.

Where possible both full data sets have been retrieved, as well as a subset of data queried under the 'Nutrients' category. Data was unloaded from the site as 'Full Record' files which were then imported directly into Excel spreadsheet format. No further manipulation of these files took place.

Province	Marine		Estuarine		Harbours	
	All Data	Nutrients	All Data	Nutrients	All Data	Nutrients
New Brunswick	22 Samples	12 Samples	611 Samples	391 Samples	100 Samples	40 Samples
	1980; 1998	1998	1971-2000 Irregularly	1971-2000 Irregularly	1982-2000 Irregularly	1971; 1998; 1999; 2000
Prince Edward Island	57 Samples	26 Samples	1096 Samples	955 Samples	7 Samples	3 Samples
	1973; 1974; 1980; 1981	1973; 1974	1972-2002 Irregularly	1972-2002 Irregularly	1974; 1980; 1981	1974
Nova Scotia	62 Samples	11 Samples	405 Samples	246 Samples	55 Samples	3 Samples
	1971-1999 Irregularly	1974-1977	1971-2000 Irregularly	1974-1977	1971-2000 Irregularly	1974-1975
Newfoundland	50 Samples	No Data	117 Samples	69 Samples	46 Samples	No Data
	1980; 1982; 1984; 1987		1982-2002 Irregularly	1987-2002 Irregularly	1980; 1982; 1989; 2000	

Appendix E

Background Information on Databases