Environment Canada Environnement Canada

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The Canada Water Act

Annual Report

1999-2000

Canada

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Minister of the Environment

Ministre de l'Environnement

Ottawa, Canada K1A 0H3

Her Excellency
The Right Honourable Adrienne Clarkson, C.C., C.M.M., C.D.
Governor General of Canada
Rideau Hall
Ottawa, Ontario
K1A 0A1

Your Excellency:

I respectfully submit to Your Excellency and to the Parliament of Canada the annual report on operations under the *Canada Water Act* for the fiscal year 1999-2000.

Yours sincerely,

David Anderson

David Anderson, P.C., M.P.

Canada

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PREFACE

The *Canada Water Act* (proclaimed on September 30, 1970) provides the framework for cooperation with provinces and territories in the conservation, development, and utilization of Canada's water resources. Section 38 of the *Revised Statutes of Canada (1985)* requires that a report on the operations under the Act be laid before Parliament after the end of each fiscal year. The report describes a wide range of federal activities conducted under the authority of the Act, including significant water research, participation in federal–provincial agreements and undertakings, and a public information program. This, the 28th report, covers progress on these activities to March 31, 2000.

SUMMARY OF PROVISIONS:

Part I, Section 4, provides for the establishment of federal-provincial consultative arrangements for water resource matters. **Sections 5, 6, and 8** provide the vehicle for cooperative agreements with the provinces to develop and implement plans for the management of water resources. **Section 7** enables the Minister, directly, or in cooperation with any provincial government, institution, or person, to conduct research, collect data, and establish inventories associated with water resources.

Part II provides for federal-provincial management agreements where water quality has become a matter of urgent national concern. It permits the joint establishment and use of federal or provincial incorporated agencies to plan and implement approved water quality management programs. The application of alternative cooperative approaches and programs has resulted in Part II never having been used.

Part III, which provided for regulating the concentration of nutrients in cleaning agents and water conditioners, was incorporated into the *Canadian Environmental Protection Act* (CEPA) in 1988 and later into Sections 116–119 (Part VII, Division I) of the new *Canadian Environmental Protection Act*, 1999, which came into force March 31, 2000. (See the CEPA annual report to Parliament.)

Part IV contains provisions for the general administration of the Act. In addition, Part IV provides for inspection and enforcement, allows the Minister to establish advisory committees, and permits the Minister, either directly or in cooperation with any government, institution, or person, to undertake public information programs.

THE *CANADA WATER ACT* IN PERSPECTIVE

INTRODUCTION

The end of the 1999–2000 fiscal year marked a period of 30 years since the *Canada Water Act* was passed by Parliament.

Proclaimed in 1970, the *Canada Water Act* represented a significant shift to comprehensive water management. At that time, Canadians were becoming acutely aware of the potential long-term impacts of major activities such as energy projects on water availability, water quality, aquatic habitat, and human health. The new approach was designed to improve not only our knowledge base but also the degree of public participation and intergovernmental cooperation in water management.

Public Participation

Canada Water Act studies or other programs have always embraced extensive public information and water awareness activities before, during, and at the conclusion of a project. Major studies produced not only significant technical and scientific reports, but also summary reports and brochures for the widest possible circulation and distribution. This philosophy continues undiminished to the present day. It was an important factor in the Northern River Basins Study (1991–1996), a major investigation of the impact of human activities on the aquatic ecosystems of the Peace, Athabasca, and Slave River system. From the outset, the study board encouraged a two-way flow of ideas at community gatherings, workshops, study board meetings, science forums, trade shows, and other events. This interaction included an ongoing exchange of concerns, research results, comments, and traditional knowledge. As reflected in the Study Board's 1996 Report to Ministers, the two-way flow of information resulted in positive benefits to both the study program and members of the public.

Consultation with individual provinces on priorities for programs commenced with the passage of the Act. Its key provisions enabled the federal government to conclude cooperative agreements with provincial governments where there is "significant national interest" in the water resource management of any waters. This resulted in a number of comprehensive river basin planning agreements during the 1970s (e.g., Okanagan River basin). An essential element of the agreements was to examine the full range of reasonable alternatives, taking into account views expressed at public hearings. These joint planning studies produced recommendations on the management of water resources that could be implemented within the respective jurisdictional responsibilities of the federal or provincial governments. A more complete picture of Canada's water resources arose from the planning studies.

It was also apparent that a greater understanding of emerging policy issues would be necessary to determine future strategic directions in program areas such as scientific research on the aquatic ecosystem. The interjurisdictional dimensions of these issues prompted Environment Canada to establish an Inquiry on Federal Water Policy in 1984. The nationwide public consultations and research undertaken by the Inquiry over the next year were a major step in the path toward development of the current Federal Water Policy. Released in 1987, the new policy was a true milestone — the first time that the federal government had published a comprehensive set of strategies and specific policy statements dealing with a wide range of water issues.

Policy Development

The range of water-related issues is virtually inexhaustible. In 1984, an advisory committee was established under Section 28 of the *Canada Water Act* to seek the views of Canadians on the adequacy of management of freshwater resources in the nation (Inquiry on Federal Water Policy). The Inquiry's final report, entitled *Currents of Change*, was published in 1985. As a result of its recommendations, a comprehensive Federal Water Policy was developed and released in 1987. The policy outlines five strategies for reaching its goals — including science leadership and public awareness — which, together with 25 policy-specific statements, have helped to define a supportive, yet flexible role for the federal government within its constitutional limits.

These policy commitments were followed by improvements to environmental and resource conservation and protection strategies, legislation, and programs. In this context, the main issue areas of water policy are briefly outlined below. They attempt to provide a connection with the many ongoing individual and cooperative programs and arrangements that

are described in the report and designed to address the issues.

WATER AVAILABILITY, CONSERVATION, AND USE

Knowing the volume of our natural water resources is essential for their conservation. As water resources are primarily under provincial control, long-term cooperative arrangements with the provinces and territories provide a mechanism to tell us how much water is available. This represents an enormous task in terms of expertise, cost, and logistics for a country of Canada's size and climatic diversity. Moreover, the information gathered must incorporate snow and ice data since these are also part of our water resources. In addition, Environment Canada has periodically undertaken studies or surveys of water supply, demand, and municipal and industrial uses.

Cooperative arrangements on the planning and management of flows have played a role. For example, the Master Agreement on the equitable apportionment of eastward-flowing water-courses, signed in 1969 by Canada, Alberta, Manitoba, and Saskatchewan, ensures that at least 50 percent of the flow is passed from Alberta to Saskatchewan and from Saskatchewan to Manitoba at their respective boundaries. The application of this guiding principle has largely eliminated the potential for conflict that can arise when allocations are proposed for individual projects.

Water Monitoring Networks

Under federal–provincial and federal–territorial cooperative arrangements, Canada has about 2 800 water quantity and quality monitoring stations (2 600 hydrometric stations, which constitute the main national water resource inventory, and over 200 water quality monitoring stations). The network is supplemented by various special-purpose and often shorter-term networks established by provinces, territories, the federal government, power companies, and others for their own needs.

Data on water flows and levels relate to water uses in many sectors of Canadian society, the economy, and the environment. This information is used for various purposes including navigation, forecasting drought and floods, managing water supply and electric power production, and the study of environmental issues such as climate change. Because hydrologic behaviour varies from year to year, only long-term records can indicate the range of conditions likely to occur. These provide a valuable basis for developing climate change and other computer models to analyze and predict the volumes of water available for various uses and conditions (e.g., flood warnings and water levels for shipping) in river basins and at specific locations.

WATER QUALITY

While our knowledge of water quality issues has progressed considerably over the past 30 years, scientists and water managers have only begun to discover their many dimensions. Early efforts were concentrated on resolving the most visible concerns such as eutrophication and single-point sources of effluents. With the passage of time, scientists have gradually discovered more about the presence and long-term effects of problems such as persistent, bioaccumulative toxic pollutants. These are less obvious, but long-lasting contaminants that can build up in the food web to levels that are harmful to human and ecosystem health. They tend to be transported long distances and do not break down easily. Other less obvious pollutants include endocrine-disrupting chemicals that interfere with the activity of hormones within the body and can undermine learning abilities, reproduction, and resistance to disease. Environment Canada has conducted a considerable amount of key research in these areas and many more dealing with the health of the aquatic ecosystem.

The collection and assessment of information on water quality across the country, together with specific research on issues and the development of objectives and standards, have been crucial to this progress. This includes the development of a number of federal–provincial agreements over the last two decades to undertake water quality monitoring on a regional or province-wide basis. In addition, the Canadian Water Quality Guidelines (CWQGs), prepared in cooperation with the provinces and territories, were released in 1987 by the Canadian Council of Resource and Environment Ministers (now the Canada Council of Ministers of the Environment [CCME]). They contain recommendations for chemical, physical,

radiological, and biological parameters necessary to protect and enhance major uses of water in Canada, including drinking water supplies, freshwater and marine life, agricultural uses (livestock and irrigation waters), and recreation.

Water Research Facilities

Scientific information based on research, monitoring, and analytical and modelling techniques is the foundation for practically all water programs. This involves staff in all regions and at headquarters, but research as such in Environment Canada is concentrated in two research institutes.

National Water Research Institute (NWRI). NWRI is the largest freshwater research establishment, with facilities at Burlington, Ontario (Canada Centre for Inland Waters), and Saskatoon, Saskatchewan (National Hydrology Research Centre). NWRI conducts a comprehensive program of research and development in the aquatic sciences in partnership with the Canadian and international science communities.

St. Lawrence Centre (SLC). Located in Montreal, SLC is the only federal research and development centre devoted entirely to river ecosystems. The centre undertakes research programs to improve the understanding and dissemination of knowledge of St. Lawrence ecosystems. Its expertise is sought at both the national and international levels.

Most of the activities reported for these institutes are in direct support of many programs described in this report (e.g., ecosystem initiatives). Significant water-related research also occurs in other federal departments and agencies (e.g., the Freshwater Institute of Fisheries and Oceans). Although water is not always the primary focus, the integration of this research will become even more widespread as cross-disciplinary studies with wildlife, health, climate change, and other issues become more common.

The CWQGs have been used in various ways, including the development of water quality objectives at specified sites. For example, they formed the basis for an agreement on water quality objectives signed by Canada and the Prairie Provinces in 1992, which served to strengthen their commitment under the 1969 Master Agreement on Water Apportionment to consider water quality problems. By 1999, the CWQGs had been expanded into a compendium of Canadian Environmental Quality Guidelines (CEQGs) released by the CCME. The compendium contains over 550 water, sediment, tissue residue, soil, and air guidelines for the protection of the environment and human health.

The 1987 Federal Water Policy encouraged the development of measures to protect water quality. Over the next decade, one of the legislative measures included the *Canadian Environmental Protection Act* (CEPA 1988), which provided the means to control toxic substances throughout their life cycles. (More recently, CEPA 1999 came into force [March 31, 2000], with an increased focus on pollution prevention.)

For example, in 1992 new CEPA regulations were passed with respect to pulp and paper mills that use the chlorine bleaching process, together with amendments to improve the pulp and paper effluent regulations then in force under the *Fisheries Act*. The CEPA regulations prohibit the release of specified dioxins and furans, formed when certain compounds present in the materials used to manufacture wood pulp react with chlorine. As result of such regulations, many mill operators have installed new pollution control equipment and releases to the water of dioxins and furans have declined by 99 percent.

By 1995, efforts to protect water quality culminated in two new commitments that together provide the basis for all federal government actions on toxic issues: the Toxic Substances Management Policy, which set environmental objectives for substances of concern (e.g., virtual elimination of persistent, bioaccumulative anthropogenic toxics), and a pollution prevention strategy ("Pollution Prevention: A Federal Strategy for Action"), which shifted the emphasis from managing wastes and pollutants to avoiding or minimizing their creation. Also in 1995, the *Canadian Environmental Assessment Act* was proclaimed, making it easier to ensure that impacts of development on the environment, including water quality, are considered and that measures are undertaken to minimize their effect.

Freshwater quality was also raised as an important issue at the Governments Roundtable on Water held in January 2000. The Roundtable recommendations on water quality and aquatic ecosystems identified the protection of groundwater quality as one of the emerging challenges. The recommendations stressed that more research is needed to understand various factors affecting freshwater quality, including, among others, priority toxic substances, land

and aquatic ecosystem interactions, sediment quality, Arctic issues, and the effects of climate change, UVB, and ozone.

WATER ACROSS BOUNDARIES

There are few major lakes and rivers in Canada that are not part of a river basin straddling provincial, territorial, or international borders. Many of these river basins have been the subject of planning studies over the years, and some are now included in the major ecosystem initiatives described in this report. The Prairie Provinces Water Board, which administers the 1969 Master Agreement on Water Apportionment, is one of the longest surviving interprovincial arrangements and continues to serve as an excellent model for successful interjurisdictional water management. The most recent intergovernmental arrangement is the 1997 Mackenzie River Basin Transboundary Waters Master Agreement, signed by six governments (see box). The Agreement laid the groundwork for bilateral agreements and established principles such as effective consultation and sharing of information on potential developments that might affect the ecological integrity of the aquatic ecosystem of the Mackenzie River basin.

Mackenzie River Basin

The Mackenzie River basin alone covers one-fifth of Canada and contains seven provincial–territorial borders, the largest lake entirely within Canada's borders, the most northerly sand dunes in the world, and three deltas. The Mackenzie River Basin Transboundary Waters Master Agreement was signed in 1997 by the governments of Canada, Alberta, British Columbia, the Northwest Territories, Saskatchewan, and Yukon. Arising from the recommendations of a major study (1979–1982), the Agreement endorses principles for managing the water resources of the basin and includes Aboriginal membership on the intergovernmental board. Another current activity, the Northern Rivers Ecosystem Initiative, which involves three southern tributaries of the Mackenzie (the Peace, Athabasca, and Slave Rivers), indicates the importance of water quality issues in the basin.

In addition, over 40 percent of the 9 000-kilometre long border between Canada and the United States runs through lakes, river, streams, and aquifers. Most of Canada's population lives within 250 kilometres of this border. These international waters are managed cooperatively by both countries in accordance with principles and mechanisms established under the provisions of the Boundary Waters Treaty of 1909. The International Joint Commission (IJC) is a permanent binational body created to fulfill certain Treaty responsibilities. Where the IJC has authority to grant approval, it may impose conditions binding on both nations and oversee compliance with the conditions. The IJC has established over 12 international boards that assist with its responsibilities in relation to waters shared by Canada and the United States. In addition, the Commission has periodically established advisory bodies and task forces, as the result of Canada–United States agreements or references, to identify common solutions to boundary and transboundary water issues.

WATER, CLIMATE, AND WEATHER

Weather phenomena and climate are important factors affecting the abundance of water. Extremes of the water cycle, such as drought and flooding, are natural events and as such are not preventable. However, governments have a significant role in providing information to the public and developing programs to mitigate their economic impacts. Over the last 65 years, the Prairie Farm Rehabilitation Administration has been instrumental in reducing the effects of drought in the semi-arid areas of western Canada through its programs to improve land use practices and water delivery. With respect to the frequent occurrence of flood events, Environment Canada has stressed an approach that minimizes flood damages by discouraging damage-prone development in the floodplain.

In recent decades, climate change has become an issue. Scientists continue to warn that increasing concentrations of greenhouse gases could directly affect both the quality and quantity of water available. Global warming affects a wide range of ecosystems, with the nature and magnitude of the effects dependent on latitude and various other factors. A long-term warming trend could have the potential to influence the amount and distribution of precipitation, thawing of permafrost, glacial water reserves, seasonal snowmelt and runoff, and biological and chemical processes. These processes would eventually have impacts on freshwater availability, flow

regimes, drainage systems, the frequency and duration of floods and droughts, and the productivity of ecosystems such as wetlands.

Prevention of Flood Damages

Nearly 1 000 of the most flood-prone communities in Canada were provided with detailed flood-risk maps prepared under federal–provincial agreements. These were the basis for discouraging flood-vulnerable development on the floodplain and encouraging local measures such as municipal zoning. Nevertheless, extreme weather events will continue to occur as the 1997 Red River and 1996 Saguenay River floods proved again in the recent past. Such events will become more frequent and severe if predicted climate changes occur. The development of models to forecast these extreme events will require considerable lead time since the new weather patterns on which they are based will very likely continue to evolve. Furthermore, as the value of existing development increases, the cost of post-disaster recovery spirals upward. Therefore, with or without climate change, improved predictive capabilities in flood forecasting are essential and of interest to all levels of government, the public, the private sector, and in particular the insurance industry.

Climate change research undertaken over the past decade has examined large ecosystems such as the Mackenzie River basin and the drylands of the southern Prairies. Early indications are that significant changes may be taking place already. A project on global climate change in the Palliser Triangle was completed by Natural Resources Canada in the late 1990s. Located in the driest region of the Canadian prairies, the Palliser Triangle extends from southwestern Manitoba to southern Alberta. The results demonstrate that past climate changes have resulted in major changes in groundwater tables that impact surface water quantity, quality, and landscape stability, all of which are critical for regional agriculture.

WATER AND THE ECOSYSTEM INITIATIVES

Any approach to the study and management of ecosystems must take into consideration complex interrelationships among water, land, air, wildlife, and human activities. As water is one of these interrelated components, the report covers Environment Canada's development and implementation of its six major ecosystem initiatives from this perspective.

Although each initiative has its own unique characteristics, a number of common management principles are observed throughout. These principles stress the following:

- ecosystem and precautionary approaches to pollution prevention
- citizen and community involvement in the design and implementation of initiatives
- long-term stewardship through partnerships and governments working together
- sound science combined with local and traditional knowledge as the basis for identifying and resolving issues

The newest of these initiatives, the Northern Ecosystem Initiative, was begun in 1998. It covers a geographically and politically diverse area that represents about 80 percent of the northern coastline and oceans. The other five initiatives continue to work toward the implementation of recommendations and targets and to build on the solutions and new dimensions identified in the findings of earlier work. The report includes a section on each initiative.

Major Ecosystem Initiatives

Atlantic Coastal Action Program (ACAP)
Georgia Basin Ecosystem Initiative
Great Lakes 2000 Program
Northern Ecosystem Initiative
Northern Rivers Ecosystem Initiative
St. Lawrence Vision 2000 Program

CONCLUSION

New dimensions of issues continue to emerge, involving such matters as governance, human and ecosystem health, municipal water and wastewater infrastructure, climate change, and global transport of pollutants. For example, the concerns of Aboriginal peoples continue to be an important factor. Already, traditional and local experience and knowledge are being recognized

as essential and complementary to the scientific approach and are being incorporated into development of some programs and cooperative arrangements. Over the years, it has been possible to adapt the Act to the constant evolution of approaches related to environmental and resource management, and in this manner resolve a wide array of issues.

HIGHLIGHTS, 1999–2000

COMPREHENSIVE WATER RESOURCE MANAGEMENT
(Part I of the *Canada Water Act*)

1. Federal–Provincial Programs

1.1 Data Collection and Use

Collection of Water Quantity Data

Background

Under hydrometric agreements administered since 1975 with the provinces and territories, government agencies have gathered, analyzed, and interpreted water quantity data to meet a wide range of client needs in the hydrologic community. Following modifications to the hydrometric network, a federal–provincial working group was established in 1997–98 to analyze the existing agreements against a set of principles for a renewed partnership. In order to address outstanding issues, additional working groups were established to examine matters related to the equitable sharing of costs; access to data, information, and services; national standards; and the decommissioning of hydrometric stations.

Progress (to March 31, 2000)

During the year, the federal and provincial officials responsible for operating the hydrometric agreements (known as the Administrators of the Water Quantity Agreements) continued discussions on renewing their partnership. In November, the Administrators achieved consensus on most outstanding issues, including the equitable sharing of costs (i.e., cost-neutrality for the operator); access to data, information and services; a process for developing a quality assurance management system and multi-level national standards; and the decommissioning of discontinued stations.

A concerted effort was made to address field infrastructure issues. Under an April 1999 Memorandum of Understanding signed by Environment Canada and Indian and Northern Affairs Canada, 68 mercury manometer gauge sites were assessed and remediated in Yukon, the Northwest Territories, and Nunavut. One gauge site in Ontario was completed and 14 sites in British Columbia were revitalized in cooperation with BC Hydro. Ninety discontinued stations were decommissioned. By year-end, modernization of the field infrastructure had been completed for all of New Brunswick, Prince Edward Island, Newfoundland, Nova Scotia, Quebec, Nunavut, and the Northwest Territories.

Water Quality Monitoring Agreements

Background

Since 1982, agreements on water quality monitoring have been concluded in several provinces and territories, including British Columbia (1985), Manitoba (1988), New Brunswick (1988), Newfoundland (1986), the Northwest Territories (1995), Prince Edward Island (1989), Quebec (1983), and Yukon (1995).

More recently, the agreement with New Brunswick was informally modified in 1995 when the provincial government undertook to collect, analyze, and manage the data for the water quality monitoring program, while Environment Canada continued to manage the hydrometric monitoring program. The agreement with Quebec was terminated by the parties in 1995 because the activities were similar to those in the St. Lawrence Action Plan. There was no monitoring in Yukon under the auspices of the 1995 agreement because of resource constraints. The agreement with Prince Edward Island was incorporated into the Canada-Prince Edward Island Water Annex, signed in 1996 pursuant to the Federal-Provincial Framework Agreement for Environmental Cooperation in Atlantic Canada (signed in 1994 by Canada, Newfoundland, New Brunswick, Nova Scotia and Prince Edward Island). Both the Framewrork Agreement and the Annex expired on 31 March 1999.

In addition to these broad monitoring agreements, Environment Canada also participates in specific monitoring arrangements with certain provinces. For instance, the Prairie Provinces Water Board maintains water quality (and quantity) monitoring stations for interprovincial waters that cross the

Alberta–Saskatchewan and Saskatchewan–Manitoba boundaries.

Progress (to March 31, 2000)

Environment Canada, in partnership with the British Columbia Ministry of Environment, Lands and Parks, conducted biweekly water quality monitoring at 30 stream or river sites in British Columbia. A report on trends for these sites and other sites monitored since 1985 under the program by Environment Canada or the province was in progress and expected to be released in 2000–01.

Discussions continued with Manitoba on revisions to the Canada–Manitoba Water Quality Monitoring Agreement. Environment Canada continued to monitor at eight locations under the proposed new monitoring schedule. Negotiations to finalize the new arrangement were ongoing at year-end.

In Prince Edward Island, the Parties informally maintained the water quality monitoring program while an interim arrangement was developed to replace the Annex that had expired in 1999. Based on analyses of long-term water quality data on the island, an interpretive report on water quality was under preparation. Although groundwater quality was generally found to be excellent, nitrate levels remained a concern in some cases. A trend of increasing nitrate concentrations was also observed in surface water at three long-term monitoring locations. The report was planned for release in 2000–01.

In New Brunswick, approximately half a dozen long-term surface water quality stations continued to be monitored in accordance with the federal–provincial agreement. Water quality monitoring was also conducted in that province in support of a few long-term multi-agency research projects on Catamaran Brook and in the Fundy Model Forest.

In Newfoundland and Labrador, several water quality sites continued to be sampled under the federal–provincial agreement. Lake monitoring sites also serve as an information source for Environment Canada's ongoing LRTAP* effects program.

Cooperative Modeling in the St. Lawrence River and the Great Lakes Connecting Channels

(i) St. Lawrence River

Background

In 1997–98, Environment Canada's Meteorological Service of Canada (MSC–Quebec Region) and the Institut national de la recherche scientifique (INRS–Eau) concluded a cooperation agreement for 2D hydrodynamic modeling of the St. Lawrence River between Cornwall, Ontario, and Trois-Rivières, Quebec. The modeling project is aimed at developing a capability to forecast the transport of pollutants (from oil spills and industrial and municipal sewers) as well as developing applications in other areas of interest such as bank erosion, dredging, and shipping activities. The project is also designed to understand the physical processes present in the river, and to establish the connection between these processes and the flora and fauna habitat. INRS–Eau is an internationally recognized research institute of the University of Quebec that specializes in hydrology and hydrodynamic modeling.

MSC–Quebec Region contributes to emergency responses in the event of accidental spills into the St. Lawrence River and models the distribution of currents in the fluvial portion of the St. Lawrence. It has concluded agreements with various governmental agencies (e.g., Hydro-Quebec) to facilitate hydrometric data exchange.

Progress (to March 31, 2000)

During 1999–2000, MSC–Quebec Region and INRS–Eau continued work under the cooperation agreement for hydrodynamic modeling of the St. Lawrence River. Field data were collected to define the river bed and the first flow simulations were produced. Research scientists from Environment Canada, Quebec Region (MSC, St. Lawrence Centre, and Canadian Wildlife Service), and the Government of Quebec (Société de la Faune et des Parcs) used the numerical modeling approach in a cooperative effort to assess the impacts of fluctuations in water flows and levels on St. Lawrence River biota.

* Long-Range Transport of Airborne Pollutants

(ii) Great Lakes Connecting Channels

Background

In 1997, Environment Canada, the Ontario Ministry of Natural Resources, the U.S. Army Corps of Engineers, and local conservation authorities initiated a comprehensive study to analyze the impact of encroachments from shoreline and in-channel projects on flows and levels in the St. Clair and Detroit Rivers.

Using a two-dimensional numeric model, the goal of the study was to develop a framework for determining whether future proposed projects will have acceptable hydraulic impacts when considered in combination with other potential developments.

Progress (to March 31, 2000)

The encroachment analysis was completed during the year. The study participants planned to release the final report in July 2000. The findings will be used to provide guidance to a wide range of regulatory agencies in Canada and the United States with a role in reviewing shoreline and in-channel projects on the St. Clair and Detroit Rivers.

Monitoring of 1999 Trial Gate Opening— Petitcodiac River Causeway

Background

In 1968, a 1-kilometre long causeway and dam with five sluice gates was built across the Petitcodiac River estuary in southern New Brunswick. While beneficial as a crossing, the causeway is also a barrier that impedes freshets and tidal flows. Over the years, this condition has created ecological and other issues related to fish passage, levels of nutrients and dissolved oxygen, pollution, and channel sedimentation.

As part of efforts to rehabilitate the estuary, Canada (Environment Canada and Fisheries and Oceans) and New Brunswick signed a Memorandum of Understanding in 1996 to conduct an experimental opening of the causeway gates. The purpose of the experiment was to evaluate a means of operating the gates that could restore the river to a more natural ecological state. A steering committee and several working groups were established to design and monitor the experiment.

Progress (to March 31, 2000)

A causeway gate-opening experiment, first attempted in 1998, was concluded prematurely. In 1999, following federal and provincial environmental assessment, a second limited and brief gate-opening trial was conducted in an attempt to determine a viable regime for the gate operations. Three phases were originally planned for the 1999 experiment:

- flushing accumulated sediments from the river channel, upstream and downstream of the causeway
- decreasing the water level in the headpond to a specified maximum
- letting the tide in, controlled by "clipping" the tides (i.e., periodically closing gates to limit the amount of tidal intrusion)

The gate experiment was conducted from April 8 to June 1, 1999, and was carefully monitored. It was terminated, however, during the second phase after it was determined that the specified water level in the headpond could not be achieved. The experiment nevertheless provided valuable information on important issues related to the restoration of the estuary, and on the eventual re-establishment of the linkages between the estuary and the freshwater tributaries of the Petitcodiac basin.

Environment Canada's role included water level monitoring at four locations on the Petitcodiac River. Real-time data from two tidal water level stations (upstream and downstream of the causeway) served an important function in operating the causeway gates during the experiment. Similar real-time information was provided by two stations located further upstream, one influenced by tidal action and the other measuring freshwater input into the system. Environment Canada also collected and analyzed water and sediment quality samples in both the freshwater and brackish portions of the river as part of an environmental monitoring program associated with the experiment.

A report with findings and recommendations was in preparation during the year. The participants in the experiment planned to release the report in 2000–01. For more details on this project, go to Environment Canada's Web site: http://www.atl.ec.gc.ca/petitcodiac/index.html.

1.2 Interjurisdictional Boards

Ottawa River Basin Regulation

Background

In 1983, Canada, Quebec, and Ontario concluded an Agreement Respecting Ottawa River Basin Regulation. Under its terms, a board was constituted to plan and recommend regulation criteria for the 13 principal reservoirs of the basin, taking into account flood protection, hydroelectric power production, and other interests. Supported by a Regulating Committee and a Secretariat, the Ottawa River Regulation Planning Board endeavours to ensure that the integrated management of the reservoirs provides protection against flooding along the Ottawa River and its tributaries and along its channels in the Montreal region.

During the spring freshet, hydrometric and meteorological data are collected daily and forecasts are issued to the public. A simulation model is used to evaluate the effects of sub-basin inflows and regulation decisions on flows and levels throughout the basin. Since 1986, flood reserves have been implemented in three of the principal reservoirs (Quinze, Timiskaming, and Poisson Blanc) to improve downstream flood reduction. One of the main benefits of the reserves is to enable operation of the Grand Moulin dam to provide protection for residents along the Milles Iles River in the Montreal region.

Progress (to March 31, 2000)

During the 1999 spring freshet, the Ottawa River experienced a single flood peak (on April 10 at Carillon). Prudent management of the reservoirs, including limited use of flood reserves, was successful in reducing the magnitude of the flood peak, almost eliminating flood problems in that year along the Ottawa River and in the Montreal region.

Prairie Provinces Water Board

Background

In 1969, Canada, Alberta, Manitoba, and Saskatchewan signed the Master Agreement on Apportionment, which provides for the equitable apportionment of eastward-flowing Prairie rivers and the consideration of water quality problems. Under Schedule C, the Prairie Provinces Water Board (PPWB) was reconstituted to administer the provisions of the Master Agreement.

The apportionment of the natural flow of Lodge and Middle Creeks at the Alberta–Saskatchewan boundary is specified in Article 6, Schedule A, of the Master Agreement. Lodge Creek is also subject to international apportionment under the 1909 Boundary Waters Treaty following the subsequent 1921 Order of the International Joint Commission. Since the inception of interprovincial apportionment monitoring in 1985, deficits in delivery to Saskatchewan have occurred in 1988, 1989, 1992, and 1998.

In 1992, the Master Agreement was amended to include a new Agreement on Water Quality (Schedule E) in response to concerns for protecting these water resources. Schedule E specified acceptable water quality objectives in each river reach and further defined the duties of the Board with respect to its water quality mandate.

Progress (to March 31, 2000)

During the year, an Amending Agreement to the Master Agreement on Apportionment was concluded by the governments of Canada, Alberta, Manitoba, and Saskatchewan. The Amending Agreement changed the definition of "watercourse" to clarify that interprovincial lakes are subject to apportionment and modified the apportionment period for streams crossing the Saskatchewan–Manitoba boundary from the water year (April 1 to March 31) to the calendar year.

The revised definition of "water course" will benefit the Parties by enabling the Board to address any apportionment issues involving the 101 inter-provincial lakes situated on the Alberta–Saskatchewan and Saskatchewan–Manitoba boundaries (e.g., concerns over low water levels periodically experienced at Cold Lake). The change in the apportionment period will make it consistent with the period already used along the Alberta–Saskatchewan boundary and in published water survey data.

The Board established an Instream Flow Needs Committee in 1997–98. Its mandate was to review and evaluate methods available in the Prairie Region for estimating instream flow needs* in the context of fish health and survival. In November 1999, the Committee submitted its report, which was approved by the Board. The report

* In this context, an "instream flow need" may be defined as the amount of water required in a river or stream to sustain aquatic organisms and processes.

recommended that the choice of appropriate methods for determining instream flow needs should be directly related to the management objectives in a particular situation. Follow-up monitoring of fisheries and other relevant ecosystem parameters would be necessary. The Committee also recommended that a public consultative process be followed in the definition of fisheries management objectives, identification of instream flow problems, and resolution of water management issues.

Since 1985, the Committee on Hydrology (COH) has sought ways to improve the effectiveness of apportionment monitoring of Lodge and Middle Creeks at the Alberta–Saskatchewan boundary. In 1999, the Board approved three changes to the natural flow computation procedure recommended by the COH to improve the accuracy of apportionment monitoring for these two interprovincial streams. In March 2000, the Board further agreed to adjust the evaporation data of upper reservoirs in Lodge and Middle Creeks.

Nutrients cause excessive weed and algae growth. In 1999, the Committee on Water Quality (COWQ) completed an analysis of existing information on nutrient–plant relationships in Prairie rivers. In March 2000, COWQ received the final recommendations of a report drafted to determine the feasibility of establishing nutrient water quality objectives, and a review of information on planktonic algae and chlorophyll prepared by the National Water Research Institute. In 2000–01, COWQ members will be identifying stream-specific nutrient issues and reviewing algae and nutrient data at PPWB sites to assist in the development of new site-specific water quality objectives.

COWQ is also developing a water quality index that could be employed to reduce the multivariable nature of water quality data. This approach would combine individual measures and provide a clear description of water quality on a use-by-use basis. A pilot study was undertaken that used the PPWB water quality monitoring data set and took advantage of similar work done by Alberta. A report was planned for 2000–01.

Mackenzie River Basin Transboundary Waters Master Agreement

Background

Signed in July 1997, the Mackenzie River Basin Transboundary Waters Master Agreement endorses the principle of managing water resources for future generations in a manner consistent with the maintenance of the integrity of the aquatic ecosystem and provides for early and effective consultation on potential developments in the basin.

The Master Agreement is administered by the Mackenzie River Basin Board. Its members are appointed representing all Parties: Canada, British Columbia, Alberta, Saskatchewan, the Northwest Territories, and Yukon. Federal members include representatives of Environment Canada, Indian and Northern Affairs Canada, and Health Canada. A member nominated by Aboriginal organizations is also provided by each of the three provincial and two territorial governments.

Under the Master Agreement, Environment Canada is responsible for managing the expenditures of the Board. Costs shared by the Parties include, among other things, the staffing and operation of a secretariat to support the Board at the working level. An Executive Director of the Secretariat is hired within Environment Canada, Prairie and Northern Region, to plan, direct, and manage Board operations.

Progress (to March 31, 2000)

In 1998, the Board initiated a long-term strategic planning process. As a result of two workshops, including one held in June 1999 at Fort Smith, the Board developed a draft Strategic Plan and was preparing to undertake a program of public communication and consultation on the plan. This consultation program will be an integral part of the Board's overall aim to inform and involve the people who live and work in the basin.

During 1999–2000, the Board made a decision to relocate the Secretariat from Edmonton to an Environment Canada facility in Fort Smith, Northwest Territories.

The Board also initiated planning for a water forum as the first step in preparing a report on the state of the aquatic ecosystem. The report is a commitment under the Master Agreement and must be completed every five years. The forum itself would identify indicators of a healthy aquatic ecosystem that can be monitored for the report, including science-based indicators and those identified by local residents of the basin.

The Parties continued discussions on some of the seven bilateral water management agreements to

be attached to the Master Agreement. These agreements will address water resources issues at the boundaries of neighbouring jurisdictions and facilitate the provision of water quality and quantity data to reflect regional and local concerns.

Working relations were maintained between the Mackenzie River Basin Board and the Northern Rivers Ecosystem Initiative (NREI).

1.3 Flood Damage Reduction Program

Background

In 1975, Environment Canada initiated the national Flood Damage Reduction Program. By 1989, cooperative agreements had been concluded with the governments of nine provinces and the Northwest Territories. The purpose of the mapping program was to identify flood-risk areas and implement common federal–provincial policies in those areas through a joint designation process. The aim of the policies was to discourage flood-vulnerable undertakings in designated flood-risk areas.

Progress (to March 31, 2000)

The program was highly successful in mapping flood-risk areas in nearly 1 000 communities across Canada (see appendix B). The program also increased public awareness and fostered the development of improved policies, programs, and institutions by governments to deal with a variety of issues related to preventing flood damages (e.g., flood forecasting).

By the mid-1990s, most priority areas were mapped, and the program had achieved its main policy and awareness objectives. With the mapping program finished, any future federal–provincial renewal of the joint designation policies will need to address ways to maintain the currency of designated flood-risk areas.

During 1999–2000, agreements containing policy provisions remained in effect with six provinces, committing the parties not to engage in, or provide assistance to, undertakings vulnerable to flood damage in designated flood-risk areas. The agreements signed with Saskatchewan and New Brunswick expired on March 31, 2000.

No new designations were approved under these agreements. However, on March 15, 2000, the Environment Ministers for Canada and Quebec recommended the designation of 31 map sheets delineating flood-risk areas in the Saguenay region. These new sheets replace the interim designation approved for these areas in September 1996, following exceptional floods that occurred in the Saguenay region in July 1996.

1.4 Ecosystem Initiatives: Watershed and Water-Related Activities

During the year, Environment Canada continued the development and implementation of its major ecosystem initiatives, covering a wide variety of sensitive marine and freshwater systems across Canada. The program was being supported by a five-year $122.5 million funding authorization, which began in 1998–99.

Although each initiative has unique features, common management principles are observed throughout. These principles stress ecosystem and precautionary approaches to pollution prevention; citizen and community involvement in the design and implementation of initiatives; long-term stewardship through partnerships and governments working together; and sound science combined with local and traditional knowledge as the basis for identifying and resolving issues.

The ecosystem approach itself takes into consideration complex interrelationships among water, land, air, wildlife, and human activities. The focus of this report is primarily on water-related activities and their interjurisdictional arrangements.

Atlantic Coastal Action Program

Background

The Atlantic Coastal Action Program (ACAP) was initiated by Environment Canada in 1991. It is centred on community-based leadership and delivery to address environmental and sustainable development issues in ecosystems involving watersheds and coastal areas throughout Atlantic Canada. With broad local support, nonprofit organizations have been incorporated at 14 sites across Atlantic Canada. At these sites, Environment Canada contributes funding, technical and scientific expertise, and direct staff support with respect to four broad categories of projects relevant to the *Canada Water Act*:

- clean water (e.g., domestic sewage)
- atmospheric emissions
- toxics
- natural habitat

Progress (to March 31, 2000)

ACAP has provided substantial encouragement and funding to many partners and communities to help them undertake water-related projects in support of environmental sustainability, reduction of toxic releases, and habitat restoration. Over the past decade, some 500 projects have been undertaken. These projects have already resulted in significant water quality improvements in several coastal river systems (e.g., Clean Annapolis River Project).

Achievements include the restoration of over 300 kilometres of stream banks, the diversion of 500 tonnes of waste from land fill sites, and the upgrading of sewage treatment in three communities. Most significant though is the broad local capacity built, the strong partnerships established, and the trusting community–government relationships that have provided the foundation for long-term commitment and action throughout the Atlantic region.

The Bluenose Oil Spill Response Program is a notable success. In operation since 1996, it has played an instrumental role in cleaning up several small spills in the region by supplying training and materials to local volunteers. This innovative approach is being emulated by other communities in the region.

During 1999–2000, the ACAP focus was on building broad ecosystem coalitions (e.g., Bay of Fundy, southern Gulf of St. Lawrence, and Gulf of Maine) and addressing the issue of untreated sewage. Highlights include the following clean water activities:

- Bluenose ACAP hosted an Atlantic Region Sewage Workshop in Lunenburg, Nova Scotia, to promote and identify means to address the municipal wastewater issue in the Atlantic Region. The workshop resulted in recommendations to governments and helped to forge a regional consensus on giving sewage treatment top priority in infrastructure programs.

- St. John's Harbour ACAP in Newfoundland presented a state-of-the-harbour report to municipal representatives and stakeholders outlining an "at-source control" proposal for municipal wastewater in the St. John's–Mount Pearl area. At-source control is necessary because even the effluent from full-scale treatment may be harmful to aquatic life due to the presence of household and industrial toxic substances. The proposal complemented efforts to promote sewage treatment and related infrastructure to improve water quality in St. John's Harbour.

- Saint John ACAP in New Brunswick continued to implement "Creek Sweeps", a project to restore several urban streams degraded by litter, untreated sewage, and toxic compounds. With community leadership and participation, projects have included pilot stormwater engineering and a campaign for regulatory efforts to clean up one of Canada's worst contaminated sites.

Georgia Basin Ecosystem Initiative: Cooperative Arrangements in the Georgia Basin

Background

In December 1998, Environment Canada and the British Columbia Ministry of Environment, Lands and Parks announced their shared priorities of clean air, clean water, conserving and protecting habitat and species, and building sustainable communities, collectively known as the Georgia Basin Ecosystem Initiative (GBEI). The Georgia basin ecosystem encompasses most of the Georgia Strait, part of the Juan de Fuca Strait, and the waters that flow into these marine bodies. Building on the success of earlier initiatives* undertaken in the Fraser River and estuary, GBEI provides an opportunity for community and watershed groups, Aboriginal peoples, industry, and business to participate with governmental agencies in stewardship projects to maintain the health of the ecosystem. The focus is on clean water and air, the conservation and protection of habitat and species, and the promotion of sustainable communities.

GBEI Clean Water focuses on reducing the impacts of urban growth and agricultural activities on stormwater, municipal sewage, and shellfish harvesting areas, and includes the following priorities:

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* Fraser River Action Plan and Fraser River Estuary Management Program

- identification and management of toxic substances
- management of sewage treatment operations, biosolids, and urban stormwater
- practices to reduce pollution from vessels and marine facilities (including pleasure craft)
- management practices to reduce agricultural nonpoint source pollution
- water conservation practices and protection of drinking water sources
- pollution prevention programs for municipalities and small businesses
- management practices to maintain and restore shellfish harvesting areas

Progress (to March 31, 2000)

During 1999–2000, GBEI sponsored several clean water projects in the Georgia basin, including the following:

- Agreements were signed with Cowichan First Nations and Snuneymuxw First Nations to determine sources and levels of contamination in shellfish harvesting areas of Cowichan Bay and in the Nanaimo River and estuary. Similar assessments of water and stormwater quality were conducted in Boundary–Semiahmoo Bay, Comox Harbour, the Saanich Peninsula, and Sooke Harbour to identify actions necessary to reduce pollution in the shellfish-growing areas and to ensure that any harvested shellfish will be safe to eat.

- Lower Fraser Valley aquifers and streams and the fish, crayfish, and other benthic (bottom dwelling) organisms in the streams are being studied to investigate the effects of agricultural and urban nonpoint source pollution (NPS). Fish and crayfish are being used as indicators of exposure to NPS contaminants in both Elk and Yorkson Creeks (Chilliwack and Langley). Results to-date indicate higher levels of nutrients, coliform bacteria, and some metals in water in areas downstream of urban and agricultural activities. Samples to determine benthic community structure (the numbers and types of insects and worms that live on the stream bottom) were collected from the Fraser Valley and Greater Vancouver area in the fall of 1998 and 1999; sampling will continue in 2000.

- With about 60 percent of the septic systems failing, the residents of Union Bay (on Vancouver Island) face a huge bill to fix their on-site systems and there is a lot of support to find an alternative. The community, with support from GBEI, has developed a Liquid Waste Management Plan (LWMP) that could be used as a model by other communities wishing to start a similar process. This plan will address wastewater pollution that has resulted in a shellfish closure in Union Bay since 1969. The long-term goal of the Union Bay "Waste to Wealth Project" is to reduce or lift the shellfish closure fronting the Town of Union Bay, previously home to an important shellfish industry.

- The Urban Watershed Management CD-ROM was developed to serve as the textbook for a comprehensive Internet-based course on urban watershed management offered through the University of British Columbia's Continuing Studies Program. The CD-ROM covers topics related to watershed assessment and monitoring, management and planning, and action and education, as well as various special topics including impervious areas, riparian (streamside) buffer zones, floodplain management, and drinking water supply. It includes over 1 000 colour photographs, drawings, and maps; 30 minutes of video; and one hour of sound. The content of the CD-ROM and course will provide practicing watershed management professionals and community leaders with a thorough, up-to-date understanding of urban watershed problems and solutions.

- In 1999, two one-day stormwater workshops were organized to help bring about the change and the commitment required to move beyond stormwater planning to implementation of innovative stormwater solutions. The workshops, held in Nanaimo and Sechelt, showcased urban and rural case studies from every part of the Georgia basin. These cases demonstrate that "smart" development principles (e.g., environmentally sensitive practices such as the reduction of impervious surfaces) are being applied successfully and cost-effectively to integrate green infrastructure into sustainable community designs.

- As the Georgia basin shares its waters with the Puget Sound and inflows from Washington State, the development of a protocol for transboundary cooperation was an ideal complement to the

GBEI. Signed in January 2000, the Joint Statement of Cooperation on the Georgia Basin and Puget Sound Ecosystem commits Environment Canada and the U.S. Environmental Protection Agency to develop annual action plans and report to the public on progress. Water-related issues of joint concern include point and nonpoint discharges to surface water, contamination of groundwater, sewage contamination of shellfish production areas, toxic chemicals, and the degradation and loss of coastal and uplands habitat.

Great Lakes 2000 Program—Canada–Ontario Agreement Respecting the Great Lakes Basin Ecosystem

Background

The Great Lakes 2000 Program is the second phase of Environment Canada's 1989 Great Lakes Action Plan (GLAP) initiative to manage and improve the ecosystem of the Great Lakes basin. Great Lakes 2000 is a cooperative effort that brings together other federal ministries, First Nations, communities, organizations, industry, and citizens in partnership to help Canada fulfil its obligations under the Canada–United States Great Lakes Water Quality Agreement (GLWQA). The 1994 Canada–Ontario Agreement respecting the Great Lakes Basin Ecosystem (COA) builds on this partnership by establishing a cooperative framework between the two governments to work toward restoring and protecting the Great Lakes ecosystem.

The 1994 COA created a results-oriented approach that identified more than 50 targets to be achieved during the six-year term of the agreement. These targets address the three primary objectives of COA, namely to

- restore and protect ecosystem health and beneficial uses in degraded areas
- prevent and control pollution by working toward the virtual elimination of persistent, bioaccumulative and toxic substances of greatest concern with a philosophy of zero discharge
- conserve and protect human and ecosystem health by determining the impacts of contaminants on the basin and use this information to address significant ecosystem health issues

Progress (to March 31, 2000)

Released during the year, the Third Report of Progress under the Canada–Ontario Agreement Respecting the Great Lakes Ecosystem, 1997–1999 provides a detailed account of the achievements and progress made by government and its partners. Many of the targets in COA were met, and significant progress was made on others, including the following:

- The use, generation, and release of seven priority toxic substances were reduced by 71 percent.
- Through voluntary pollution prevention agreements, industry reduced toxic and hazardous waste releases into the environment by over 390 000 tonnes.
- A total of 9 500 hectares of wetlands were protected and over 3 000 hectares were rehabilitated.
- Over 200 kilometres of lake and shoreline habitat have been rehabilitated.
- Overall, more than 60 percent of the actions necessary to restore 16 Areas of Concern (AOCs) have been implemented and 35 percent of the impaired beneficial uses of the environment across AOCs have been restored.
- The Collingwood Harbour AOC was fully restored and de-listed — the first and only one in the Great Lakes basin.
- All remedial actions have been completed in the Spanish Harbour AOC; the harbour is now in a stage of natural recovery.
- Remedial action taken in Hamilton's West Harbourfront area has improved the harbour's water quality, contributing to higher property values in the area.
- In Thunder Bay Harbour, a partnership between local industry and the federal and provincial governments was restoring a historically degraded area that has affected the harbour's water quality.
- A common strategy to work in cooperation with the Great Lakes Community toward the goal of virtual elimination of persistent toxic substances was established with the signing by Canada and the United States of the Great Lakes Binational Toxics Strategy in 1997.

The COA Third Progress Report also noted that as part of a binational initiative to maintain the relatively pristine quality of Lake Superior and Nipigon Bay, Ontario and Canada had explored the feasibility of a joint designation of those waters under the *Canada Water Act*. It concluded that although special designations were possible under the *Canada Water Act* (Part I), a formal agreement between Canada and Ontario was required.

While these results are extremely encouraging, the continued commitment by the Great Lakes community is essential to the restoration and protection of the Great Lakes ecosystem. On the expiry of the Canada–Ontario Agreement on March 31, 2000, Environment Canada pledged to continue its cooperative partnership with Ontario while a new agreement was negotiated.

Environment Canada's commitment to a healthy, prosperous, and sustainable Great Lakes basin ecosystem will enter its next stage with the Great Lakes Basin 2020 initiative, the third phase of the GLAP.

For information on research related to this initiative, see the section on the National Water Research Institute.

Northern Ecosystem Initiative

Background

The Northern Ecosystem Initiative (NEI) was launched in 1998 to enhance the health and sustainability of communities and ecosystems in the Canadian North. These northern ecosystems encompass a vast area of the nation's freshwater systems and marine coastline in the Northwest Territories, Nunavut, Yukon, and the northern parts of several provinces including Labrador, Nunavik (northern Quebec), and the Hudson Bay–James Bay lowlands. The initiative is guided by the principle of sustainable development and follows an interdisciplinary scientific approach that also seeks to assimilate local and traditional knowledge.

Initial efforts have concentrated on four priority issue areas:

- biodiversity
- climate change in the North
- contaminants in northern ecosystems
- impacts of development

Progress (to March 31, 2000)

At year-end, the initiative was still under development and activities were mainly preparatory in nature. Broad issue scans were completed to discover what is already being done in the four priority issue areas and by whom and to identify potential program, policy, and research needs. The scans reviewed the literature and sought expertise from a wide array of sources—government agencies, Aboriginal peoples, nongovernmental organizations, and academic and industrial groups.

The program administrators initiated consultations in the northern territories, northern Quebec, and Labrador to identify community priorities; they also developed focus projects to provide opportunities for innovative approaches and partnerships. In addition, Environment Canada consulted with a wide cross-section of northerners on the development of a federal Northern Sustainable Development Strategy, which will be useful in guiding the initiative.

During 1999–2000, NEI made some early progress on the following water quality and contaminants issues:

- The Contaminants Issue Scan reported that mercury should be a top priority because concentrations found in marine mammals and predatory fish have been increasing over the past decade.

- Consultations were successfully initiated in Labrador and northern Quebec. Under an NEI focus project, the Labrador Inuit Association prepared a discussion paper on setting a contaminants research agenda for Labrador.

- NEI developed a focus project to follow up and expand on observations collected from a community-based contaminants monitoring program in Yukon and the western Northwest Territories, begun in the mid-1990s by the Arctic Borderlands Ecological Knowledge Cooperative.

Northern Rivers Ecosystem Initiative: Follow-up Activities to the Northern River Basins Study Agreement

Background

Undertaken pursuant to an agreement signed by Canada, Alberta, and the Northwest Territories in

1991, the Northern River Basins Study assessed the cumulative effects of industrial, agricultural, municipal, and other developments on the aquatic ecosystems of the Peace, Athabasca, and Slave River systems. The final report, with key findings and recommendations, was completed and transmitted to ministers in June 1996.

A joint governmental response to the recommendations was released in November 1997. In the response, a number of federal government departments (Fisheries and Oceans, Indian and Northern Affairs Canada, Health Canada, Heritage Canada, and Environment Canada), as well as Alberta and the Northwest Territories, made commitments to undertake follow-up activities such as research to improve the understanding of the effects of nutrients and contaminants on the river system.

The follow-up activities are being cooperatively undertaken by Canada, Alberta, and the Northwest Territories through the Northern Rivers Ecosystem Initiative (NREI). This five-year initiative began in April 1998 under the direction of a steering committee co-chaired by Environment Canada and Alberta Environment.

Progress (to March 31, 2000)

By 1999–2000, approximately 15 projects were under way. These projects focus on matters such as pollution prevention, drinking water, and research into contaminants, nutrients, endocrine disruption in fish, dissolved oxygen, and hydrology. NREI's First Progress Report, completed in November 1999, outlined the main achievements in implementing the study's recommendations. Some important highlights include the following:

- Resulting from improved technology and more stringent regulations, pulp mill effluent loadings have declined since 1990 even though pulp production has more than doubled.

- In the Northwest Territories, a comprehensive water quality study (Slave River Environmental Quality Monitoring Program) was completed to establish a baseline for assessing future changes in aquatic conditions relating to human health.

- Begun in 1998, a four-year research program undertaken by Environment Canada continued to assess and predict the potential impacts of oil sands extraction on the aquatic environment. This project is funded by the Panel on Energy Research and Development.

The Northern Rivers Ecosystem Initiative is scheduled to conclude in 2003. A newsletter, "River News", shares results directly with the public (available at www.pnr-rpn.ec.gc.ca/nature/ecosystems/nrei-iern/publications/dg03s01.en.html)

St. Lawrence Vision 2000 Program

Background

Originally launched in 1988 with a five-year horizon, the St. Lawrence Action Plan is a Canada–Quebec environmental initiative to protect, preserve, and restore the St. Lawrence River ecosystem. Some 10 federal and provincial departments have participated in the process. Efforts are focussed on most reaches of the St. Lawrence and its major tributaries, extending from Lac Saint-François at the Quebec–Ontario boundary to the eastern extremities of the Gulf of St. Lawrence.

As a main thrust of Phase II, conducted from 1993 to 1998, riverside residents of the St. Lawrence and Saguenay Rivers were invited to participate in a consensus-building process to encourage local initiatives to protect and develop water resources and uses in areas of prime concern, known in French as Zones d'intervention prioritaire (ZIP). ZIP committees were formed with a mandate to develop a consensus on local priorities and to formulate an Ecological Remedial Action Plan (ERAP).

In 1998, a third Canada–Quebec Agreement on the St. Lawrence River was signed to implement the St. Lawrence Vision 2000 Action Plan, Phase III. Stressing community involvement, the agreement covers several other consensus-building areas: agriculture, biodiversity, human health, industrial and urban sectors, and navigation.

Progress (to March 31, 2000)

Phase III of the Action Plan is continuing the successes of Phases I and II. Over the past decade, there have been measurable decreases of contaminants in fish and plants and improve-ments to the quality of water and sediments. These decreases have resulted from reductions in discharges of toxic effluents by 106 industrial plants identified as priorities. About 50 of these plants had

reduced their discharges by 96 percent. The initiative has also protected 15 000 hectares of wildlife habitat; and the implementation of recovery plans for 27 threatened species has contributed to efforts to maintain biodiversity.

By year-end, 14 ZIP committees were formed or under development, 11 of the ZIP committees were in the process of implementing local initiatives, and about 75 community projects had received funding under the Community Interaction Program (1998-2000 period).

During the year, ZIP committees reported significant progress in implementing their ecological clean-up plans (ERAPs) in both rural and urban areas. For example, the Alma–Jonquière ZIP Committee was active in restoring riverbanks and water quality along the Bédard River in the Saguenay Region, and the Jacques Cartier ZIP Committee was addressing contaminated sediments in the Port of Montreal.

Following are other water-related activities that addressed some of the consensus-building areas identified for the program.

- Navigation. The Shipping and Boating Harmonization Committee examined several issues, among these were ways to better protect sensitive areas from shoreline erosion caused by shipping activities (e.g., reduced speeds) and ways to avoid harmful exotic species transported in ballast water and accidentally introduced into the ecosystem.

- Human Health. The Shellfish Water Quality Protection Program surveyed and monitored bacterial water quality in shellfish areas and promoted pollution prevention and the remediation and restoration of shellfish harvesting areas. The program also strives to avoid occurrences of consumer poisoning.

- Biodiversity. Plans were developed to construct a fish passage on the Richelieu River at the St. Ours Canal Historic Site to give the copper redhorse, an endangered species endemic to Quebec, access to spawning grounds upstream in the Chambly Rapids.

The St. Lawrence Centre provides support to the St. Lawrence 2000 Program by undertaking research (see section 2.2). Other projects undertaken within the framework of the St. Lawrence 2000 Program include hydro-dynamic river modelling and assessment of the impacts of fluctuating water levels on the ecosystem and uses of the St. Lawrence (see section 1.1).

Detailed reports of these and other achievements frequently appear in the newsletter *Le Fleuve* (http://www.slv2000.qc.ec.gc.ca/bibliotheque/lefleuve/accueil_a.htm).

2. Water Research

2.1 National Water Research Institute

Background

The National Water Research Institute (NWRI) is Canada's largest freshwater research establishment, with facilities in Burlington, Ontario, and Saskatoon, Saskatchewan. NWRI generates scientific knowledge through ecosystem-based research to support the development of sound government policies and programs, public decision making, and early identification of environmental problems. NWRI works with other federal departments, provincial governments, universities, the science and technology industry, and national and international science communities in collaborative research projects to conserve and protect freshwater resources in Canada and abroad.

Progress (to March 31, 2000)

Research to conserve and protect national priority ecosystems

- To support sustainability in Atlantic Canada, NWRI has developed a computerized statistical procedure to be used by the Canadian Coast Guard to identify ships responsible for polluting Atlantic coastal waters; contributed to a framework for studying groundwater transport of nitrate in Prince Edward Island; and completed work on the dispersion, toxicity, and transport of acid mine drainage from abandoned gold mine sites at Goldenville, Nova Scotia.

- In support of a healthy and sustainable Great Lakes basin, NWRI research staff contributed expert knowledge to an assessment of clean-up and restoration requirements and provided technical guidance to the development of a remediation plan for Randle Reef, Hamilton Harbour. Researchers also developed methods for estimating contaminant levels and loads from coal-

pile runoff, combined sewer overflow, and industrial cooling water discharges to Hamilton Harbour to support the development of remediation plans for sediments, water, and habitat. In addition, NWRI formed a research partnership with the Ontario Clean Water Agency to investigate the source of taste and odour compounds in western Lake Ontario. The main compound, geosmin, was found in surface water, while samples from lower depths indicated that deeper, colder water may not have problem levels, suggesting a possible solution might be to draw drinking water from greater depth. Further work will investigate the efficacy of nutrient controls.

- Contributing to the Northern Rivers Ecosystem Initiative, NWRI played a key role in designing and leading research in progress to address public concerns about the health of northern rivers. In cooperation with industry and Aboriginal communities, NWRI is investigating the effects of climatic variability at local and regional scales and of flow regulation on the hydrologic regimes of the Peace–Athabasca delta. Results of this research can be used in designing a hydropower operations system to minimize ecological impacts, restore ecosystem function, and remediate the effects of climate variability on northern deltas. Working with staff of Wood Buffalo National Park, researchers are attempting to clarify the ecological effects of the 1996 flood on the Peace–Athabasca delta, which had previously been adversely affected by a prolonged drying period. In another project, a land-use hydrology model is being developed to evaluate the impacts of land clearing, land conversion, natural burn, and re-vegetation on water supplies.

Research to minimize agricultural impacts on water quality and quantity

- To support development of best management practices for minimizing impacts of agriculture on Canadian water resources, researchers are working with western farmers in a project to learn more about the effects of different tillage methods on herbicides in surface runoff. The final report of a three-year study on herbicides and nutrients entering the South Saskatchewan River from flood-irrigated land has been completed.

Research to minimize the impacts of mining on aquatic ecosystems

- Contributing to efforts to prevent damage to surface and subsurface ecosystems from the flow of waters of extreme acidity, NWRI has developed a model to improve predictions of geochemical reactions that lead to their formation at mine sites. Under the Toxic Substances Research Initiative, a study of geochemical processes controlling the long-term release of metals from mine waste sites, transport in aquifers, and discharge at the groundwater–surface interface was granted funding over a three-year period.

- Researchers contributed expert knowledge to remediation plans to protect groundwater from arsenic trioxide-rich dust located below the Giant Mine in Yellowknife, Northwest Territories. They also brought their groundwater expertise to reviews of the groundwater component of an environmental impact assessment for the Diavik Diamond Mine and to remediation plans for mine sites in northern Manitoba.

- NWRI played a leading role in producing the technical guidance document for Canada's Environmental Effects Monitoring Program for Metal Mining. The document has been presented to industry, government, and nongovernment groups for approval. NWRI continues participation through work to integrate the benthic component of the program with the other program elements of fish, sediment, toxicity, and water quality.

Research to improve municipal wastewater management

- NWRI staff conducted research on the impacts of municipal wastewater discharges on the Athabasca and Bow Rivers in western Canada and advised Parks Canada on methods for minimizing effects on water quality in national parks. NWRI has also joined with the provincial and municipal governments in Ontario to develop new methods for treating combined sewer overflows. These methods will be evaluated in terms of conventional chemical parameters and also in relation to effluent toxicity and other potential impacts on receiving waters.

Research on the impacts of atmospheric change on aquatic ecosystems

- NWRI scientists investigated the impacts of climate change on the glacier reserves feeding the Columbia River, a Canada–United States transboundary system supporting an extensive complex of hydroelectric developments. Researchers compared changes in glacier

resources since 1850 with historical changes in climate and are using an atmospheric–hydrologic model to predict how these reserves will respond to climatic variations in the future. This information will assist resource managers in maximizing power production and minimizing downstream hydrologic and ecological impacts.

- In a study of the highly glacierized sub-basins of the Saskatchewan–Nelson River basin within the eastern slopes of the Rocky Mountains, NWRI has found that a pronounced reduction in the area of glacier cover over the last 50 years has already led to reduced yields of water during critical periods in these sub-basins. Researchers are now planning a more extensive study of all the major contributing basins of the eastern slopes of the Rocky Mountains.

- NWRI is engaged in a four-year study to determine the interacting effects of agricultural activities, climate warming, and increased UV radiation on prairie wetland functioning and productivity. A unique database on biogeo-chemical processes in two prairie wetlands has been generated, giving access to data not previously available for prairie systems. Using specialized confocal laser equipment, work is in progress to see how biofilm structure and composition changes in response to UV radiation.

New tools and technologies for sustainable management of aquatic resources

- New approaches to assess cumulative impacts of multiple stressors on freshwater ecosystems were generated, including the use of fish populations as assessment tools; a weight-of-evidence approach integrating the effects of multiple stressors for risk assessments of northern rivers; isotopic tools to evaluate the impacts of multiple effluents and low dissolved oxygen on aquatic organisms at cold temperatures; and a reference-condition approach to support a national biomonitoring and bioassessment network.

- To assess the impacts of nutrients and toxic chemicals on aquatic ecosystems, researchers developed a reactor for the cultivation of river biofilms at a fraction of the cost of a commercial system. This tool advanced laboratory studies of the effects of nutrients and contaminants on the development of microbial biofilms in rivers and the role of these microbial communities on the fate and effects of contaminants and genetically modified bacteria.

- In a four-year project funded by the Panel on Energy Research and Development to investigate the effects of refinery effluents on aquatic ecosystems, researchers have made successful use of small forage fish as sentinel species to assess the health and reproductive status of fish in oil sands regions.

- In partnership with provincial governments and conservation authorities, NWRI has developed and applied a decision-support system to creeks, rivers, and watersheds in a project to promote sustainability of Ontario's water resources.

- NWRI was a major contributor to a book* that provides details on current ecotechnologies for the recovery and restoration of aquatic ecosystems affected negatively by human activities. The collection of 10 invited contributions provides a historical perspective on aquatic restoration in Canada, highlights successful remediations, and advises on problems to avoid in future restoration projects.

2.2 St. Lawrence Centre

Background

The St. Lawrence Centre (SLC) has carried out a number of major studies since 1993 on the state of the St. Lawrence River ecosystem, including water quality monitoring and a mass balance study of chemical contaminants. In December 1998, a new strategic plan for research was approved and implemented.

Progress (to March 31, 2000)

Ongoing and new research programs include the following activities.

Impacts of Water Level Fluctuations

- Effects on the biodiversity and biological productivity of ecosystems

* Murphy, T.P., and M. Munawar (eds.). 1999. Aquatic Restoration in Canada. Ecovision World Monograph Series. Blackhuys Publishers, Leiden, The Netherlands.

- Effects on different uses, including drinking water
- Effects on the physical dynamics of the river, including erosion
- Effects on contaminant transport

State of the St. Lawrence River

- Analysis of the short-term and long-term variation in the diversity of fish species in the St. Lawrence River
- Distribution and invasion rates of exotic species
- Chemical contamination levels in biota, sediments, and water
- Development of bioindicators using biomarker responses
- Presence and impacts of parasites
- Chemical characterization and study of the transport and deposition of suspended matter in the Cornwall–Massena region
- Study of the evolution of water bodies in the Montreal area and the impact on urban pollution

Urban pollution

- Toxicological aspects of urban sewage effluents
- Impacts of urban sewage on fish and molluscs
- Source, transport, and fate of endocrine-disrupting chemicals
- Geochemical behaviour of metals in the plume of dispersion of urban effluents

Long-Range Transport of Airborne Pollutants

- Study of the rehabilitation of water courses and lakes damaged by acid precipitation in order to verify the effectiveness of programs to counter acid precipitation
- Monitoring of water quality in approximately 40 lakes in Quebec and the assessment of acid deposition and its effects.

Partnerships

- Biochemical, physiological, immunological, and genotoxicological measurements were performed on the tissue of bivalve molluscs from the Saguenay fjord in order to gain a better understanding of the impact of anthropogenic contaminants on water quality in the fjord and their impact on intertidal biota. The project, carried out by SLC, the University of Quebec at Rimouski (UQAR), and the Berlin University of Technology under a bilateral agreement between Canada and the Federal Republic of Germany, culminated in 1998–99 with the publication of a scientific article summarizing four years of field studies. The study proved useful to appraise the state of health of the Saguenay fjord and enabled the three partners to develop and validate new biomarker measurements (e.g., those relating to endocrine disruption). One result indicated that impacts on clam populations at upstream stations are generally higher than those at downstream stations, probably due to contaminant discharges linked to industrial activities.

- Under a program on the impacts of water level fluctuations, research projects are being undertaken with the Quebec provincial government (Ministère de l'environnement du Québec and Societé Faune et Parcs Québec), universities (University of Montreal and l'Institut national de la recherche scientifique–Institut Armand-Frappier), and regional components of Environment Canada (Meteorological Service of Canada and the Canadian Wildlife Service).

- The structure and diversity of the fish community at a reference site in the St. Lawrence River are being analyzed in collaboration with the Aquarium du Québec. Tagging studies were performed in collaboration with personnel from the aquarium, who contributed to the development of an efficient anesthetic for use when tagging and examining fish.

- The toxicity of municipal sewage effluents was determined as part of regional environmental protection activities.

- The urban effluent discharge program carried out at the St. Lawrence Centre includes projects that are related to emerging environmental

problems, in collaboration with the Communauté urbaine de Montréal, l'Institut national de recherche scientifique–Institut Armand Frappier, and the Quebec government (Ministère de l'Environnement du Québec and Societé Faune et Parcs Québec).

2.3 Other Research Highlights

Environment Canada conducts many water-related investigations in addition to the research undertaken at the two major institutes. Inter-disciplinary endeavours are often fostered in partnership with educational institutions or with the institutes or agencies of other governments and federal departments.

This section highlights examples of water research activities not reported elsewhere in the text. Although not comprehensive, the selections are representative of some of these activities.

Atlantic Environmental Research Network—Freshwater and Estuarine Ecosystems

Background

Early in 2000, Environment Canada initiated the development of an Atlantic Environmental Research Network (AERN) in association with Atlantic Canada universities. Based on the successful model of the Atlantic Cooperative Wildlife Ecology Research Network (ACWERN), the broad focus of this research network is to increase the environmental science capacity in the Atlantic Region.

Of AERN's three major themes, one is directly related to water research, with its focus on freshwater and estuarine ecosystems. The other themes target climate change and wildlife/ biodiversity.

Progress (to March 31, 2000)

At year-end, the proposal was in the exploratory stage; however, all the major Atlantic Canada universities had been approached and funding and partnership opportunities were being sought.

Water-Related Research on Atmosphere, Climate Change, and Weather Issues

Background / Progress (to March 31, 2000)

During 1999–2000, the Atmospheric Science Division, Meteorological Service of Canada, Quebec Region undertook, or participated in, the following projects:

- A multipartite research project to integrate radar precipitation estimates in the simulation of watersheds that are sensitive to severe rains, being supported for three years (1998–2002) through the New Initiatives Fund managed by the National Search and Rescue Secretariat. Project participants include Environment Canada, the Ministère de la Sécurité publique du Québec, and l'Institut national de la recherche scientifique—Eau.

- A multipartite research project supported by research and development funds of the Panel on Energy Research and Development concerning the impact of climate change on the St. Lawrence system (including both the Gulf and the estuary upstream) and Hudson Bay, aimed at the development of air-water-ice-soil–coupled simulations. Project participants include the Université du Québec à Montréal, the University of Alaska, Fisheries and Oceans—Maurice Lamontagne Institute, Environment Canada, and the Centre for Research on Computation and its Applications (CERCA) of the Université de Montréal.

- Commencement of work to document systematically (from a meteorological, hydrological, and statistical point of view) severe rain events that occurred in southern Quebec from 1871 to 1999.

- Development, in cooperation with the Ontario Region, of periodic follow-up activities to monitor climatic anomalies (temperature and precipitation) in the entire Great Lakes–St. Lawrence basin.

- Field measurements and research activities to increase the understanding of physical and chemical processes involved in gas exchange fluxes (air-water-soil) for a limited number of toxics (mercury and pesticides) on the Upper St. Lawrence and to better estimate the contribution to the atmosphere from chemical contaminants in the river.

WATER QUALITY MANAGEMENT
(Part II of the *Canada Water Act*)

Background/Progress (to March 31, 2000)

There were no activities conducted during the year pursuant to Part II of the *Canada Water Act*.

Part II has never been used. (See summary of provisions, page vi.)

PUBLIC INFORMATION PROGRAM
(Part IV of the *Canada Water Act*)

Background/Progress (to March 31, 2000)

The public education program continued to expand its presence on the Internet. The Freshwater Web site, part of Environment Canada's Green Lane, provides basic information and comprehensive educational materials such as the full text of the *Canada Water Act*, the *Canada Water Act Annual Report,* and the *Federal Water Policy*. Links to specific issues at other governmental and nongovernmental sites across the country are being regularly updated and expanded. New sections on floods and bulk water removal and water export were added this year. The Web site can be accessed at *http://www.ec.gc.ca/water/index.htm*.

A fifth edition of the popular publication *A Primer on Fresh Water: Questions and Answers* was published. The new edition has a new look and updated content. In addition to new questions, Web site and e-mail addresses have been added to the primer make it easier to gather additional information on specific topics.

Partnerships continued to play a major role in public information activities. Environment Canada continued the promotion of the international Blue Thumb Project and its associated Web site in Canada by providing a French language version for world audiences.

The municipal water use survey, undertaken periodically by Environment Canada, was conducted electronically for the first time in 1999. The survey facilitates the collection and updating of information on water usage, wastewater treatment, and water pricing methods in Canadian municipalities. Once the data are compiled, this information will be made available on the Web site.

APPENDIX A

AGREEMENTS

Canada Water Act Agreements* Ongoing During 1999–2000

Apportionment and Monitoring Programs

- Agreements on water quantity surveys with all provinces, and with Indian and Northern Affairs Canada for Yukon and the Northwest Territories
- Canada–Quebec Protocol on Administrative Arrangements under the Canada–Quebec Agreement on Hydrometric and Sedimentological Networks in Quebec
- Master Agreement on Water Apportionment in the Prairie Provinces (Prairie Provinces Water Board)
- Water quality monitoring agreements with British Columbia, Newfoundland, New Brunswick, Manitoba, Prince Edward Island, Yukon, and the Northwest Territories
- Agreement Respecting Ottawa River Basin Regulation

Water Management Programs

- Agreement with Ontario Respecting the Great Lakes Basin Ecosystem**
- Agreement Respecting Water Resource Management and Information Exchange in the Yukon and Alsek River Basins
- Mackenzie River Basin Transboundary Waters Master Agreement

Flood Damage Reduction Program

- Agreements on policies in designated flood-risk areas with British Columbia, New Brunswick,** Newfoundland, Nova Scotia, Quebec, and Saskatchewan**

* For which *Canada Water Act* authority exists (in most cases, by Order in Council)
** Expired March 31, 2000

APPENDIX B

SUMMARY OF FLOOD DAMAGE REDUCTION PROGRAM

Designation of Flood-Risk Areas Under the Flood Damage Reduction Program, By Province/Territory*

Province/Territory	Communities	Designations
Alberta**	20	18
British Columbia	211	81
Manitoba**	24	17
New Brunswick	88	13
Newfoundland	43	35
Northwest Territories	9	9
Nova Scotia	20	5
Ontario**	273	102
Quebec	274	44
Saskatchewan	20	17
Total	982	341

*Updated to March 31, 2000; the numbers are approximate. Prince Edward Island and Yukon did not join the program. One designation can cover one or more communities in a flood-risk area. Although the procedure of designation was not part of the arrangement for the mapping of flood risks on Aboriginal lands, approximately 40 reserves or communities were mapped with the full cooperation of band councils.

** No policy agreement on designations during 1999–2000.

APPENDIX C

FOR MORE INFORMATION

Selected Web Sites

Environment Canada

Freshwater Site (including *Canada Water Act* Annual Report)
www.ec.gc.ca/water

Clean Water
www.ec.gc.ca/envpriorities/cleanwater_e.htm

Weather and Meteorology
www2.ec.gc.ca/weath_e.html

Ottawa River Regulation Planning Board
www.ottawariver.ca

Research Institutes

National Water Research Institute
www.cciw.ca/nwri/nwri.html

St. Lawrence Centre
www.qc.ec.gc.ca/csl/index_en.html

Ecosystem Initiatives

Atlantic Coastal Action Program
www.atl.ec.gc.ca/community/acap/index_e.html

Georgia Basin Ecosystem Initiative
www.pyr.ec.gc.ca/GeorgiaBasin

Great Lakes 2000 Program
www.on.ec.gc.ca/glimr

Northern Ecosystem Initiative
(under development)

Northern Rivers Ecosystem Initiative
www.pnr-rpn.ec.gc.ca/nature/ecosystems/nrei-iern/index.en.html

St. Lawrence Vision 2000 Program
www.slv2000.qc.ec.gc.ca/index_a.htm
Newsletter: *www.slv2000.qc.ec.gc.ca/bibliotheque/lefleuve/accueil_a.htm*

Other Federal Departments

Agriculture and Agri-Food Canada
www.agr.ca

Fisheries and Oceans
www.dfo-mpo.gc.ca

Health Canada
www.hc-sc.gc.ca

Indian and Northern Affairs Canada
www.ainc-inac.gc.ca

Natural Resources Canada
www.NRCan-RNCan.gc.ca

Federal–Provincial

Canadian Council of Ministers of the Environment (CCME)
www.ccme.ca/

International

Arctic Council
www.arctic-council.org/

International Joint Commission
www.ijc.org

United Nations Environment Programme: GEMS/Water Global Environment Monitoring System
www.cciw.ca/gems/gems.html

United Nations University: International Network on Water, Environment and Health
www.inweh.unu.edu/inweh

Associations, Networks, and Journals

Canadian Water Resources Association
www.cwra.org

Canadian Water and Wastewater Association
www.cwwa.ca

Ecological Monitoring and Assessment Network (EMAN)
www.cciw.ca/eman/intro.html

Federation of Canadian Municipalities
www.fcm.ca

Great Lakes Information Network (GLIN)
www.great-lakes.net/

Water Quality Research Journal of Canada (Canadian Association on Water Quality)
www.cciw.ca/wqrjc/intro.html

WaterCan
www.watercan.com

Enquiries

General Information

National Water Issues Branch
Ecosystems and Environmental
Resources Directorate
Environmental Conservation Service
Environment Canada
Ottawa, ON K1A 0H3
Tel.: (819) 997-2307
Fax: (819) 994-0237

Publications (Public Information Program)

Inquiry Centre
Environment Canada
Ottawa, ON K1A 0H3
Toll free: 1-800-668-6767
Local: 997-2800
Fax: (819) 953-2225
E-mail: enviroinfo@ec.gc.ca

National Water Research Institute

Science Liaison
Canada Centre for Inland Waters
867 Lakeshore Road P.O. Box 550
Burlington, ON L7R 4A6
Tel.: (905) 336-4675
Fax: (905) 336-6444

Science Liaison
National Hydrology Research Centre
11 Innovation Boulevard
Saskatoon, SK S7N 3H5
Tel.: (306) 975-5779
Fax: (306) 975-5143

Regional Offices

Environmental Conservation Branch
Environment Canada
Atlantic Region
17 Waterfowl Lane
Sackville, NB E4L 1G6
Tel.: (506) 364-5044
Fax: (506) 364-5062

Water Issues Division
Meteorological Service of Canada
Environment Canada
Ontario Region
867 Lakeshore Road
Burlington, ON L7R 4A6
Tel.: (905) 336-4712
Fax: (905) 336-8901

Environmental Conservation Branch
Environment Canada
Pacific and Yukon Region
700-1200 West 73rd Avenue
Vancouver, BC V6P 6H9
Tel.: (604) 664-9120
Fax: (604) 664-9126

St. Lawrence Centre
Environmental Conservation Branch
Environment Canada
Quebec Region
105 McGill Street, 7th Floor
Montreal, QC H2Y 2E7
Tel.: (514) 283-7000
Fax: (514) 283-9451

Environmental Conservation Branch
Environment Canada
Prairie and Northern Region
4999-48 Avenue, Room 200
Edmonton, AB T6B 2X3
Tel.: (780) 951-8700
Fax: (780) 495-2615

Prairie Provinces Water Board

Transboundary Waters Unit
Environment Canada
Prairie and Northern Region
2365 Albert Street, Room 300
Regina, SK S4P 4K1
Tel.: (306) 780-6042
Fax: (306) 780-6810