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The Canada Water Act

Annual Report

2002–2003



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Minister of the Environment



Ministre de l'Environnement

Ottawa, Canada K1A 0H3

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

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 2002-2003, which was completed under my leadership.

Sincerely,

A handwritten signature in black ink that reads "John Baird".

John Baird, P.C., M.P.



Canada

CONTENTS

PREFACE	vii
EXECUTIVE SUMMARY	xi
HIGHLIGHTS, 2002–2003	1
COMPREHENSIVE WATER RESOURCE MANAGEMENT (Part I of the <i>Canada Water Act</i>)	1
1. Federal–Provincial Programs.....	1
1.1 Data Collection and Use	1
1.2 Interjurisdictional Boards.....	5
1.3 Ecosystem Initiatives: Watershed and Water-Related Activities	7
1.4 Other Federal or Federal–Provincial–Territorial Collaboration	14
2. Water Research	15
2.1 National Water Research Institute	15
2.2 St. Lawrence Centre	18
2.3 Other Research Highlights.....	20
PUBLIC INFORMATION PROGRAM (Part IV of the <i>Canada Water Act</i>).....	22
1. Freshwater Website	22
2. International Forums and Conferences.....	22
3. Environment Canada's Biosphère.....	22
APPENDIX A: AGREEMENTS	23
APPENDIX B: FOR MORE INFORMATION	24

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 requires that a report on the operations under the Act be laid before Parliament after the end of each fiscal year. This, the 31st report, covers progress on these activities from April 1, 2002 to March 31, 2003.

The report describes a wide range of federal activities conducted under the authority of the Act, including significant water research, participation on federal-provincial agreements and undertakings, significant water research and a public information program. A map depicting Canada's major drainage areas and drainage flows is provided in Figure 1.

Provisions of the *Canada Water Act*

The following is a summary of the major provisions of the Act.

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, available at www.ec.gc.ca/CEPARRegistry/gene_info/).

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.

Figure 1. Major Drainage Areas and Drainage Flows in Canada.



Comments on the Report

At the end of this report, a feedback form has been included to share your comments. Feedback on the report is appreciated and will help Environment Canada better understand the variety of audiences that read the report, as well as help shape future annual reports on operations under the *Canada Water Act*.

List of Acronyms

ACAP	Atlantic Coastal Action Program
AOC	Area of Concern
CABIN	Canadian Aquatic Biomonitoring Network
CCME	Canadian Council of Ministers of the Environment
CEPA	<i>1988 Canadian Environmental Protection Act</i>
CEPA 1999	<i>Canadian Environmental Protection Act, 1999</i>
CESI	Canadian Environmental Sustainability Indicators
COA	Canada–Ontario Agreement Respecting the Great Lakes Basin Ecosystem
GLWQA	Canada–United States Great Lakes Water Quality Agreement
HAL	Hydrometeorology and Arctic Laboratory
HYDAT	Environment Canada’s hydrometric database
IJC	International Joint Commission
IMSL	Integrated Management of the St. Lawrence
NEI	Northern Ecosystem Initiative
NWRI	National Water Research Institute
SLP	St. Lawrence Plan
SOAER	State of Aquatic Ecosystem Report
ZIP	zone d’intervention prioritaire (priority intervention zone)

EXECUTIVE SUMMARY

Federal Programs

The *Canada Water Act* calls for consultation between the federal and provincial governments in matters relating to water resources. Joint projects involve the regulation, apportionment, monitoring, or surveying of water resources, and the pre-planning, planning, or implementation of sustainable water resource programs. The planning studies encompass interprovincial, international, or other basins where federal interests are important. Implementation of planning recommendations occurs on a federal, provincial, and federal–provincial basis. Agreements for specific water programs provide for the participating governments to contribute funding, information, and expertise in agreed ratios.

Various federal programs are highlighted in this *Canada Water Act* Annual Report. For example, Program Integrity is an initiative to collect hydrometric data across the country, including modernization of stations and gauging sites and improving technology used in monitoring. A number of water quality monitoring agreements have been developed since the early 1980s to ensure that the quality of water is maintained and monitored throughout the country. Highlights of these include an agreement between Environment Canada and Quebec's department of the environment to measure mercury in precipitation along the St. Lawrence River, and monitoring conducted by Environment Canada and the British Columbia Ministry of Water, Land and Air Protection at 31 stream or river sites.

Also highlighted in this report is the National Water Research Institute (www.nwri.ca), which operates as Canada's largest freshwater research facility, leading initiatives from five locations across the country to protect and sustain Canada's aquatic ecosystems, aquatic biodiversity, and the quality and quantity of Canadian water resources. Some noteworthy NWRI initiatives for the 2002–2003 fiscal year include: research on the impacts of climate change on the circulation, storage and distribution of water and energy in cold regions (in association with the Mackenzie Global Energy and Water Experiment); studies on impacts of agriculture on water quality in the Prairies and in Ontario; and the organisation of the first in a series of science-policy workshops on behalf of the Canadian Council of Ministers of the Environment. In recognition of NWRI's national and international leadership in water science, NWRI was awarded the prestigious "Cannes International Prize for Water and Sciences" in 2003.

Atlantic Region

The Atlantic Region consists of the provinces of Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland and Labrador. In this region, ecosystem initiatives are a key component of *Canada Water Act* activities. One of the key ecosystem initiatives is the Atlantic Coastal Action Program (ACAP). It is a community-based program that relies on local involvement to conduct projects that are funded to address environmental and sustainable development issues at a watershed level throughout Atlantic Canada.

A considerable laboratory analysis effort was mobilized to investigate the fish kill incidents that occurred in Prince Edward Island in the summer of 2002 using a diagnostic tool that identified the presence of pesticide residues in fish tissue.

Also in 2002–2003, Fisheries and Oceans Canada led an environmental impact assessment (EIA) with the province of New Brunswick to evaluate options for rehabilitating the Petitcodiac River estuary. Environment Canada contributed in-kind expertise to the EIA in the form of monitoring, data provision and analysis, and professional advice.

Quebec Region

In the Quebec Region, the St. Lawrence River and connected ecosystems are the main focus of the *Canada Water Act*. Quebec's and Canada's objective was to join forces to more effectively fight the chemical pollution of the river's waters and ecosystems. An ecosystem-oriented approach was taken, built on the strength and energy of community groups. Phase III of St. Lawrence Vision 2000 (SLV 2000)

reached its final year in 2002–2003. One significant result was a 96-percent decrease since 1988 in liquid effluent toxicity in 50 of the largest industrial facilities along the St. Lawrence River and its tributaries.

At the St. Lawrence Centre, which is the only federal research and development centre devoted entirely to the river ecosystem, specialists are involved in a number of studies and research programs aimed at better understanding how the ecosystems of the St. Lawrence River function and how to keep this knowledge up to date. The St. Lawrence Action Plan (SLV 2000) was created as an ecosystem initiative to protect, preserve, and restore the St. Lawrence River ecosystem. ZIP (Zone d'intervention prioritaire [priority intervention zone]) committees were established with priorities that included the reduction of industrial and agricultural pollution, the conservation of biodiversity, and community-based involvement. To date, 17 Ecological Rehabilitation Action Plans (ERAPs) have been developed by these committees. In addition, models and quality control algorithms have been developed to study the effects of water level fluctuations, coastal processes, and tourism on the ecology of the river.

In 2002–2003, the region was also involved in ecosystem studies for the study board on Lake Ontario and St. Lawrence River regulation plan according to a mandate given by the International Joint Commission.

Ontario Region

The Great Lakes basin is a key component of *Canada Water Act* activities in the Ontario Region. Under the Great Lakes Program, the activities of the partners within the government departments/ agencies are organized in relation to three main goals (healthy environment, healthy citizens, and sustainable communities) and seven objectives (restore Areas of Concern, conserve ecologically important areas, control introduction of exotic species, assess and manage ecosystem health, protect and promote human health, reduce harmful pollutants, and advance sustainable use).

Within the region, water use and supply studies focus on gathering information at a watershed level to determine ecological sensitivities, impacts of climate change, and future projections.

The Ottawa River basin is also an important resource in the Ontario and Quebec regions. Under the *Canada Water Act*, regulations aimed at protecting against flooding along the Ottawa River and its tributaries were established.

In 2002–2003, a significant effort was made to restore the environmental quality and beneficial uses in the Severn Sound Area of Concern (AOC). As a result, the Severn Sound was de-listed as an AOC pursuant to the Canada–United States Great Lakes Water Quality Agreement.

Prairie and Northern Region

The Prairie and Northern Region encompasses more than 50 percent of Canada's land mass and includes five political jurisdictions: Alberta, Saskatchewan, Manitoba, Northwest Territories, and Nunavut. In this region, two main initiatives are noted in the *Canada Water Act* Annual Report: The Northern Rivers Ecosystem Initiative (NREI) and the Northern Ecosystem Initiative (NEI).

The NREI is the response of the Governments of Canada, Alberta, and Northwest Territories to the recommendations of the Northern River Basins Study. Through the NREI, science teams have been focusing on priorities such as pollution prevention, endocrine disruption in fish, drinking water, and enhancement of environmental effects monitoring. Studies have also continued into the incidence of fish abnormalities and the effects of land use, flow regulation, and climate change on aquatic ecosystems.

The NEI supports partnership-based efforts to improve the understanding of how northern ecosystems respond to climate change, contaminants, and resource use activities. It also supports the development of indicators and a network to monitor ecosystem changes.

The Prairie Provinces Water Board (PPWB) was established in this region to ensure that eastward-flowing interprovincial streams are shared equitably and that water quality at interprovincial boundaries is

maintained at acceptable levels. The PPWB also facilitates a cooperative approach for the integrated development and management of interprovincial streams and aquifers to ensure their sustainability. It continues to monitor and report on water chemistry, the condition of benthic macro-invertebrate communities and fish, and contaminant levels at PPWB monitoring sites. The PPWB is also considering the application of a water quality index for the presentation of water quality data at its transboundary monitoring sites.

The Mackenzie River Basin Board was created in 1997 to ensure a healthy and diverse aquatic ecosystem for the benefit of present and future generations within the Mackenzie River basin. In 2002–2003, the major initiatives of the Board were the completion of a draft strategic plan and work on its first State of Aquatic Ecosystem Report (SOAER), which included an overview of water quality in the basin.

Pacific and Yukon Region

The Pacific and Yukon Region encompasses British Columbia and Yukon. The region is characterized by rugged terrain and variations in the amount, distribution, and form of water, resulting in a diverse climate. Water issues in the region stem from conflict or uncertainty in the allocation of water and adequate quality and quantity to meet human and ecosystem needs, now and in the future. Stresses from urban growth, rural development, agriculture, industry, and resource use have impacts on the quality and quantity of water suitable for human and environmental uses. Other water issues stem from fundamental human conflict with the environment: urban and rural development versus floods and drought versus agricultural and municipal water needs. The conflict is compounded by the mosaic of international, interprovincial, municipal, and First Nations interests, each with its own perspectives on the issues, root causes, and solutions.

The Georgia Basin Ecosystem Initiative is a key component of this region's initiative on water. Under this initiative, projects and research are funded to address the threats, pressures, and impacts to the sustainability of the Georgia Basin. Priorities include habitat and species conservation, reduction of pollutants, remediation of shellfish-growing areas, and improved local decision making.

In 2002–2003, Environment Canada and the British Columbia Ministry of Water, Land and Air Protection, through the Canadian Information System for the Environment, made a significant breakthrough in establishing public reporting of data collected on the Internet under the Canada–British Columbia Water Quality Monitoring Agreement. Access to water quality information through www.waterquality.ec.gc.ca/EN/home.htm will significantly improve access to data and information used to determine long-term trends in water quality, identify emerging aquatic ecosystem impacts, and provide information to Canadians for decision making.

HIGHLIGHTS, 2002–2003

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

1. Federal–Provincial Programs

In 2002–2003, a committee of assistant deputy ministers from six federal departments with core responsibilities for water, driven by the contamination of the drinking water supply in Walkerton, Ontario (that led to a provincial inquiry), spearheaded internal reviews over a one-year period to determine immediate water quality priorities. This led to a Budget 2003 announcement of \$600 million in new federal funding targeted toward improving the quality of water and wastewater treatment in First Nations communities.

In the spring of 2003, Environment Canada's deputy minister and the Environment and Sustainable Development Coordinating Committee developed an interdepartmental subcommittee of assistant deputy ministers from 19 different federal departments that have interests in water. The subcommittee is the principal interdepartmental forum for discussion and joint action on issues of federal, national, bi-national (Canada-U.S.), and international concern related to water, and its mandate is to better coordinate and integrate water programs. This group is a focal point for harnessing federal capacity in the area of water and provides a stronger basis for federal participation in federal-provincial programs.

Federal–provincial collaboration on data collection and use, progress achieved within interjurisdictional boards and ecosystem initiatives, as well as highlights of other types of collaboration on water, such as through the Canadian Council for Ministers of the Environment (CCME), are discussed in this section of the annual report.

1.1 Data Collection and Use

1.1.1 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.

In 1997, all the parties agreed that there was a need to review the existing bilateral agreements and determine the path forward for updating the 1975 agreement. This initiative became known as the partnership renewal process.

In 2000, under the federal government's Program Integrity initiative, the Meteorological Service of Canada was allocated \$10M over a five year period. The funding was to be used for re-engineering the collection of hydrometric data in order to minimize the associated field hazards.

Progress (to March 31, 2003)

Hydrometric data were collected, interpreted, and disseminated to meet a variety of needs in the hydrologic community. Under the agreements, there were 2490 stations operating in the federal and provincial networks, with a net increase of 83 stations in 2002–2003. This change was driven primarily by 61 new or reactivated stations in Ontario as part of a multiyear expansion of the provincially funded network. In 2002–2003, the modernization of federally funded stations across the country was nearly completed, while the modernization of provincially funded stations continued as allowed by provincial funding.

Joint federal and provincial efforts continued to address infrastructure issues. During the year, 137 gauging sites were assessed for spilled mercury and 109 sites were remediated. Considerable effort has gone into developing the national hydrometric agreement template in terms of a consensus on the content and wording. There are still a number of unresolved issues that need to be addressed before moving forward with the bilateral negotiations.

The initial focus of the Program Integrity initiative has been on research and development. Testing

and evaluation of hydroacoustic technologies for suitability as an operational tool within the water survey field program has also taken place. The acoustic Doppler current profiler has shown great promise in reducing the time and dangers encountered by field staff when conducting velocity and flow measurements. It reduces the time needed to obtain river velocity measurements and uses new deployment platforms, including small hand-carried tethered boats, remote-controlled boats, and remote-controlled cableway rovers. Other technologies investigated include in situ acoustic velocity meters and noncontact stage, velocity, and flow meters using radar and laser systems. Hydraulic and hydrological techniques are also under development that will reduce the risks associated with field measurements and will allow for the extrapolation of data from existing sites to be used for estimating streamflows at ungauged sites.

1.1.2 Water Supply and Use Data

Background

In the fall of 2000, Canada and the province of Ontario initiated a joint federal–provincial water use and supply project for the Great Lakes basin. The primary objectives of this Canada–Ontario project are to gain baseline information, at the sub-basin level, on water supply, use, and demand; to identify the system’s ecological sensitivities to water resources; and to make projections for the future, including the potential impacts of climate change.

Environment Canada and the Ontario Ministry of Natural Resources co-lead the project. The project management team includes members from these two agencies, along with the Ontario Ministry of Environment, the Ontario Ministry of Agriculture and Food, Conservation Ontario, and Fisheries and Oceans Canada. In addition, Natural Resources Canada and Statistics Canada have shown an interest in the project and have been participating in an advisory role. An advisory committee includes members from numerous agencies and organizations that have expressed an interest in the project. Three technical working groups (water use, water supply, and ecological needs) conduct the work with a five year timeline.

Progress (to March 31, 2003)

The Canada–Ontario Water Use and Supply Project has made considerable progress throughout the past three years on a work-share basis. The support of the partner agencies and the commitment of those involved have kept the project progressing despite a limited resource base. In addition, the project has benefited from collaborative efforts with other initiatives and programs.

The Water Use Working Group compiled data by tertiary watershed for the entire study area for the years 1991, 1996, 1998, and 2000. The Water Supply Working Group estimated groundwater flow in terms of base flow index (BFI) and base flow recession (BFR) for gauged unregulated watersheds, and BFI has been extrapolated to the entire southwest portion of Ontario. The Ecological Requirements Working Group continued its efforts in developing models that identify the relationships between ecological indicators and hydrologic conditions. Work is also proceeding on ecological requirements in identifying species at risk, characterizing streams, and identifying aquatic habitats.

1.1.3 Water Quality Monitoring Agreements

Background

Beginning in the early 1980s, federal–provincial agreements were negotiated with several provinces and territories, including British Columbia (1985), Manitoba (1988), New Brunswick (1988), Newfoundland (1986), Northwest Territories (1995), Prince Edward Island (1989), Quebec (1983), and Yukon (1995).

The agreement with New Brunswick was modified in 1995 when the provincial government undertook to collect, analyze, and manage the data for the water quality monitoring program. The agreement with Quebec was terminated in 1995 because activities were similar to those in the St. Lawrence Action Plan. The agreement with Prince Edward Island was incorporated into the Canada–Prince Edward Island Water Annex in 1996, which expired in 1999 and was replaced with the Canada–Prince Edward Island Memorandum of Agreement on Water signed in

May 2001. Water quality monitoring continues under this new agreement.

A specific framework agreement was negotiated with Quebec for the monitoring of the state of the St. Lawrence River, including long-term water quality monitoring. The agreement marks the first partnership between Environment Canada–Quebec Region, Fisheries and Oceans Canada–Quebec Region, Quebec's department of the environment (Ministère de l'Environnement), and the Société de la faune et des parcs du Québec.

As part of an action plan to measure mercury in precipitation, an agreement was extended between Environment Canada and Quebec's department of the environment for a further three years (2001–2004) at the request of the Conference of New England Governors and Eastern Canadian Premiers. Under the agreement, mercury will be measured in precipitation at two sites in Quebec along the St. Lawrence River (Saint-Anicet and Mingan). The measurements will be incorporated into the North American Mercury Deposition Network.

Progress (to March 31, 2003)

Environment Canada and the British Columbia Ministry of Water, Land and Air Protection jointly conducted biweekly water quality monitoring at 31 stream or river sites in British Columbia. Working agreements to test groundwater quality at wells have also been implemented where cost effective. Environment Canada monitored water quality at an additional four stream and/or river sites in British Columbia and seven sites in Yukon in cooperation with Parks Canada. A pilot project to make water quality trend data accessible through the Internet on the Environment was completed in cooperation with the Canadian Information System for the Environment (www.waterquality.ec.gc.ca/EN/home.htm).

Environment Canada completed discussions with Manitoba on the Canada–Manitoba Water Quality Monitoring Agreement. Environment Canada plans to continue monitoring five locations under the agreement until the Lake Winnipeg Nutrient Study is completed.

A considerable laboratory analysis effort was mobilized to support the investigation of the fish kill incidents in Prince Edward Island that occurred in the summer of 2002. The analysis

benefited from the diagnostic tool developed the year before to identify the presence of pesticide residues in fish tissue.

In New Brunswick, 15 long-term surface water quality stations continued to be monitored in accordance with the federal–provincial agreement.

In Newfoundland and Labrador, several water quality sites continued to be sampled under the federal–provincial agreement. Water quality monitoring at a selected network of Labrador ashkui sites continued during 2002–2003. (The term ashkui refers to the first open water area in the spring). The ashkui stations are now integrated into the Canada–Newfoundland Water Quality Agreement.

Water quality lake monitoring continued in Nova Scotia and Labrador for Environment Canada's ongoing Long-Range Transport of Airborne Pollutants (LRTAP) Program. Water quality monitoring also continued in New Brunswick and Nova Scotia in support of long-term multi-agency research projects on Catamaran Brook, the Fundy Model Forest, and the Pockwock watershed.

In Nova Scotia, a report on the development and use of provincial water quality objectives in Canadian jurisdictions was produced. The report included a summary of the purpose, applications, and uses of water quality objectives, the process for adopting them, and their relevant legislation or policy. A second report reviewed and summarized existing phosphorus models and their applications and possible applicability for conditions found in Nova Scotia.

A project to study therapeutic and pharmaceutical compounds in the Atlantic Region environment was started. It includes nonylphenols and ethoxylated derivatives (common chemicals used in domestic and industrial products such as detergents, lubricating oils, and resins).

Collaborative projects with the National Water Research Institute (NWRI), the Canadian Information System for the Environment, and the Knowledge Integration Branch improved access to Atlantic Region ENVIRODAT water quality data and interpretive products, including on-line mapping applications and a querying tool (Water Wizard).

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

(i) St. Lawrence River / Lake Ontario

Background

Since 2001, several studies have been undertaken as part of the revision of the regulation plan for Lake Ontario and the St. Lawrence River. Environment Canada–Quebec Region is involved in various working groups on issues such as the environment, coastal processes, hydrology, data management, pleasure boating, and nautical tourism. The results of the studies will be used as performance indicators to evaluate and propose an update of Plan 1958-D, which was developed over 30 years ago.

Progress (to March 31, 2003)

On the basis of these studies, the Meteorological Service of Canada (Hydrology Section) has completed a two-dimensional representation of Lac Saint-François and Lac Saint-Pierre, two areas covered by the Lake Ontario and St. Lawrence River regulation plan. A number of physical parameters have been incorporated into the model in order to improve the simulation of the effects of water level fluctuations. In 2002–2003, special attention was focused on erosion.

The Environmental Conservation Branch (St. Lawrence Centre and Canadian Wildlife Service) conducted a series of projects and field studies (specifically in wetlands) to acquire a better understanding of the relationships between water levels and ecosystem components. The relationships will be used as the basis for validating the hydro-logic model and criteria in order to update the regulation plan.

(ii) Automated Control of Data

Background

The Meteorological Service of Canada–Quebec Region participated in the implementation of a pilot project involving the automated, real-time application of quality-control algorithms to data from hydrometric and meteorological monitoring networks. Traditional methods of managing these data were also reviewed and optimized in accordance with the most up-to-date concepts and technologies in the field.

Progress (to March 31, 2003)

The data model and the bank of suitable data have been reviewed and optimized. This model has incorporated new data including updated bathymetry. Quality control algorithms for the domain of variation and for temporal variability were applied at a large number of hydrometric and meteorological stations to assess the capacity of the system to handle large quantities of data in real time. Final representations and data validation of the Lac Saint-François area as well as advancement in completing the Varennes-Contrecoeur area were undertaken. The project for all of the St. Lawrence River section will be completed in 2003–2004.

1.1.5 Petitcodiac River Estuary Restoration

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 issues related to fish passage, levels of nutrients and dissolved oxygen, pollution, and channel sedimentation.

As part of efforts to rehabilitate the estuary, Canada and New Brunswick agreed to undertake a harmonized environmental impact assessment (EIA) for achieving a long-term solution to the fish passage and ecosystem problem. The EIA will consider proposed modifications to the Petitcodiac River causeway.

Environment Canada organized a key Petitcodiac Estuary/River Modeling Workshop in March 2002. The proceedings in the form of a workshop summary report, along with other documentation related to the harmonized EIA process, may be found at www.petitcodiac.com.

Progress (to March 31, 2003)

Environment Canada is providing in-kind support (i.e., laboratory analysis and engineering expertise) for the EIA.

Water level stations continue to be operated on the Petitcodiac River in support of hydrodynamics modeling requirements for the EIA.

1.2 Interjurisdictional Boards

1.2.1 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 Montréal region.

During the spring freshet, hydrometric and meteorological data are collected daily and are used to develop inflow forecasts. A simulation model is used to evaluate the effects of sub-basin inflows and regulation decisions on flows and levels throughout the basin. The Secretariat provides information on flows and levels to the public. 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 Mille-Îles River in the Montréal region.

Progress (to March 31, 2003)

Snow surveys during the late winter of 2002 showed significant variation in depth throughout the Ottawa River basin. The water equivalent was much higher than average in the north and less than average in the south. Therefore, spring peak flows varied throughout the region.

Flooding problems occurred in the Campbell's Bay and Fort Coulonge areas along Lac Coulonge on the Quebec shore. High tributary inflows contributed to the flooding situation. It was an exceptional year because three flood peaks were recorded at Carillon. The lower Ottawa River and Lac des Deux Montagnes were above flood stage during the spring runoff, but no major flood damages were reported.

1.2.2 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. Schedules A and B provide procedures to apportion water between the provinces. Lodge and Battle creeks in southwestern Saskatchewan are apportioned under the Article 6, Schedule A of the Master Agreement and the 1921 Order of the International Joint Commission under the terms of the 1909 Canada–U.S. Boundary Waters Treaty. Under Schedule C, the Prairie Provinces Water Board (PPWB) was reconstituted to administer the provisions of the Master Agreement. Schedule E specifies acceptable water quality objectives in each river reach along the interprovincial boundaries and further defines the duties of the Board with respect to its water quality mandate.

Progress (to March 31, 2003)

Although drought conditions existed in southern and central Alberta and southern Saskatchewan, these provinces met all apportionment requirements and minimum flow criteria for interprovincial streams during 2002.

The PPWB agencies are supporting studies, done under the Canadian Climate Action Fund, to consider the potential impacts of climate change on water availability and on the vulnerability of various water use sectors.

Since 1985, the Committee on Hydrology (COH) has sought ways to improve the effectiveness of apportionment monitoring of Lodge, Middle, and Battle creeks at the Alberta–Saskatchewan border. The Board approved changes to the natural flow computation procedure recommended by the COH to improve the accuracy of apportionment monitoring in these two interprovincial streams. Because these waters are also shared with the United States and are subject to the 1909 Boundary Waters Treaty, the PPWB must consider how apportionment changes between Alberta and Saskatchewan affect the apportionment arrangement at the international boundary. Therefore, some recommended changes have been postponed until similar changes are accepted in the international

computations by the International Joint Commission Accredited Officers.

The Committee on Groundwater recommended specific tasks that should be completed before negotiating a groundwater apportionment agreement between the provinces, including the mapping and assessment of transboundary aquifers, the definition of sustainable yield, and aquifer management plans. A pilot study to map and assess a transboundary aquifer was conducted in 2003.

The Committee on Water Quality (COWQ) continued its multimedia monitoring program, including collection of biota to indicate water quality and aquatic health. The COWQ also applied the Canadian Council of Ministers of the Environment Water Quality Index (CCME WQI) to basins with PPWB monitoring sites and ran the index for a five-year period on a general group of variables. The application of the index and various scenarios were considered for the presentation of PPWB water quality data. The PPWB continued monitoring fish conditions and contaminant levels at PPWB monitoring sites on a five-year cycle. Specific biological pilot studies, which include benthic macro invertebrate communities and periphyton measurements, continued in 2002–2003. The COWQ continued working on developing appropriate nutrient water quality objectives.

1.2.3 Mackenzie River Basin Transboundary Waters Master Agreement

Background

The governments of Canada, British Columbia, Alberta, Saskatchewan, Northwest Territories, and Yukon signed the Mackenzie River Basin Transboundary Waters Master Agreement (Master Agreement) in July 1997. The Master Agreement endorses the principle of managing water resources for future generations in a manner consistent with the maintenance of the ecological integrity of the aquatic ecosystem. It provides for early and effective consultation on potential developments and activities in the basin that could affect the integrity of the aquatic ecosystem. It also contains provisions for seven sets of bilateral agreements between adjacent jurisdictions in the basin. These bilateral agreements identify scientific criteria for water quality, water quantity, and seasonal timing of flows at boundary crossing points required to

maintain the integrity of the aquatic ecosystem of transboundary water bodies.

The Mackenzie River Basin Board administers the Master Agreement. Its members are appointed and represent all parties: Canada, British Columbia, Alberta, Saskatchewan, Northwest Territories, and Yukon. Federal members include representatives of Environment Canada, Indian and Northern Affairs Canada, and Health Canada. There are five Aboriginal board members nominated by Aboriginal organizations in each of the jurisdictions.

Under the Master Agreement, Environment Canada is responsible for managing the expenditures of the board, which are cost-shared equally by the parties. Shareable costs 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. The secretariat is located in the middle of the Mackenzie River basin in Fort Smith, Northwest Territories, providing accessibility to the people who live in the basin.

Progress (to March 31, 2003)

A major initiative of the Mackenzie River Basin Board in 2002 was completion of the board's draft strategic plan. A formal public information and consultation program was not possible with the existing budget. Nevertheless, the board is committed to keeping the people who live in the basin informed of its activities and to soliciting their input as part of finalizing major initiatives such as the strategic plan. Two thousand five hundred copies of the draft strategic plan were published and distributed, along with associated information brochures on the Mackenzie River Basin Transboundary Waters Master Agreement and the Mackenzie River Basin Board, to the board members. The documents were directed to Aboriginal and stakeholder groups within their respective jurisdictions, and feedback was solicited through existing public involvement processes. The board also distributed this package at public forums and placed it on the board's Web site. Once public feedback has been received from each jurisdiction, the strategic plan will be finalized.

The board's Web site (www.MRBB.ca) is continually being refined, and in 2002,

21 different maps, which can be downloaded, were added as a precursor to an online library. Once complete, the Web site will play a major role in public information and consultation.

The board has a major responsibility under the Master Agreement to produce a State of Aquatic Ecosystem Report (SOAER) for the Mackenzie River Basin every five years. Most of the financial and human resources available to the board were devoted to the board's first SOAER during 2002–2003. An overview of existing water quality in the basin was completed. The board established an SOAER Committee to prepare the report. A final report writer–editor was seconded from Environment Canada. The board decided to structure the SOAER by sub-basins. This format facilitates a focus on the aquatic ecosystem and ties in development of bilateral agreements and the interests of local people. It was also agreed to use the Environment Canada Pressure State Response Model with the addition of future predictions based on current trends. Climate change was also a major issue. Traditional environmental knowledge based on existing documentation was used throughout the report. The report begins with an overview chapter from the perspective of the Mackenzie River basin as a whole, with climate change as an important component. The overview chapter is followed by six sub-basin chapters. The board's strategic plan is used to provide the focus of the sub-basin chapters. Environmental indicators are being used to track the questions posed under the Pressure State Response Model. Each sub-basin chapter is being prepared by a team composed of representatives of the jurisdictions involved in the sub-basins. The SOAER is scheduled to be completed and released to the ministers and the public in the spring of 2004.

1.3 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. A five-year \$122.5 million funding authorization, which began in 1998–1999, has supported the program.

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.

1.3.1 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, non profit 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
- atmospheric emissions
- toxics
- natural habitat

Over the past decade, over 800 projects have been undertaken. These projects have already resulted in significant water quality improvements in several coastal river systems. For example, the Clean Annapolis River Project in Nova Scotia continued its long-standing efforts to support volunteer water quality monitoring and restore riparian habitats. The Miramichi River Environmental Assessment Committee in New Brunswick built on its sub-watershed restoration activities in the Napan and Cains rivers.

Progress (to March 31, 2003)

As the partnership between Environment Canada–Atlantic Region and the community-

based ACAP organizations passed its tenth productive year, the solid base of water quality monitoring, education, capacity building, awareness raising, and behavioural change in the 14 ACAP communities was strengthened. Long-standing issues around inadequate sewage treatment were addressed through concerted efforts at the local and political level in St. John's, Newfoundland. This resulted in financial commitments from all three levels of government to construct sewage treatment infrastructure for St. John's Harbour.

A stronger focus developed on the scientific dimensions of a shared water agenda through the ACAP Science Linkages Initiative (a \$250K fund available for projects proposed, developed, and implemented jointly by ACAP organizations and Environment Canada scientists from Atlantic and national institutes). This resulted in a better understanding of water resources and the activities that impair them. For example, 10 of the 14 ACAP sites participated in the development and delivery of an Atlantic Region component of the Canadian Aquatic Biomonitoring Network (CABIN). Through the CABIN, a regional volunteer-based invertebrate stream biomonitoring initiative was established to assess the health of rivers in Atlantic Canada. This is but one example of Environment Canada scientists collaborating as equals with community partners.

1.3.2 Georgia Basin Ecosystem Initiative: Cooperative Arrangements in the Georgia Basin

Background

The Georgia Basin Ecosystem Initiative (GBEI) five-year action plan was established in 1998 to address pressures, impacts and threats to the sustainability of the Georgia basin. In 2003, the GBEI was renewed as the Georgia Basin Action Plan (GBAP) and is the second five-year program of collaborative programming for the Georgia basin.

The GBAP focuses on the following departmental priorities as they pertain to clean water:

- conservation and protection of habitats and species
- reduction of pollutants (including persistent organic pollutants [POPs] and other toxics)

in municipal wastewater and in urban and agricultural nonpoint sources

- remediation of shellfish growing areas
- development and transfer of science, tools, and knowledge to support improved decision making

Strong regional and transboundary relationships will be further enhanced through the GBAP. Examples include the Environment Canada–U.S. Environmental Protection Agency Joint Statement of Cooperation on the Georgia Basin and Puget Sound Ecosystem; the Washington–British Columbia Environmental Cooperation Council; the Fraser Basin Council; Coast Salish First Nations; the Pacific Coast Joint Venture; and the emerging Greater Vancouver Regional District's Sustainable Region Initiative and Liveable Regions Strategy.

Progress (to March 31, 2003)

Federal/Provincial Water Quality Monitoring Agreement: To determine water quality trends in ambient surface water, governments regularly sample and analyze the waters of British Columbia at selected locations. Over time, adequate information on water quality will be gathered to allow examination of the long-term trends at these locations. "Water Quality Trends in Selected British Columbia Water Bodies," produced in 2000, focused on the trends in surface water quality in British Columbia. Reporting in 2002–2003 focused on the development of a Web site for public access to the data (www.waterquality.ec.gc.ca).

Water Quality Remediation in Ladysmith Harbour: Efforts are under way to identify and remediate nonpoint source pollution in Ladysmith Harbour with the long-term goal of restoring water quality to a point where shellfish harvesting beds can be re-opened to direct shellfish harvesting. The shellfish closure affects First Nations, commercial, and recreational harvesters in the area. Possible sources of water contamination include on-site septic systems, agricultural and urban stormwater runoff, combined sewage overflows, pleasure boat sewage discharges, and discharge from the Ladysmith sewage treatment plant. The project was initiated through the Southern Gulf Islands Round Table, a multi-stakeholder committee dedicated to the environmental health of the southern Gulf Islands region.

Chlorination/Dechlorination of Municipal Wastewater Effluents: Disinfection of wastewater is often required for the protection of public health and shellfish resources. Some dischargers use chlorination. However, chlorine, even at very low concentrations, is toxic to fish and other aquatic life, so regulatory authorities encourage the use of alternative disinfection technologies.

The purpose of this project is to identify practical chlorination/dechlorination systems for wastewater treatment plants. This will meet the requirements of both fish protection and public health and shellfish resource protection, with emphasis on what is practicable for small wastewater treatment plants.

Abbotsford Aquifer Ground Water Monitoring: Groundwater samples taken from 23 locations in the Abbotsford aquifer were monitored monthly for nitrate from nonpoint source (NPS) pollution. NPS pollution cannot be exactly pinpointed to a source, but includes sources such as manure or pesticides applied to fields, oil leaks from cars, and household cleaners that seep into groundwater, rivers, and creeks. A status report prepared in 2000 showed that although the overall average concentration of nitrate at the monitoring wells seems to be slowly decreasing, many wells showed nitrate concentrations higher than the Canadian drinking water guideline. Recent results from the monitoring program are available on Pacific and Yukon Region's Environmental Indicators Web site at www.ecoinfo.ec.gc.ca/env_ind/region/nitrate/nitrate_e.cfm. Since 1996, Environment Canada has implemented, in partnership with other federal, provincial and municipal agencies, projects to educate the public on ground water stewardship. These included the production of a newsletter called the Groundwater Keeper, a septic maintenance video and a groundwater protection video. Environment Canada is currently working with researchers at Simon Fraser University to develop a model that will be used to assess the environmental impacts of land use practices and land management strategies, and continues to work with other agencies and stakeholders to prevent nitrate contamination of the aquifer.

Water Balance Model for British Columbia: The Water Balance Model for British Columbia provides a decision support tool for better stormwater management. The model simulates

the hydrologic performance of various stormwater source controls under different land use planning scenarios, including impervious controls, absorbent landscaping, infiltration facilities, green roofs, and rainwater re-use. Data inputs to the model include rainfall, evapotranspiration and soils; site design parameters such as road width, rooftop, and parking coverage; and type and design of stormwater source controls. The model then predicts the volume of rainfall that becomes runoff and the number of times that peak predevelopment flows are exceeded, providing a measure of the expected avoidance of habitat loss, pollution, and flooding. The model will be used both to promote better understanding of the benefits of low impact development and to facilitate on-the-ground implementation of stormwater management plans. The Water Balance Model for British Columbia is being developed by an intergovernmental partnership with membership from local, regional, provincial, and federal government agencies. The model is available at www.waterbalance.ca, with the Georgia Basin Action Plan as a contributor.

Headwaters Model Sustainable Community in Surrey: Phase One of the Headwaters Model Sustainable Community in Surrey project involved the creation of a Neighbourhood Concept Plan (NCP) for East Clayton, Surrey. Principles for sustainable urban development have been shaped into plans through a series of charrettes, meetings, and design sessions with different stakeholders as well as design and technical specialists. The East Clayton Land-Use Plan was adopted by council in late 1999 and the full NCP was approved in early 2001. Currently, the City of Surrey, along with the Headwaters partners, is undertaking Phase Two of the Headwaters project, which will develop standards to ensure the long-term health of the area's streams and agricultural lowlands and will set a precedent for future development in the area.

Elk Creek Study Community Watershed: Information System: A series of studies on Elk Creek in the Chilliwack area of the Fraser Valley were initiated under the Georgia Basin Ecosystem Initiative to assess the impacts of agricultural and urban land uses on environmental quality. The Community Watershed Information System project collated those studies and other available information on a hypermedia CD-ROM that can be used as a

local resource document or as an educational tool on watersheds and ecosystems. The CD-ROM is expected to be available in early 2004. It will be distributed to various watershed groups to provide an integrated picture of the resource status and the processes that are taking place in the watershed. It should be a valuable tool for describing local issues and learning about watersheds and ecosystems.

Stream Condition Assessment: The condition of streams draining urban and agricultural areas in the Georgia basin was assessed using the Canadian Aquatic Biomonitoring Network (CABIN) approach. Insect communities living on the bottom of streams were used for assessing the health of streams. Data indicate a greater disturbance of this community in urban streams than agricultural streams.

1.3.3 Great Lakes Action Plan – Canada–Ontario Agreement Respecting the Great Lakes Basin Ecosystem

Background

The Government of Canada launched the Great Lakes Action Plan (GLAP) in 1989 to integrate its efforts to restore the health of the Great Lakes basin ecosystem. This is a coordinated effort among federal departments to ensure that Canada's commitments under the Canada–United States Great Lakes Water Quality Agreement (GLWQA) are met. Through subsequent renewals of the program in 1994 and most recently in 2000 through the Government of Canada's announcement of the Great Lakes Basin 2020 initiative (GLB2020), the federal Great Lakes Program has evolved.

The federal Great Lakes Program is a partnership of eight federal departments and agencies with the goals of a healthy environment, healthy citizens, and sustainable communities. Program partners include Agriculture and Agri-Food Canada, Fisheries and Oceans Canada, Health Canada, Natural Resources Canada, Transport Canada, Public Works and Government Services Canada, Environment Canada, and the Parks Canada Agency. This important federally coordinated program significantly bolsters Canada's efforts to protect and restore the Great Lakes basin ecosystem, particularly in combination with Environment Canada's Great Lakes Ecosystem Initiative, which is one of several national priority

ecosystem initiatives targeted for funding to address and solve complex environmental, economic, and social issues (\$10 million annually).

The GLB2020 provides \$40 million over five years (i.e., \$8 million dollars annually until March 2005) to restore environmental quality in significantly degraded Areas of Concern designated pursuant to the Canada–United States Great Lakes Water Quality Agreement. In addition to restoring Areas of Concern, the Great Lakes Program seeks to engage government, nongovernment, and citizens in addressing priority threats to the Great Lakes ecosystem, including harmful pollutants, loss of fish and wildlife habitat, climate change, alien invasive species, and population growth and development.

Through the 2002 Canada–Ontario Agreement (COA) Respecting the Great Lakes Basin Ecosystem, the activities of Ontario are integrated with those of federal departments and United States federal and state agencies. The governments of Canada and Ontario signed their first COA in 1971 to demonstrate their joint commitment to stemming the tide of environmental degradation within the basin. The COA has been renewed four more times, each time revised to reflect the changing challenges within the basin.

The COA is guided by the vision of a “healthy, prosperous, and sustainable Great Lakes basin for present and future generations”. It is a successful model of federal–provincial cooperation that recognizes the shared jurisdiction surrounding many of the issues faced within the Great Lakes basin, establishes common goals and results, and coordinates actions to eliminate overlap and optimize use of resources for maximum results.

Previous COAs have enabled the partners to achieve significant progress toward their shared vision of a healthy, prosperous, and sustainable Great Lakes basin for present and future generations. Achievements include: reduced levels of many pollutants, improved water quality, and restored species and their habitats.

The 2002 COA enabled the continuation of progress on priority issues. Through the COA, both governments set out environmental priorities and specific goals and actions for the

enhancement and preservation of the basin's ecosystem. The 2002 COA focused on four major environmental priorities that benefited from federal–provincial cooperation and coordinated action. For each major environmental priority, the 2002 COA set out a series of desirable goals and actions to be achieved over the five-year duration of the agreement. The four major environmental priorities were as follows:

- the cleanup of the remaining Areas of Concern within the basin
- the implementation of a series of binational lake-wide management plans to address problems unique to each of the Great Lakes
- the virtual elimination and significant reduction of harmful pollutants within the basin
- improved monitoring and information management

Signatories to the COA include eight federal departments and agencies (Agriculture and Agri-Food Canada, Canadian Heritage, Fisheries and Oceans Canada, Environment Canada, Health Canada, Natural Resources Canada, Public Works and Government Services Canada, and Transport Canada) and three provincial ministries (the Ontario Ministry of Agriculture, Food and Rural Affairs, the Ontario Ministry of Environment, and the Ontario Ministry of Natural Resources).

Progress (to March 31, 2003)

Canada and Ontario have been working cooperatively to implement the 2002 COA. It will take considerable time, effort, and resources to achieve the extensive results set out in the agreement. Work under the 2002 COA has been under way for one year, and steady progress has been made in relation to all COA results.

The major accomplishments for the first year of the agreement include the restoration of environmental quality and beneficial uses in the Severn Sound Area of Concern (AOC), resulting in its formal de-listing in January 2003 pursuant to the GLWQA.

Environment Canada undertook the following in support of the COA:

- completed a detailed federal analysis on the status of all Canadian AOCs
- funded 88 projects to advance restoration in the Great Lakes AOCs, under the Great Lakes Sustainability Fund
- established effective and efficient management and administration processes, including the formation of the COA committee structure, which includes the COA Management Committee, the Annex Implementation Committee, and Secretariats
- developed work plans in support of the commitments
- managed the development of a framework for the stakeholder advisory committee (the Great Lakes Innovation Committee), a multi-stakeholder advisory group to assist with the identification of opportunities for overcoming barriers to COA implementation

1.3.4 St. Lawrence Vision 2000 Program

Background

Originally launched in 1988, the St. Lawrence Action Plan is a Canada–Quebec ecosystem initiative to protect, preserve, and restore the St. Lawrence River ecosystem. This five-year plan has been renewed twice since 1988 and has achieved concrete results through concerted efforts on the part of federal and provincial departments aided by the private sector, universities, research centres, ZIP (Zone d'intervention prioritaire [priority intervention zone]) committees, nongovernment agencies, as well as riverside communities. Efforts are focused on the St. Lawrence River and its major tributaries, from Lac Saint-François at the Quebec–Ontario border to the eastern end of the Gulf of St. Lawrence.

Phase III of St. Lawrence Vision 2000 (SLV 2000) was initiated in 1998 and carried forward the efforts of the previous 10 years, in particular, the reduction of industrial and agricultural pollution, protection and conservation of biodiversity, and involvement of communities located along the St. Lawrence. A new component, related to shipping, was added to this third phase of SLV 2000.

Progress (to March 31, 2003)

The final year of Phase III was 2002–2003. The development of a new agreement was initiated and an overview of the progress made since 1988 was prepared. The highlights included a 96-percent reduction in the toxicity of the liquid effluent of 50 of the largest industrial facilities, an improvement in water and sediment quality, a reduction in contaminant concentrations in fish and plants, the protection of 116,650 hectares of natural habitat, and the implementation of 27 recovery plans for over 20 threatened species.

Established to promote local initiatives and public participation, the 14 ZIP committees made significant progress in implementing their Ecological Rehabilitation Action Plans (ERAPs). Since the formation of these committees, 16 public consultations have been held to obtain public opinion concerning priority actions in each area. To date, 17 ERAPs have been developed and are in the implementation phase.

PARE (plans d'action et de réhabilitation écologique [ecological rehabilitation and action plan]) projects and other community projects have been supported financially through the Community Interaction Program. This has resulted in 15 local projects in 2002–2003. For example, through cleanup activities carried out by the North Shore ZIP committee on Anticosti Island, metal wastes and a large number of auto hulks were removed from isolated communities and recycled. Another example is the information and awareness campaign carried out by the Jacques-Cartier ZIP committee on wastewater discharges around Montreal. The objective of the campaign was to mobilize local and regional action by citizens, elected representatives, and municipal managers aimed at reducing wastewater discharges during wet weather and eliminating them during dry weather.

The St. Lawrence Centre provides support to the SLV 2000 program by undertaking research. One major research program was focusing on water level impacts on fauna and flora of the fluvial section. Research projects included water level impact on fish community evolution, northern pike year-class strength, wetlands diversity and abundance, especially in Lac Saint-Pierre, and riparian birds diversity (see section 2.2). Other projects within the framework of this program include hydrodynamic river modeling and assessment of the impacts of fluctuating water

levels on the ecosystem and uses of the St. Lawrence (see section 1.2). Detailed reports of these and other achievements frequently appear in the newsletter *Le Fleuve* (www.slv2000.qc.ec.gc.ca/bibliotheque/lefleuve/accueil_a.htm).

In response to the recent dramatic increase in the area of land devoted to corn production in southern Quebec, intensive measurement programs have been implemented to gain a better understanding of the air–water–soil interactions of a small number of pesticides used in corn production and to eventually carry out modeling of their life cycle in the environment.

Other water-related activities associated with navigation and human health include the following:

Navigation: The Sustainable Navigation Strategy for the St. Lawrence, scheduled for release in 2004, proposes an approach to the management of commercial and recreational navigation activities and practices that is consistent with environmental requirements, protection of ecosystems, and the development of other uses of the river. The strategy calls for the development of an integrated dredging and sediment management plan, the prevention of the effects of ship-generated waves on shoreline erosion, the management of waste and wastewater from cargo ships, and the evaluation of options for the adaptation of shipping activities to a possible decline in St. Lawrence River water levels. Cooperation among stakeholders is recognized as key to the implementation of the strategy.

Human health: Preliminary results of the second survey of residents along the St. Lawrence River, which was conducted in 2001–2002, show that 9.7 percent of the population, or 287,000 residents, engage in sport fishing and that for those who do not eat their catches, the risk of contamination is minimized. The final survey results will be released in 2003–2004 and will reveal the St. Lawrence users' practices and individual protective measures toward perceived risks.

Biosphère exhibition on water levels: The Biosphère (Environment Canada–Quebec Region), a unique museum dedicated to water resources, organized a public exhibition on water level fluctuations and the related impacts. The exhibition combined high-tech, animation, and

games to provide visitors, young and old, with a better understanding of the water cycle, water requirements in Canada and elsewhere, and ways of limiting pressure on water resources.

1.3.5 Northern Ecosystem Initiative

Background

The Northern Ecosystem Initiative (NEI) was launched in 1998 and supports partnership-based efforts to improve understanding of how northern ecosystems respond to climate change, contaminants, and resource use activities; to develop indicators; and to create a network to monitor ecosystem changes. The NEI supports projects that address science and capacity-building needs throughout the Canadian North, including Yukon, Northwest Territories, Nunavut, the lowlands of northern Manitoba and Ontario, northern Quebec, and Labrador.

The initiative is guided by the principle of sustainable development and follows an interdisciplinary scientific approach that also seeks to promote the use of local and traditional knowledge systems in combination with western scientific knowledge and methodologies.

Progress (to March 31, 2003)

With multiyear funding support from the NEI, Environment Canada developed a Cumulative Effects Assessment and Management Framework (CEAMF) for the central Arctic in response to rapid resource development that included diamond exploration and mine development activities. The CEAMF was completed in 2002, followed by implementation throughout 2003. Building on that work, the NEI supported subsequent efforts in Labrador to adopt and apply the CEAMF concept in response to similar concerns over cumulative effects. In this instance, the effects were associated with road and base metal mine development as well as low-level flight activities.

By March 2003, with funding support from the NEI, the Ecological Monitoring and Assessment Network–North completed a plain language water quality manual to be used by researchers as well as nonspecialists such as park wardens, renewable resource officers, and community workers. The NEI continued to support projects investigating mercury in northern aquatic ecosystems. Research included the initiation of

work investigating mercury isotopes as well as the completion of studies of mercury levels in sediments of several northern lakes, fish in Great Bear Lake, and mink in Yukon. Mercury has emerged as a priority contaminant in the Arctic and inland lakes of central and eastern Canada. The studies supported by the NEI helped complete knowledge of mercury loadings in these important aquatic ecosystems across Canada's North.

The NEI continued with funding support to the Labrador Contaminants Working Group. A metadata inventory of contaminant publications and current research activities has been completed and posted on a public Web site (www.lcwg.ca) to enable communities, researchers, planners, and policy makers easy accessibility to this important information base in one central location.

Multiyear NEI funding support has produced a final report for the Nunavik Abandoned Mining and Exploration Site Assessment and Prioritization Project. This project was led by the Kativik Regional Government, and its results will empower the local communities with the information needed to identify priority sites for cleanup by responsible authorities. The project integrated data and information from Western science in combination with local and traditional knowledge.

1.3.6 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 Northwest Territories in 1991, the Northern River Basins Study (NRBS) 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, commitments to undertake follow-up activities were made by a number of federal departments including: Fisheries and Oceans Canada, Indian and Northern Affairs Canada, Health Canada, Heritage Canada, and Environment Canada, as

well as Alberta and Northwest Territories. These activities included research to improve the understanding of the effects of nutrients and contaminants on the river system and work to understand the interrelationships of hydrology and climate on northern deltas.

Follow-up activities have been cooperatively undertaken by Canada, Alberta, and 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. The Northern Rivers Ecosystem Initiative is scheduled to conclude in 2003. A newsletter, River News, has been created to share progress with the public. Information on the Northern Rivers Ecosystem Initiative and the Northern River Basins Study can be found at www.pnr-rpn.ec.gc.ca/nature/ecosystems/nrei-iern/index.en.html.

Progress (to March 31, 2003)

Approximately 15 research projects were under way in 2002–2003. These projects, which focused on pollution prevention, drinking water, and research into contaminants, nutrients, endocrine disruption effects in fish, dissolved oxygen, and hydrology, concluded in 2003. Technical reports on these various projects have been received by the NREI Steering Committee. These reports, along with a summary of the various policy initiatives undertaken in response to the original NRBS recommendations will form the basis for a synthesis report, which is currently being prepared. In many instances, initiatives undertaken by industry also addressed the recommendations. Where possible, the results will also be included in the synthesis report. These reports will be made available to stakeholders within the basin.

1.4 Other Federal or Federal–Provincial–Territorial Collaboration

1.4.1 Canadian Council of Ministers of the Environment

Background

The Canadian Council of Ministers of the Environment (CCME) is the principal intergovernmental forum in Canada for discussion and joint action on environmental

issues of national, international, and global concern. Environment Ministers from the ten provinces, the three territories, and the federal government meet at least annually to direct the work of CCME. The primary purpose of CCME is to support member jurisdictions in their work to improve environmental protection and promote sustainable development in Canada. It provides federal, provincial, and territorial ministers with a forum for discussion of the harmonization of environmental laws, policies, and actions; and collaborative action by the member governments to address issues of national as well as international concern. CCME manages environmental issues in a cross-cutting and horizontal way, thereby leading to enhanced integration of approaches to the protection of water quality, ecosystems, and drinking water, and to the prevention of pollution. Information on water-related initiatives of CCME can be found at www.ccme.ca/initiatives/water.html.

Progress (to March 31, 2003)

CCME achieved a number of accomplishments in 2002–2003. Taking a source-to-tap, multi-barrier approach to water quality protection that includes aspects of local jurisdictions and the federal, provincial, territorial, and international levels, CCME prepared a Source to Tap Multi-Barrier Approach Overview report. Progress was made on a technical report scheduled to be published in 2004. The report outlines the elements of a multi-barrier approach that would help ensure that Canadian drinking water supplies are kept clean, safe, and reliable for generations to come. The multi-barrier approach recognizes the inter-relationship of health and environmental issues, and encourages the integration of efforts to improve public health with those that also protect the natural environment.

A series of multilateral research and policy workshops entitled Linking Water Science to Policy were held. These workshops initiated discussions between science and policy groups, identified knowledge gaps, and helped set priorities for research and partnerships. For example, in October 2002, CCME brought together water quality experts in monitoring for a workshop to situate monitoring more broadly within a Canadian and international context. Results affirmed strong support for developing a CCME framework for a water quality monitoring “network of networks” and options toward its implementation. Another workshop held in the

series looked at the effects of agriculture activities on water quality and groundwater quality.

In April 2002, the CCME Water Quality Index (CCME WQI) was published. The CCME WQI is based on a suite of water quality guidelines and provides a consistent mechanism for reporting, to both management and the public, on the overall quality of water bodies, both regionally and nationally. The Water Quality Task Group of CCME continues to explore ways to build on its development and to promote the CCME WQI as one of a group of national indicators. The next step for the task group includes the identification of applications and monitoring reports.

In June 2002, the Source to Tap section (www.ccme.ca/sourcetotap) of the CCME Web site (www.ccme.ca) was launched to demonstrate governments' leadership in protecting water quality from source to tap and to provide a gateway to water quality information for Canadians. Ongoing development continues on the Web site with plans for jurisdictions to prepare gateway pages and provide links, to populate the site with relevant action plans, and to further develop the water quality section.

In December 2002, the Deputy Ministers Committee of CCME instructed the Environmental Planning and Protection Committee (EPPC), which plays a role in policy development for CCME, to initiate a scoping of issues related to the management of municipal wastewater effluents in Canada. The EPPC set up a Scoping Committee with a mandate to provide CCME Ministers with strategic advice on how to move forward on this issue.

Ongoing development work on guidelines related to aquatic life protection continued in 2002–2003 as seven new Canadian Environmental Quality Guidelines were finalized and 14 others were under development.

CCME came together to prepare Canada's position for the 3rd World Water Forum as a follow-up to the commitments made at the World Summit on Sustainable Development. As a result, five actions were showcased as a part of the Portfolio of Water Actions:

- implementation of a source-to-tap, multi-barrier approach to safe drinking water
- strengthening of governance models for integrated water resource management

- delivery of targeted initiatives to improve water quality and access to safe drinking water in Canada
- research, capacity building, and action in developing countries and economies in transition
- building and sharing of knowledge for better water management.

The 3rd World Water Forum also provided a platform for meeting major themes outlined in the Ministerial Declaration, for example, implementation of integrated water resource management (IWRM) in the areas of safe drinking water and sanitation, water pollution, and ecosystem conservation; water resource management and benefit sharing; governance and capacity; and disaster mitigation and risk management.

2. Water Research

2.1 National Water Research Institute

Background

The National Water Research Institute (NWRI) is Canada's largest freshwater research institute with centres in Burlington, Ontario, and Saskatoon, Saskatchewan, and offices in Victoria, British Columbia, Fredericton, New Brunswick, and Gatineau, Quebec. NWRI researchers work with partners from universities, industry, citizens' groups, and local, provincial, and federal governments to confront threats to the quality and quantity of Canada's water resources.

These threats include impacts of agriculture, industry, and urbanization on water quality; effects of contaminants in lakes, rivers, wetlands, ground-water, and sediments; the extent of atmospherically transported persistent organic pollutants and metals in aquatic ecosystems; and the potential impacts of climate change on water quantity and quality.

Progress (to March 31, 2003)

- *Impacts of Climate Change on Water Quality and Quantity – Northern Water Resources*

In 2002–2003, NWRI's climate change research program included investigation of the impacts of

climate change on water quality and quantity and ecosystem responses in northern lakes, rivers, wetlands, and deltas. NWRI continued to play an integral role in the Global Energy and Water Experiment (GEWEX) through the Mackenzie GEWEX study. This study investigated circulation, storage, and distribution of water and energy in cold regions and used results to improve models for climate change impact prediction. NWRI staff served as experts on the impacts of climate change on Arctic freshwater ecosystems and hydrology for the Arctic Climate Impact Assessment of the Arctic Council. They also worked with international scientists in assessing impacts of climate variability on Arctic river flow and inputs to the freshwater budget of the Arctic Ocean.

- *Impacts of Contaminants – Persistent Organic Pollutants and Metals on Northern Water Quality*

Collaborative studies on contaminants in Arctic fish and on deposition of persistent organic pollutants (POPs) to Arctic glaciers continued to increase knowledge of sources and pathways of toxic chemicals in the high Arctic environments. In a multifaceted series of studies on mercury, researchers began assessment and predictive modeling of sources and pathways of mercury in the Arctic and an evaluation of the importance of anthropogenic versus natural sources and possible climate effects on the bioavailability of mercury and other metals in sediments.

- *Impacts of Agriculture on Water Quality – Prairies and Ontario*

New work began to study the sustainability of the application of sulfonylurea herbicides to prairie wetland landscapes. Wetlands are vulnerable aquatic ecosystems where the activity of microbial communities is vital to ecosystem function, nutrient cycling, carbon cycling, and energy flow. Wetlands are also interspersed among agricultural land where herbicides are regularly used. This study targeted the effects of sulfonylurea herbicides on the production, growth, and metabolism of planktonic and attached microbial communities in prairie wetlands.

Liquid hog manure is an important plant nutrient source. Working with the University of Saskatchewan, NWRI began a five-year study to investigate the persistence in liquid hog manure

and in soil of two antibiotics (spectinomycin and lincomycin) administered to hogs. Researchers assessed the potential for these antibiotics to be transported in surface runoff from manure-treated cropland and leaching/preferential flow to groundwater.

In ongoing research to control agrochemical pollution in Ontario, NWRI evaluated an integrated nutrient control system in the form of a constructed wetland with controlled drainage and assessed nutrient levels and fertilizer use efficiency in agricultural production areas.

- *Improving Water Quality – Water Wells and Groundwater*

Researchers began a cooperative research project with the Prairie Farm Rehabilitation Administration on water well protection and rejuvenation of existing water wells. The project focused on new and emerging issues in groundwater resources such as biofouling, best management practices (BMP), and contamination by nitrates, pesticides, and pathogens. A technique to mitigate or rehabilitate specific problems addressed by industry was also developed.

- *Impacts of Urbanization on Water – Great Lakes*

Researchers are developing innovative wastewater treatment technologies for the removal of ammonia and UV disinfection of municipal wastewater effluents. NWRI helped Great Lakes municipalities deal with combined sewer overflow (CSO) pollution by developing treatment manuals, assessing treatability and various treatment technologies, analyzing the performance of existing CSO facilities, and determining effective retrofits.

- *Taste and Odour in Drinking Water – Lake Ontario*

The periodic taste and odour problem of drinking water taken from Lake Ontario has caused thousands of complaints over the last decade. NWRI staff have formed a research consortium with the Ontario Ministry of the Environment, the Ontario Clean Water Agency, and area municipalities to determine the problem. Early results showed that the problem could be avoided by accessing very deep water in the lake. Spin-off work on the problem of attached algae has shown that elevated nutrients near

shore stimulate growth and that urban drainage and land runoff tend to concentrate near shore in the spring when the algal growth begins. This may indicate that more treatment and less fertilizer use may be needed for better near shore conditions.

- *Monitoring of Pharmaceuticals in the Great Lakes Basin*

NWRI successfully completed a large-scale program in the Thames River basin. The design incorporated concurrent sampling of 12 wastewater treatment plants on the Thames River and its tributaries, with surface water samples collected above and below each wastewater treatment plant. Sampling was carried out in October, November, and December 2002. Samples have been analyzed for their acidic pharmaceutical components and tests were ongoing.

- *Developing a Regional Cumulative Effects Assessment Framework*

NWRI researchers worked with partners to develop a conceptual framework and implementation software for conducting cumulative effects assessments in aquatic systems. The framework provided an ongoing and regional assessment of “accumulating” aquatic effects. Extensive aquatic data and evaluation benchmarks from multiple sources and jurisdictions were accessed for graphical display and download. Water quality data sets were evaluated using the Canadian Council of Ministers of the Environment Water Quality Index (CCME WQI) as a benchmark.

Results of the index calculations were displayed as “circles of water quality” on map layers. Biological data sets were also analyzed using a science-based, fully automated module where the data at “developed” sites were compared to reference sites and “effects”, as defined under the Environmental Effects Monitoring Program. In this way, accumulating effects were assessed by comparing data sets to their respective benchmarks.

- *Development of Ecological Effects Indicators for Rivers – Atlantic Region*

NWRI embarked on a national study, led from the Atlantic Region, to evaluate proposed and

alternative tools for environmental effects monitoring (EEM) and to provide a link between EEM programs and requirements for cumulative effects assessment. In addition, the CCME guidelines for dissolved oxygen were evaluated.

- *Leadership in Water Science and Policy*

In 2002–2003, NWRI took a leadership role in advancing Canadian water research and enhancing links between the water research community and water policy makers through two major initiatives. On behalf of CCME, NWRI organized a series of workshops on priority water quality issues for Canada: impacts of agricultural practices on water quality; groundwater quality; water reuse and recycling; wastewater treatment for small communities; and water quality monitoring. The initiative was designed to communicate results of new research and management practices to senior decision makers and stakeholders, and to provide a mechanism for scientists and water managers to provide expert input to Canadian water research programs.

The other major undertaking in this fiscal year was a scientific assessment of the threats to freshwater availability in Canada. Partnering with the Meteorological Service of Canada, NWRI organized a cross-Canada team of water quantity experts from government, universities, and industry to investigate priority threats to water. Each threat was assessed based on current scientific knowledge, trends, and information and program needs. Priority threats included urban development, dams, industrial and manufacturing demands, mining, agriculture, droughts, floods, and climate change. A report is expected to be published in early 2004.

- *Metal Toxicity and Aquatic Ecosystems – Quebec Region*

A comparison of population parameters and biomarkers of effects in soft-shell clams (*Mya arenaria*) exposed to direct sources of contamination in the Saguenay fjord and St. Lawrence estuary was conducted. Two contaminated sites and two control sites were used to evaluate the response of soft-shell clams to a series of biomarkers. The results show that soft-shell clam populations directly exposed to sources of contamination had very different population profiles and biomarkers than those from noncontaminated sites.

The bioavailability and uptake of heavy metals in urban wastewater receiving waters in the St. Lawrence River were studied by means of the exposure of mussels in cages. The distribution of certain metals (such as silver, cadmium, and chromium) in the tissue of the exposed mussels was a good indicator of the exposure pathways (comparison between the dissolved phase and the particulate phase). Bronchial tissue was generally the most affected by the bioaccumulation of metals.

- *A Biomonitoring Network to Protect Canadian Water Quality – Atlantic Region*

Researchers initiated research collaboration with Environment Canada–Atlantic Region and Atlantic Coastal Action Program (ACAP) community organizations to develop an Atlantic stream biomonitoring network. The benthic reference condition approach was used to monitor the health of aquatic ecosystems developed at NWRI and already used in British Columbia and Ontario.

2.2 St. Lawrence Centre

Background

The St. Lawrence Centre 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. In 2002–2003, the plan was reviewed and updated and a new program was introduced, focusing on the evaluation of urban wastes, the in-depth understanding of the biodiversity of the St. Lawrence River and pressures on it, and the long-term monitoring of the state of the river.

Progress (to March 31, 2003)

Ongoing and new research programs include the following activities.

Impacts of Water Level Fluctuations on River Biodiversity: The general objective was to further establish relationships between water level fluctuations of the St. Lawrence River (Lac Saint-Louis to Lac Saint-Pierre) and ecosystem components and critical uses. Indicators were selected to develop these water level–impact curves according to the following dimensions:

- Effects of area and distribution of wetlands along the St. Lawrence River (impact on wetlands diversity and abundance, especially Lac Saint-Pierre and Îles de Boucherville)
- Effects on different uses, including drinking water (impact on water intake services between Lac Saint-Louis and Lac Saint-Pierre) and recreational boating (impact on boat users, infrastructures and boat related tourism)
- Effects on migration duration and fish recruitment (impact on fish populations and communities)
- Effects on shoreline nesting birds and wetland birds (impact on shoreline bird habitats)
- Effects on the physical dynamics of the river, including erosion

Partial results came from this third year of a five-year plan of study according to an International Joint Commission mandate regarding evaluation and formulation of a new regulation plan for Lake Ontario and the St. Lawrence River. Projects were designed to evaluate water level variations in the lower St. Lawrence River on critical ecosystem components, such as wetlands and fish communities. Multi-year and site-specific data have been collected to ensure better correlation regarding water level conditions and seasonal patterns.

Other field data and analysis have completed previous research on contaminant transportation based on a mass-balance approach. Fish health studies have gone further with specific identification of fish parasite distribution and abundance.

State of the St. Lawrence River: The state of St. Lawrence activities were realized through a federal–provincial collaboration regarding the long-term monitoring of the St. Lawrence River system’s main environmental components. Activities in 2002–2003, included the following:

- Monitoring of contamination in Lac Saint-François (mercury and PCBs)
- Monitoring of St. Lawrence wetlands in terms of area and historic analysis of wetlands distribution and abundance

- Monitoring of water quality and toxics (e.g., heavy metals) in the St. Lawrence River
- Production of facts sheets on the monitoring of the state of the St. Lawrence in cooperation with Fisheries and Oceans Canada–Quebec Region, the Ministère de l'environnement du Québec, and the Société de la faune et des parcs du Québec
- On-line dissemination of new information on the St. Lawrence River through a new Web site (available at www.slv2000.qc.ca/plan_action/phase3/biodiversite/suivi_ecosysteme/accueil_a.htm)

Urban Pollution: Another program focused on the impacts of urban sewage on the ecosystem. In 2002–2003, new data were collected in collaboration with the Montréal Metropolitan Community, representing sewage effluent resulting from 2 million people living in urban areas on the following:

- Toxicological aspects of urban sewage effluents
- Impacts of urban sewage on fish and mollusks (sensitive components)
- Source, transport, and fate of endocrine-disrupting chemicals (new chemicals)
- Geochemical behaviour of metals in the plume of dispersion found in urban effluents (contaminants spatial distribution)

Long-Range Transport of Airborne Pollutants: Following a national mandate on air quality and the impacts of acidic components, a 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 was released in 2002–2003. An extended monitoring survey of water quality in approximately 40 lakes in Quebec and the assessment of acid deposition and its effects were also released.

Partnerships: Under a program on the impacts of water level fluctuations, research projects were undertaken with the Quebec provincial government (Société de la faune et des parcs du Québec), universities (Université de Montréal and Université du Québec à Montréal), and regional components of Environment Canada

(Meteorological Service of Canada and the Canadian Wildlife Service). Closer scientific cooperation also exists with Environment Canada–Ontario Region as part of the current review of the Lake Ontario and St. Lawrence River regulation plan.

With respect to biodiversity, many partnerships have been established in the various research areas with Quebec universities (McGill, Laval, Université de Montréal, Université du Québec à Montréal, and Université du Québec à Trois-Rivières).

The structure and diversity of the fish community at a reference site in the St. Lawrence River were analyzed in collaboration with the Parc Aquarium du Québec. Tagging studies were performed in order to describe the migratory movements and the spatial distribution of fish species within the St. Lawrence River corridor. An efficient anesthetic for use when tagging and examining fish was developed.

A model to assess the effects of pesticides on amphibian physiology was validated. This project studied the effects of pesticides on development, endocrine function, immune response, and parasitism in frogs. The project was funded by the Toxic Substances Research Initiative and involved partners from l'Institut national de recherche scientifique–Institut Armand Frappier and Concordia University.

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 included projects that were related to emerging environmental problems. This program was conducted 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 Société de la faune et des parcs du Québec).

Finally, it is important to mention the Collaborative Mercury Research Network (COMERN), which is funded by the National Research Council of Canada. COMERN's approximately 20 researchers take a multidisciplinary ecosystem approach to the impact of the presence of mercury in the environment. Meteorological Service of

Canada's integrated research station on air–water–soil exchanges at Baie Saint-François (Lac Saint-Pierre) is a key component of the network's mercury sampling programs.

2.3 Other Research Highlights

Environment Canada conducts many water-related investigations in addition to the research undertaken at the two major institutes. Interdisciplinary 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 the activities.

2.3.1 Atlantic Environmental Science Network—Freshwater and Estuarine Ecosystems

Background

Early in 2000, Environment Canada initiated the development of an Atlantic Environmental Science Network (AESN) in association with universities located in Atlantic Canada. Based on the successful model of the Atlantic Cooperative Wildlife Ecology Research Network, the broad focus of this research network is to increase environmental science capacity in the Atlantic Region. It is a partnership of universities, governments, industries, and nongovernmental organizations in Atlantic Canada and has a mission to facilitate excellence in cooperative and strategic environmental research, development, and training. It is a network of networks (thematic cooperatives) including environment and human health, climate change, watersheds, biodiversity, environmental engineering, and marine life.

Progress (to March 31, 2003)

AESN held a watershed workshop and panel discussion in Saint John, New Brunswick, in conjunction with the Canadian Water Network's "Connecting Water Resources 2003" symposium. It was an opportunity to determine the potential for a watershed collaborative initiative under the AESN umbrella.

2.3.2 Integrated Modelling of the St. Lawrence River

Background

Since 1997, the Hydrology Section of the Meteorological Service of Canada–Quebec Region (MSC–Quebec Region) has been working with partners on numerical modeling of the St. Lawrence River between Cornwall and Trois-Rivières. The models provide a better understanding of the physical and biotic environment of the river and how it is used. This work is part of an effort to understand the interactions that exist among the following.

- Pressures resulting from climate change and from natural and anthropogenic changes (e.g., export of freshwater and construction of port infrastructures). With the implementation of the Web site of Quebec's climate change impacts and adaptation resource centre (www.criacc.qc.ca) in 2000, it is possible to more closely monitor climate changes in Quebec, and more specifically in the St. Lawrence watershed.
- Physical characteristics of the river environment (e.g., flows, levels, currents, temperatures, substrates, and banks).
- Chemical characteristics of the water (e.g., turbidity, colour, and presence of pollutants).
- Life in the river environment, whether it be human (social, economic, or recreational use), plant (aquatic or emergent vegetation), or animal (aquatic and riparian wildlife).

In the context of this approach, the physical environment of the river is considered the focal point of exchanges within the ecosystem. The approach lends itself well to quantification of the impacts of fluctuating flow and water levels on the various ecosystem components in the St. Lawrence River.

In its research and development of the St. Lawrence River ecosystem, the Hydrology Section of MSC–Quebec Region collaborates with several organizations, including the Société de la faune et des parcs du Québec, the Direction du milieu hydrique du Ministère de l'environnement du Québec, the regional branches of Environment Canada (Conservation Branch, Canadian Wildlife Service, St. Lawrence Centre), the Canadian Coast Guard (Laurentian

Region), universities (Université du Québec à Trois-Rivières, Institut national de la recherche scientifique – Eau et École Polytechnique) and the International Joint Commission.

Progress (to March 31, 2003)

In 2002–2003, the initial results of the simulation were made available for certain sectors of the St. Lawrence River.

2.3.3 Climate Change, Impacts, and Adaptation

In 2002–2003, the St. Lawrence Centre, in cooperation with the Meteorological Service of Canada, the Chair of Urban Ecosystem studies (Université du Québec à Montréal), and two ZIP (Zone d'intervention prioritaire [priority intervention zone]) committees, began a two-year study on the integrated evaluation of climate change impacts at the local scale (Lac Saint-Louis).

Examples of integrated modeling activities carried out include the following:

- Modeling of the habitats of several fish species
- Hydrodynamic modeling of Lac Saint-Louis
- Quantification of the impacts of fluctuating flow and water levels in the St. Lawrence River on certain aspects of recreational boating
- Two-dimensional modeling of river temperatures
- Modeling of the various water masses in the St. Lawrence River
- Modeling of bank erosion along the St. Lawrence River
- First scenarios of climate change impacts on pleasure boating

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

Background / Progress (to March 31, 2003)

1. Freshwater Website

The public education program continued to expand its presence on the Internet. The Freshwater Website, part of Environment Canada's Green Lane since 1996, was overhauled to comply with Government of Canada standards and guidelines for Common Look and Feel. The objective of the site remained the same. It still provides basic information on a wide range of water-related topics, comprehensive educational materials (e.g., A Primer on Fresh Water and Water Fact Sheets), and the full text of key water publications (e.g., Federal Water Policy, *Canada Water Act*, and the *Canada Water Act* Annual Report). In addition, the links to specific issues at other governmental and nongovernmental sites across the country continue to be regularly updated and expanded. The Freshwater Website can be accessed at www.ec.gc.ca/water.

2. International Forums and Conferences

A number of significant international forums and conferences took place 2002–2003. Employees from various federal government departments staffed the Canadian booth at the WaterDome – a venue at the World Summit on Sustainable Development, which took place in Johannesburg, South Africa, from August 26 to September 4, 2002. A video entitled “Water for One World and One Family / De l'eau pour une planète, une famille” and a CD-ROM containing information on many of the water-related programs in Canada were prepared for viewing at the booth.

In March 2003, a Canadian delegation attended the 3rd World Water Forum in Kyoto, Japan. In connection with the Forum, a publication entitled *Water and Canada: Preserving a Legacy for People and the Environment* was prepared. It examines Canada's approach to water resource management. Information on the Forum, as well as this publication, can be found on the Freshwater Website at www.ec.gc.ca/water/en/info/events/e_wwf3.htm.

3. Environment Canada's Biosphère

Environment Canada's Biosphère, a museum of water dedicated to the St. Lawrence River and the Great Lakes, opened in 1995. A privileged meeting place where people are invited to discover and understand water, the Biosphère heightens public awareness of its importance and the necessity to protect it. The thematic exhibitions make the Biosphère an educational and entertaining place for the entire family to better learn about the great aquatic ecosystems and the major water issues. It is recognized for its innovative approach to sharing scientific knowledge with the aim of raising public awareness of the environmental issues associated with water and sustainable development.

Through its many educational activities and exhibits, the Biosphère seeks to promote responsible behaviour in the general public, particularly young people. In this sense, it is contributing to the creation of a pool of informed citizens by ensuring that sustainable development is taken into account in their day-to-day activities.

Located in Montréal, the Biosphère receives 75,000 visitors every year, including 20,000 young people on school trips. Another 6,000 young people participate in its off-site environmental education programs. The water level exhibits presented this year provided youngsters and the general public with an understanding of the sensitivities in the St. Lawrence–Great Lakes ecosystem. For example, through computer terminals and interactive games, videos, photographs, measuring instruments, a broadcast studio, a giant-screen quiz, models, and game experiments, visitors were able to gain a better understanding of the causes and impacts of water level variations in Canada.

APPENDIX A

AGREEMENTS

The following *Canada Water Act* Agreements¹ were ongoing during 2002–2003:

Apportionment and Monitoring Programs

- Agreements on water quantity surveys with all provinces and with Indian and Northern Affairs Canada for Yukon and 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 Northwest Territories

- Agreement Respecting Ottawa River Basin Regulation

Water Management Programs

- Mackenzie River Basin Transboundary Waters Master Agreement

Flood Damage Reduction Program

- Agreement on policies in designated flood-risk areas with British Columbia

¹ For which *Canada Water Act* authority exists (in most cases, by Order in Council).

APPENDIX B

FOR MORE INFORMATION

Selected Web Sites

Environment Canada

Freshwater (including *Canada Water Act* annual reports)
www.ec.gc.ca/water/e_main.html

Clean Water
www.ec.gc.ca/water_e.html

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

Research Institutes

National Water Research Institute
www.nwri.ca/nwri-e.html

St. Lawrence Centre
www.qc.ec.gc.ca/csl/acc/csl001_e.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/index_e.htm

Great Lakes 2000 Program
www.on.ec.gc.ca/water/greatlakes/intro-e.html

Northern Ecosystem Initiative
www.pnr-rpn.ec.gc.ca/nature/ecosystems/nei-ien/dh00s00.en.html

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

St. Lawrence Water Quality Monitoring (toxics, bacteria, nutrients)
www.slv2000.qc.ca/index_a.htm

Climate Monitoring in Quebec
www.criacc.qc.ca/index_e.html

Other Federal Departments

Agriculture and Agri-Food Canada
www.agr.gc.ca/index_e.phtml

Fisheries and Oceans Canada
www.dfo-mpo.gc.ca/home-accueil_e.htm

Health Canada
www.hc-sc.gc.ca/english/index.html

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

Natural Resources Canada
www.nrcan-rncan.gc.ca/inter/index_e.html

Federal-Provincial

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

Interprovincial River Boards

Mackenzie River Basin Boards
www.MRBB.ca

Ottawa River Regulation Planning Board
www.ottawariver.ca/emain.htm

Prairie Provinces Water Board
www.pnr-rpn.ec.gc.ca/water/a01/index.en.html

International

Arctic Council
www.arctic-council.org

International Joint Commission
www.ijc.org/en/home/main_accueil.htm

United Nations Environment Programme:
GEMS/Water Global Environment Monitoring
System www.gemswater.org

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/home_e.asp

Ecological Monitoring and Assessment Network
(EMAN)
www.eman-rese.ca/eman

Federation of Canadian Municipalities
www.fcm.ca/newfcm/Java/frame.htm

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

Inquiries

General Information

Watershed Management and Governance
Branch
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
Tel.: 819-997-2800
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

Boundary 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
201–401 Burrard Street
Vancouver, BC V6C 3S5
Tel.: 604-664-9100
Fax: 604- 664-9126

St. Lawrence Centre
Environmental Conservation Branch
Environment Canada
Quebec Region
105 McGill Street, 7th Floor
Montréal, 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

Canada Water Act Annual Report

Comments

Thank you for reading the *Canada Water Act* 2002–2003 Annual Report. While Environment Canada is legislatively required to report annually on operations under the *Canada Water Act*, we endeavour to publish a report that is both informative and useful to a variety of audiences. Your feedback is appreciated, and your opinions provided below will help shape future annual reporting under the *Canada Water Act*.

Please rate the report on the following:

	Excellent	Good	Satisfactory	Unsatisfactory	Suggestions for Improvement
Clarity					
Level of Detail					
Usefulness of Information					
Format					
Overall Presentation					

In what capacity did you read the report?

- Environmental Manager
- Government/Regulatory Authority
- Employee of a Research/Educational Facility
- Representative of an Environmental NGO/NPO
- Member of the Press
- Student
- Other (please specify) _____

Comments and Suggestions:

Send to:

Sustainable Water Management Division
 Environment Canada
 Place Vincent Massey, 7th Floor
 351 St-Joseph Boulevard
 Gatineau, QC K1A 0H3
 Fax: 819-994-0237