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# The Canada Water Act

## Annual Report

1982-83

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# The Canada Water Act

Annual Report

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Cat. No. En 36-426/1983

ISBN 0-662-52712-7



Minister  
Environment Canada

Ottawa, Canada  
K1A 0H3

Ministre  
Environnement Canada

Ottawa, Canada  
K1A 0H3

His Excellency  
The Right Honourable Edward Schreyer  
Governor General and Commander-in-Chief of Canada

May it Please Your Excellency:

I have the honour herewith, for the information of Your Excellency and the Parliament of Canada, to present the Annual Report on the Canada Water Act for the fiscal year ended March 31, 1983.

Respectfully submitted,

Charles Caccia



Deputy Minister  
Environment Canada

Sous-ministre  
Environnement Canada

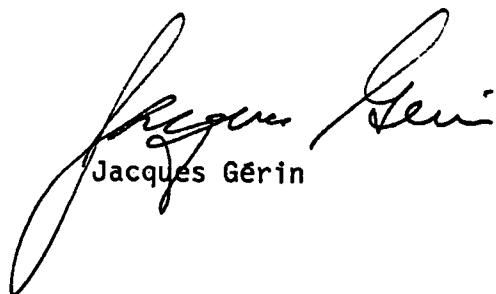
Ottawa, Canada  
K1A 0H3

The Honourable Charles Caccia  
Minister of the Environment  
Ottawa, Canada

Sir:

I have the honour to submit the Annual Report on the  
Canada Water Act for the fiscal year ended March 31, 1983.

Respectfully submitted,



Jacques Gérin

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## INTRODUCTION

The Canada Water Act, proclaimed on September 30, 1970, provides the framework for joint federal-provincial management of Canada's Water resources. Section 36 of the act requires that a report on operations under the Act be laid before Parliament as soon as possible after the end of the each fiscal year. This, the eleventh annual report, covers operations to March 31, 1983.

Up to and including fiscal year 1975-76, Canada Water Act funding was provided on the basis of individual projects. In fiscal year 1976-77, Treasury Board established a ceiling on expenditures cost-shared with the provinces (for river basin planning and implementation, and flood damage reduction) at about an \$18 million per year level. Subsequently, budget reductions and consequent adjustments to the program have lowered the ceiling for recent years to about \$11.8 million for federal-provincial agreements under the Canada Water Act. This is in addition to funding provided in regular departmental budgets for data collection and research programs.

Over the past five years water management programs have been evaluated or assessed in accordance with guidelines established by the Office of the Comptroller General and other central agencies. Program evaluations or similar studies have been completed for programs that account for more than 50% of the resource expenditures. Based on the recommendations given in those reports, action plans have been proposed that will improve the effectiveness of the programs. As part of these plans, 350 data collection platforms are to be installed at remote hydrometric stations, and additional computer facilities are now being used to improve data processing and interpretation, with the objective of providing more timely information required for effective water resource management.

## PROVISIONS OF THE CANADA WATER ACT

Part I of the Act provides for the establishment of federal-provincial consultative arrangements for water resource matters (Section 3); and for cooperative agreements with the provinces for the development and implementation of plans for the management of water resources (Section 4 - 7). This part also enables the Minister, directly, or in cooperation with any provincial government, institution, or person, to conduct research, collect data, and establish inventories associated with the water resources.

Part II envisages federal-provincial management where water quality has become a matter of urgent national concern. This part permits the establishment of joint federal-provincial incorporated agencies (although existing federal and provincial corporations might alternatively be used) to plan and implement approved water quality management programs.

Part III of the Act provides for regulations banning the manufacture or import for use or sale in Canada of any cleaning agent or water conditioner that contains a nutrient in a greater concentration than that prescribed by regulations. This is one of the principal means of reducing the rate of eutrophication of water bodies.

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



## ACTIVITIES UNDER THE CANADA WATER ACT

### PART I: Comprehensive Water Resource Management

#### Federal-Provincial Cooperation

The Canada Water Act calls for joint consultation between the federal and provincial governments in matters related to water resources. Discussed briefly in the following are joint programs under the national Flood Damage Reduction Program as well as other projects involving the regulation, apportionment, monitoring or survey of water resources, and the preplanning, planning or implementation of Water Management Programs.

Agreements for specific water programs provide for the participating governments to contribute funding, information, and expertise in agreed ratios. For ongoing activities such as the water quantity survey agreements with each province, cost sharing is in accordance with each party's need for the data. For study and planning agreements, it is usual for the federal government to meet half the costs and the provincial government(s) the other half. The planning studies encompass interprovincial, international or other basins where federal interests are important. Cost sharing for implementation is in proportion to federal and provincial responsibilities and often includes a contribution from local governments.

#### Interdepartmental Committee on Water

The Interdepartmental Committee on Water (ICW) was established before the Canada Water Act was passed to allow for interdepartmental consideration and approval of all federal water programs. Since then, ICW has actively pursued its mandate and, over the year to March 31, 1983, met three times.

A total of 20 departments and agencies with an interest in water matters, are represented on this 26-member committee. Subcommittees and Working Groups are set up as required. Currently there are four subcommittees, whose responsibilities are 1) the Canada-U.S. Great Lakes Water Quality Agreement, 2) water quality, 3) floods, and 4) to prepare responses to IJC reports. Working Groups were set up to undertake a preliminary overview of containerized water export, and to refine the federal water strategy paper.

Issues or subjects of interest brought to the attention of ICW over the past year included: mercury in northern Manitoba; regulation of the Ottawa River; the Canada-Ontario Agreement on Great Lakes Water Quality; water management issues at Sault Ste. Marie; ring dyking on the Red River; a control structure on the Mille Iles River; the Mackenzie River basin study report; a resource inventory agreement between Canada and New Brunswick on environmentally compatible hydroelectricity; water quality in the Ottawa River; an evaluation report on river basin planning and implementation activities; the National Research Council's Associate Committee on Hydrology; the World Meteorological Organization's Hydrological Operational Multipurpose Sub-Program; Energy, Mines and Resources' Remote Community Demonstration Program; federal-provincial water quality agreements; a PFRA proposal on immediate water initiatives; prairie soil and

water conservation; the Fraser River management plan; the federal water strategy; the Archipel project; water export; the federal government's response to the first IJC biennial report under the Canada-U.S. Great Lakes Water Quality Agreement of 1978; the Liard River hydro development; the Canadian Climate Program; acid rain negotiations; the national Flood Damage Reduction Program; amendments to the Northern Inland Waters Act; Heritage Rivers; flood control works for the St. Charles and du Berger Rivers; and the State of the Environment report.

#### Federal-Provincial Water Resource Management Programs

Table 1 shows a breakdown of current cost-shared federal-provincial water management programs and indicates the stage each has reached. Each of the programs is referred to briefly in the following few pages and described in more detail later in this report. Table 2 is a record of the achievements under the Act since its inception in 1970.

REGULATION, APPORTIONMENT, MONITORING AND SURVEY PROGRAMS: Although most federal-provincial agreements carry a time limit within which the objectives of the agreement are likely to be reached, there are some agreements involving monitoring and survey responsibilities which are projected to continue into the foreseeable future without termination. Two new programs associated with regulating flows and monitoring water quality in the Ottawa River were initiated in 1982-83 by Canada, Quebec and Ontario. A national program, designed to coordinate both federal and provincial water quality surveys, has come under discussion between federal and provincial officials.

The federal government has been involved in the collection of water quantity data since the late 1800s. In earlier years, hydrometric networks were operated under informal arrangements with all provinces except Quebec. The 1922 agreement with Quebec was rescinded in 1964 when the Quebec government took responsibility for most of the hydrometric network in that province. Beginning in April 1975, uniform cost-sharing Water Quantity Survey Agreements were implemented with all provinces and with the Department of Indian and Northern Affairs for the territories. It is recognized that water quantity data are essential to water management and, since the costs of collecting water data are substantial, the efficiency of data collection programs is enhanced significantly by combining networks and standardizing methodology. These agreements recognize that water quantity data may be collected to meet federal needs, provincial needs, or a combination of needs. Hence funding for the operation of the networks is provided according to each party's needs. The water quantity networks and cost-sharing data are determined annually by Federal-Provincial Coordinating Committees. Also, a national meeting of all Federal-Provincial Coordinating Committees is convened regularly to review annual progress reports and to discuss any concerns arising under the Agreements. During the year, a total of 2803 gauging stations were operated under the

TABLE 1 - STATUS OF FEDERAL AND FEDERAL-PROVINCIAL WATER MANAGEMENT PROGRAMS

REGULATION, APPORTIONMENT, MONITORING AND SURVEY PROGRAMS

<u>Under Negotiation</u>	<u>New During 1982-83</u>	<u>Ongoing During 1982-83</u>
Water Quality Surveys	Ottawa River Regulation Planning Board Ottawa River Water Quality Coordinating Committee	Water Quantity Surveys Prairie Provinces Water Board Mackenzie River Basin Committee Water Quality Monitoring- Garrison Diversion North Shore (St. Lawrence) Ecological Inventories Lake of the Woods Control Board

WATER MANAGEMENT PROGRAMS

<u>Under Negotiation</u>	<u>New During 1982-83</u>	<u>Ongoing During 1982-83</u>
	Mercury in Churchill River Diversion System	Winter Basin Preplanning Fraser Estuary Planning Wabigoon-English Mercury Contamination Study Waterford Basin Planning  Okanagan Basin Implementation Qu'Appelle Basin Implementation Lower Fraser Valley Flood Control Canada-Ontario Agreement on Great Lakes Water Quality Souris Basin Implementation

FLOOD DAMAGE REDUCTION PROGRAM

<u>Under Negotiation</u>	<u>New During 1982-83</u>	<u>Ongoing During 1982-83</u>
Initial Agreements with Alberta, British Columbia and Yukon Territory Amending Agreements with Quebec, Saskatchewan, Nova Scotia and Newfoundland Mille Iles Control Structure	Upgrading Ring Dykes, Red River Valley	Flood Works and Dykes, Montreal Region Initial Agreements with New Brunswick, Newfoundland, Nova Scotia, Saskatchewan, Manitoba and the Northwest Territories Amending Agreements with Manitoba and New Brunswick Flood Management-Marsh Creek

TABLE 2 - PROGRAMS OR STUDIES COMPLETED UNDER THE CANADA WATER ACT

Peace-Athabasca Delta Planning	1972
Qu'Appelle River Basin Planning	1972
Saskatchewan-Nelson Basin Planning	1973
Okanagan Basin Planning	1974
Saint John Basin Planning	1975
Lake Winnipeg, Churchill and Nelson Rivers Planning	1975
Great Lakes Shore Damage Survey	1975
Fraser River Upstream Storage Planning	1976
Churchill River Basin Planning (Sask.-Man.)	1976
Montreal Region Flow Regulation Planning Study	1976
Peace-Athabasca Delta Implementation	1976
Northern Ontario Water Resources Planning	1978
Southeastern New Brunswick Dyking Implementation	1978
St. Lawrence Water Quality Planning Study	1978
Souris Basin Planning	1978
Metropolitan Toronto Flood Control Implementation	1978
Lower Saskatchewan Basin Preplanning	1979
Southwestern Ontario Dyking Implementation	1979
Upper Thames Flood Control Implementation	1979
Yukon Basin Preplanning	1979
Ottawa River Regulation Planning Report	1980
Thompson Basin Preplanning	1981
Great Lakes Shore Damage Survey Implementation	1981
Dykes and Flow Regulation Works - Montreal Region	1981
Mackenzie Basin Planning	1982
Shubenacadie-Stewiacke Basin Planning	1982
Ottawa River Water Quality Report	1982
Okanagan Basin Implementation	1982
Prairie Provinces Water Board's Water Demand Study	1983

Agreements in Canada, 2575 by the federal government and 228 by the Province of Quebec. In addition, there were some 783 stations operated mainly by other provincial agencies that contributed data to the national water data bank - HYDAT. Under the terms of the Agreements, Canada is responsible for maintaining the computer data base - HYDAT and for publishing the data. All hydrometric data are provided free of charge upon request.

The federal and provincial governments also operate networks for the monitoring of water quality. In March 1982, in response to requests from some provinces, the federal cabinet approved a new program providing for federal-provincial cost sharing agreements for water quality monitoring networks. Over the next few years, Environment Canada will be negotiating water quality monitoring agreements with interested provinces to provide for sharing of costs, exchange of data and a Canada-wide quality control program. Negotiations with Quebec were almost complete and discussions with Alberta were initiated. The agreements are expected to be modelled after the hydrometric agreements, with financing being provided by each government in proportion to its data needs. By 1986-87, if all provinces join the program, the new network is expected to incorporate 450 existing stations of federal interest, upwards of 2000 existing stations of provincial interest, and about 180 new stations of joint interest. These numbers exclude Great Lakes water quality stations which are administered under other agreements.

The Prairie Provinces Water Board, a federal-provincial board which administers the Prairie Provinces Master Agreement on Apportionment, continued to provide recommendations to Canada, Alberta, Saskatchewan, and Manitoba concerning the equitable apportionment of interprovincial prairie rivers flowing eastward. During the year, the Board's Committees on Hydrology, Water Quality and Groundwater continued to recommend procedures for natural flow determination, and streamflow forecasting and apportionment for specific sites and proposed projects. The Board also has approved the report on Administration of the Apportionment Agreement and the report concerning the apportionment to be implemented at the Alberta-Saskatchewan boundary on Battle, Lodge and Middle Creeks. It is now working towards an improved methodology to use in establishing site-specific water quality requirements at the eleven interprovincial boundaries where the quality of water is monitored on a continuing basis. A four-year study of historic and current water demands in the three prairie provinces was completed in January, 1983 and the report was jointly released by the five cooperating ministers on February 10, 1983.

The Mackenzie River Basin Committee, with representation from Canada, Alberta, Saskatchewan, British Columbia and Yukon and Northwest Territories met three times during the year to fulfil its liaison responsibilities and to consider study designs and budgets associated with future implementation, as recommended in its basin study report released in February 1982.

The Ottawa River Regulation Planning Board was formally established in March 1983 with the signing of a Canada-Quebec-Ontario agreement. The Board, which will administer the agreement, has a mandate to plan and recommend criteria for regulating the Ottawa River, taking into account hydro-power production, flood protection, navigation, low water problems, water quality needs and recreation.

The Ottawa River Water Quality Coordinating Committee was established early in 1983 to be responsible for reviewing data needs and for coordinating data collection through a joint monitoring program. The setting up of the Coordinating Committee was recommended by the Canada-Quebec-Ontario Technical Working Group on Water Quality in the Ottawa River, whose report was released in October 1982.

Water quality monitoring stations related to the Garrison Diversion Project continued to operate until July 1982 to provide baseline water quality conditions for the Souris River where it crosses the International Boundary in both Saskatchewan and Manitoba. The decision to start up the monitors again will be made following evaluation of the data already collected.

Work continued on the Canada-Quebec ecological inventories program, initiated in 1978-79 on rivers flowing into the St. Lawrence River and Gulf from its north shore. This program, which covers rivers located to the east of the Manicouagan River basin up to and including the Brador River, is intended to facilitate future assessments of ecological impacts from major developments and is complemented by DREE supported studies of the Labrador portion of the river systems.

The Lake of the Woods Control Board continued to regulate certain waterways in the Winnipeg River basin so as to balance the requirements of the various and sometimes conflicting interests that depend upon the water in the basin. The Board was established under the Lake of the Woods Control Board Act, well before the Canada Water Act was passed, and is described here only to complete the picture on federal-provincial water management in Canada. During 1982, it published and distributed a brochure on managing the water resources of the Winnipeg River Drainage basin, and moved in the direction of computerizing its current methodologies and introducing new mathematical modelling activities to assist it in its deliberations.

#### WATER MANAGEMENT PROGRAMS

Depending upon the nature of the work being conducted, water management programs can fall within any of the three stages - preplanning studies, planning studies or implementation activities. During 1982-83, several water management programs were continued, one new program was initiated under a Canada-Manitoba planning agreement to study the problem of mercury in the Churchill River Diversion system, the Canada-British Columbia Okanagan implementation program was completed and the implementation commitment by Canada and Ontario to clean up the Great Lakes basin in Canada was renewed.

Preplanning Studies: Preplanning studies normally arise as a result of public representation to resolve one or more problems which are perceived at the local level. The preplanning study has become the vehicle with which to investigate the concerns expressed, and also to examine briefly all of the emerging and potential opportunities and problems of the area in question and to make recommendations as to the desirability of a longer-term planning study.

A preplanning study of the Winter River basin (Prince Edward Island) has been undertaken since 1977 to determine the reliability of the existing water supply system in Charlottetown, Prince Edward Island. This phase has been completed and a proposal for a \$250,000 planning study has been developed. Funding is being sought from federal, provincial and local agencies.

Planning Studies: Planning studies generally are directed towards the development or management of the water resources for the social betterment and economic growth of the basin or area under study. The study of mercury contamination in the Churchill-Nelson diversion system, discussed below, was the only new study initiated during the year.

A Canada-B.C. Fraser River Estuary Agreement for the development of a Management Plan for the Estuary was completed in March 1982. A review of the proposed management plan was carried out in 1982-83 to determine an implementation strategy.

In Yukon Territory, program activities were ongoing in the Yukon River basin under the 3-year, \$2.2 million Canada-British Columbia-Yukon planning agreement which was signed on November 24, 1980. Joint studies are being conducted that should lead to the formulation of a planning framework under which development alternatives in the basin can be evaluated. The Yukon River Basin Committee is in the process of seeking to extend the Agreement to September 30, 1984, without change in funding, in order to complete the studies under way and prepare reports on the completed studies.

In northwestern Ontario, field studies to assess the viability of methods to deal with the problem of mercury in waters and sediments of the English-Wabigoon River system were completed. Preparation of the final report has been seriously delayed but is now scheduled for completion late in 1983.

An exchange of correspondence confirmed the start of a Canada-Newfoundland urban hydrology study in the Waterford River basin of Newfoundland early in 1980-81. Federal input is in the form of work sharing. Steering and Technical Committees have been formed to administer the projects, and field and office work in several project areas is now well advanced.

Canada, Manitoba, Manitoba Hydro and the Northern Flood Committee signed the Northern Flood Agreement in 1977-78 that commits Canada and Manitoba to joint action for a Canada-Manitoba Lake Winnipeg, Churchill and Nelson Rivers Implementation Program and calls for annual reporting to northern communities on progress made. An order was issued following arbitration proceedings initiated by the Northern Flood Committee in

1981 that obliged Canada and Manitoba to implement appropriate studies of mercury contamination in the diversion system. This resulted in the signing of a Canada-Manitoba study agreement on March 10, 1983, committing the two governments to a joint scientific study of mercury in the waters of the Churchill River diversion system. The program is expected to continue through 1986 and its cost of \$760,000 will be shared equally by the two governments.

Implementation Programs: Although there were no major implementation programs initiated during the year under the Canada Water Act, the Canada-Ontario Great Lakes Water Quality Agreement was renewed and extended to March 1985 while implementation in the Okanagan basin was brought to completion.

The Qu'Appelle and Okanagan Implementation Programs were ongoing during the year to implement recommendations arising from comprehensive basin studies. For the Canada-Saskatchewan Qu'Appelle Implementation Program, scheduled to run from 1975 until March 1984, projects essentially completed include flood control works for Regina, Lumsden, Tantallon and Moose Jaw, Phase I of the Regina tertiary sewage treatment plant and the Land Use Planning and Development Controls Program. The Canada-British Columbia Okanagan Implementation Program, was completed in September 1982 and the Implementation Board issued a report containing 25 recommendations for ongoing management of water resources in the basin.

The Canada-British Columbia construction program, designed to reduce damages due to floods in the lower Fraser Valley of British Columbia, continued during the year. Some \$97 million of a total joint commitment of \$120 million was spent up to the end of December 1982.

A renewed Canada-Ontario Agreement on Great Lakes Water Quality, retroactive to April 1, 1982, and extending to March 31, 1985, was signed on July 12, 1982. The new agreement provides for the cost-sharing of research, surveillance and information activities and reflects the commitments undertaken by Canada in the 1978 Canada-U.S. Great Lakes Water Quality Agreement. It also re-emphasizes the cooperative phosphorus control and Great Lakes surveillance programs and, in accordance with the 1978 agreement, outlines programs for dealing with toxic substances and hazardous materials in the Great Lakes. The annual federal contribution to cost-shared programs continued at a maximum annual rate of \$1.2 million. To meet federal responsibilities under the 1978 Canada-U.S. Agreement, Canada also is making \$65 million available to the province for the period 1982-1985 to assist in the completion of municipal sewage treatment facilities in the Great Lakes region.

Implementation of a majority of the recommendations arising from the Souris River basin study is being undertaken under existing federal programs, provincial programs and federal-provincial agreements. In particular, a number of the recommendations associated with water supply and flood damage reduction are included in



the Canada-Saskatchewan DREE Interim Subsidiary Agreements on Water. These agreements were extended in 1981-82 for an additional two years to March 31, 1984.

**FLOOD DAMAGE REDUCTION PROGRAM:** During 1982-83, this program was actively supported throughout most of Canada.

**OBJECTIVE:** The Flood Damage Reduction Program follows the cooperative federal-provincial approach of the Canada Water Act. Its overall aim is to reduce flood damages by identifying flood risk areas and discouraging further flood vulnerable developments in those areas.

When joining the program, the provinces sign a General Agreement and a Mapping Agreement (or a combined agreement). The General Agreement outlines the basic approach that will be taken to reduce flood damages. The respective governments, and their agencies, agree not to engage in, or provide assistance to undertakings vulnerable to flood damage in areas designated as flood risk areas. In such areas, federal disaster assistance will be restricted to structures built before designation and, in some circumstances, new structures which are flood proofed. Zoning on the basis of the flood risk is encouraged.

The Mapping Agreement provides for the flood risk mapping and designation of the areas to which the policies in the General Agreement will apply. Forming part of this agreement is a list of communities in the province which are to be mapped and specifications to be followed in conducting the hydrotechnical and mapping work. When maps not meeting these specifications are available, interim designation may be applied until such time as new maps are prepared. This agreement also requires that information pertaining to the designated area be made available to governments, zoning authorities, the public and anyone contemplating development in or near these areas. Designations to March 31, 1983 are listed in Table 3.

In some cases existing developments in designated areas will still require protection against flood damages and, for this reason, further agreements to study such problems can also be negotiated with the provinces. Where benefits exceed costs and where there is a national interest, federal-provincial agreements may subsequently be reached on implementation action. This action could include flood forecasting and warning, flood proofing, works to control flows and levels, acquisition of property, easements or land use planning. It should be noted that, in examining alternatives, the best choice will be made on the basis of effectiveness, cost, associated benefits and environmental impact. This could mean allowing some flooding to occur.

**DURATION:** From its beginning, the program was expected to be active for ten years, but an Amending Agreement in 1980-81 extended the General Agreement with Manitoba beyond the ten-year period. Similar extensions occurred in 1981-82 with the signing of an Amending

TABLE 3 - DESIGNATIONS UNDER THE FLOOD DAMAGE REDUCTION PROGRAM

<u>LOCATION</u>	<u>NUMBER OF COMMUNITIES MAPPED</u>	<u>NUMBER OF PUBLIC INFO. MAPS</u>	<u>POPULATION<sup>1</sup></u>	<u>DATE OF DESIGNATION</u>
<u>NEW BRUNSWICK</u>				
Fredericton*	10	1	65 000	Feb. 80
Perth/Andover	2	1	2 000	Feb. 80
Oromocto to Lower Jemseg*	16	1	15 000	Mar. 81
Lower Fredericton to Lincoln*	3	1	3 000	Feb. 82
Sussex*	15	1	5 000	Sept. 82
Keswick*	5	1	1 100	Mar. 83
6 Designations	51	6	91 100	
<u>QUEBEC*</u>				
Montréal Region	38	22	1 850 000	May 78
Chaudière Basin	19	8	50 000	Mar. 79
Gatineau/Ottawa Rivers	22	15	187 000	Oct. 79
Upper Richelieu River	19	11	69 500	Apr. 80
du Gouffre	4	2	9 000	Apr. 80
Lower Richelieu River	23	10	112 000	Nov. 81
Rivière L'Assomption	12	4	90 500	May 82
Rivière Saint-François	14	6	118 000	Oct. 82
8 Designations	151	78	2 486 000	
<u>ONTARIO</u>				
White River	1	1	1 000	Aug. 82
Toronto*	24	8	3 000 000	Dec. 82
Sturgeon River/Lake Nipissing/ French River	9	5	63 000	Mar. 83
3 Designations	34	14	3 064 000	
<u>MANITOBA</u>				
Melita	1	1	1 200	Dec. 79
Wawanesa	1	1	500	Dec. 79
Winnipeg	1	1	578 000	Feb. 80
Souris	1	1	1 700	Oct. 80
Elie	1	1	350	Nov. 80
Brandon	1	1	36 000	Mar. 82
La Salle	1	1	145	Nov. 82
Sanford	1	1	145	Nov. 82
Starbuck	1	1	260	Nov. 82
9 Designations	9	9	618 300	
<u>SASKATCHEWAN</u>				
Estevan	1	1	9 200	Aug. 80
Oxbow	1	1	1 200	Aug. 80
Roche Percée	1	1	150	Aug. 80
Moose Jaw	1	1	34 000	Oct. 81
4 Designations	4	4	44 550	
30 Designations	249	111	6 303 900	

\* These designations are on a regional or river basin basis and cover a number of municipalities or parts of municipalities.

1. Figures are approximate and based on 1981 Census data.

Agreement with New Brunswick and in 1982-83 with the signing of an Amending Agreement with Ontario. Negotiations with other provinces for similar extensions are discussed in following sections.

**PARTICIPANTS AND FUNDING:** Canada and the provinces share the costs (see Table 4).

**RELATED AGREEMENTS:** Several ongoing studies and implementation agreements dealing with flood prone areas in Canada were in force when the Flood Damage Reduction Program was launched. These include two agreements described elsewhere in this report under the titles: Lower Fraser Valley Flood Control Program and Qu'Appelle Basin.

## REPORT ON PROGRESS

### Newfoundland

Newfoundland joined the FDR Program in May 1981 with the signing of General and Mapping Agreements. The General Agreement, with a duration of 10 years, binds both parties to the basic approach and policies of the Flood Damage Reduction Program. The Mapping Agreement provides \$350 000 (equally shared) to map two flood prone areas (Steady Brook and Stephenville). A Steering Committee and Technical Committee were appointed and work got under way to implement these Agreements.

An Agreement to amend the General and Mapping Agreements, and a new Studies Agreement, have received federal and provincial approval but were not formally signed before March 31, 1983. The Amending Agreement extends the General Agreement by 2 years to 1993, changes the status of the pilot Mapping Agreement to that of a regular agreement, extends the Mapping Agreement by 5 years to 1988, increases total funding of the Mapping Agreement to \$1 470 000 (equally shared) and adds nine new areas to Schedule A. The new Studies Agreement will have total funding of \$480 000 (to be shared equally) and a duration of five years.

Flood risk mapping is under way in the Stephenville and Steady Brook areas.

### Nova Scotia

Negotiations are taking place with the province towards extending the Agreement. At the official's level, the province has indicated interest in studies and the implementation of remedial measures but not in mapping nor designation. Clarification of this position is being sought.

Flood risk mapping of several areas in Nova Scotia continued in 1982-83. Working maps for the Bedford-Sackville River flood plain and for the Stellarton-New Glasgow area have been completed. Preparation of working maps for the Truro and Antigonish areas is ongoing. Also under preparation is a remedial measures study for Mill Brook.

TABLE 4 - FEDERAL-PROVINCIAL FLOOD DAMAGE REDUCTION AGREEMENTS  
March 31, 1983

	<u>Duration</u> <u>(years)</u>	<u>Total Cost*</u> <u>(dollars)</u>	<u>Expiry</u> <u>Date</u>
<b>NEWFOUNDLAND</b>			
General Agreement	10	-	1991
Flood Risk Mapping Agreement	2	350 000	1983
<b>NEW BRUNSWICK</b>			
Amending Agreement	-	-	-
General Agreement	15	-	1991
Flood Risk Mapping Agreement	10	2 000 000	1986
Studies Agreement	10	200 000	1986
Flood Forecasting Agreement - Saint John River basin	10	1 400 000	1987
Flood Damage Reduction - Marsh Creek	6.5	2 010 000(a)	1984
Petitcodiac Sea Dykes Agreement	0.25	160 000	1979
<b>NOVA SCOTIA</b>			
General Agreement	10	-	1988
Flood Risk Mapping Agreement	5	600 000	1983
Studies Agreement	5	300 000	1983
<b>QUEBEC</b>			
Combined General and Flood Risk Mapping Agreement	10	5 000 000	1986
(mapping 6)	6		1982
Dykes and Flow Regulation Works - Montreal Region	4.8	11 556 000(b)	1981
Studies and Implementation of Dykes and Flow Regulation Works - Montreal Region	2.8	4 500 000(b)	1984
<b>ONTARIO</b>			
Amending Agreement	-	-	-
All Inclusive Flood Damage Reduction Agreement	12	1 200 000	1990
(mapping 7)	7	8 000 000	1985
<b>MANITOBA</b>			
Amending Agreement	-	-	-
General Agreement	14	-	1990
Flood Risk Mapping Agreement	8	2 190 000	1984
Studies Agreement	9	310 000	1985
Flood Forecasting Agreement	5	600 000	1986
Ring Dyke Upgrading Agreement	3	4 500 000	1985
<b>SASKATCHEWAN</b>			
General Agreement	10	-	1987
Flood Hazard Mapping and Studies Agreement	(mapping 5)	1 300 000	1982
studies		480 000	
<b>NORTHWEST TERRITORIES</b>			
Memorandum of Understanding	2	225 000(c)	1978
Memorandum of Understanding	10	400 000(c)	1989
(mapping 5)	5		1984
General Agreement	10	-	1989

- \* These costs are to be shared equally by the federal and provincial governments except for
- (a) 33-1/3% federal, 66-2/3% provincial/local
  - (b) 45% federal, 55% provincial/local
  - (c) costs shared equally by Environment Canada and the Department of Indian and Northern Affairs

### New Brunswick

During the 1982-83 fiscal year, work continued on the flood risk mapping of the Keswick and Sussex areas and a hydrotechnical study of the Norton area was initiated. A hydrotechnical study of the Walker Brook basin was completed under the Studies Agreement and work to implement the Flood Forecasting Agreement was continued.

An Amending Agreement to extend the Marsh Creek Agreement to March 31, 1984, with no increase in funding, was signed on October 12, 1982.

The Sussex area was designated officially by the Ministers on September 13, 1982, and the Keswick River area was designated on March 3, 1983.

Considerable progress was made towards improving the effectiveness of flood forecasting in terms of both timing and informing the public.

### Quebec

In 1982-83 flood risk mapping of the lower L'Assomption River and the Saint-François River basin was completed. Work continued on the flood risk mapping of the Yamaska, Nicolet and Bécancour Rivers. The lower L'Assomption River was designated officially by the Ministers on May 5, 1982 and the Saint-François River basin between Richmond and Lennoxville was designated on October 15, 1982.

An Agreement to provide for the construction of a flow regulation structure at the entrance to the Mille Iles River has received federal approval and is awaiting provincial approval. An Agreement to amend the Mapping Agreement signed on October 4, 1976 has received both federal and provincial approval. Both agreements are expected to be signed early in the new fiscal year. The Mapping Agreement is to be amended to extend the termination date by six years to September 30, 1992, to make major additions and deletions to communities listed on Schedule A, and to extend the termination date of the mapping program by five years to September 30, 1987.

At year's end, an agreement was being negotiated with Quebec to provide for remedial works on the Saint-Charles and du Berger Rivers at Quebec City. Joint studies were also being carried out to examine the feasibility of remedial works on the Saint-François River at Richmond.

### Ontario

The revised Canada-Ontario Flood Damage Reduction Agreement was signed on November 5, 1982. It provides for a two-zone approach to flood risk mapping and extends both the mapping and general portions of the Agreement by 2 years to 1985 and 1990 respectively.

White River was designated officially by the Ministers on August 16, 1982. The eight separate water courses in Metropolitan Toronto and Region were designated on December 9, 1982. The Steering Committee has recommended that the Sturgeon River/Lake Nipissing/French River System also be designated, with effect from March 31, 1983.

White River is the first designation in Ontario while the Metropolitan Toronto Region is the largest urban centre in Canada to be designated at one time. The designation of the Sturgeon/Nipissing/French system represents implementation of one of the recommendations of an FDR Program flood study following severe flooding in the region in 1979.

Work on flood risk mapping continued in 14 Conservation Authority areas as well as in a number of communities in northern Ontario where most of the watershed systems are not under the control of organized Conservation Authorities.

#### Manitoba

Flood risk mapping continued for some 20 communities during 1982-83. The Villages of La Salle, Sanford and Starbuck were designated officially on November 26, 1982.

Due to new technical information, it was agreed by an exchange of ministerial letters to alter the designated "floodway" along the Red River at cross-section number 193 in the City of Winnipeg, effective September 9, 1983.

An agreement to upgrade ring dyking around several communities in the Red River Valley was signed on March 10, 1983. The agreement provides \$4.5 million for works over the period to March 1985.

Provincial and federal approval have been received to amend the Flood Forecasting Agreement. The duration of Phase One "Planning and Design" is to be extended by one year to March 31, 1984 and the termination date of Phase Two "Development and Operation" is to be amended from March 31, 1985 to March 31, 1986. An exchange of inter-ministerial letters of amendment is expected shortly.

#### Saskatchewan

In February 1982 the Saskatchewan government invoked a moratorium on designations in order to reassess FDR policies in light of provincial policies and public reaction, and to develop plans for post designation follow-up. As a result, the proposed agreement negotiated during 1981-82 to amend the Saskatchewan General and Mapping/Studies Agreements has been delayed pending a decision by the Saskatchewan government.

Flood risk mapping continued for 18 communities in Saskatchewan during 1982-83. From April 13, 1982, this work proceeded under interim arrangements whereby Saskatchewan funded 100 per cent of the work program with the intention of seeking cost recovery from Canada. The federal government agreed in principle to the retroactive cost-sharing of mapping and studies work that had received prior approval by the Steering Committee from April 13, 1982 to the effective date of a renewal of the Mapping and Studies Sub-Agreement. This arrangement was to be in force for the 1982-83 fiscal year only.

### Alberta

Alberta has not joined the national FDR Program and there were no concrete developments in negotiations with Alberta during 1982-83. Provincial officials have indicated that provincial policies should be in place during 1983-84, after which a federal-provincial arrangement will be considered.

### British Columbia

British Columbia has not joined the national program but negotiations to this end were ongoing through 1982-83.

### Northwest Territories

During 1982-83, work continued on the flood risk mapping of the seven Northwest Territories' communities on Schedule A. Flood risk lines were delineated for Hay River and a review of historical flood records was completed for five other communities.

### Yukon

The Yukon Territorial Government is now looking at an agreement similar to the Canada-Ontario Agreement which combines all aspects of the program in one document (i.e. includes remedial measures and studies).

### Indian Lands

A draft Memorandum of Understanding pertaining to Indian land mapping has been prepared for consideration by the Department of Indian and Northern Affairs.

### Water Research Under the Canada Water Act

Research is carried out in the Inland Waters Directorate in support of operational Branches and departmental objectives. The in-house research programs are undertaken by the National Water Research Institute and the National Hydrology Research Institute. Support of related research in Universities takes place through a subventions program. Undertakings are summarized below:

#### 1. The National Water Research Institute (NWRI)

NWRI carries out water research under the Canada Water Act to address chemical, physical and biological environmental problems of lakes, rivers and reservoirs and also urban and coastal regimes. Field and laboratory studies are undertaken by five research divisions in Burlington, Ontario, and two regional groups in western Canada to advance knowledge and find solutions to problems in hydraulics research, aquatic ecology, environmental contaminants, analytical methods and aquatic physics. Some studies are undertaken in response to problems in specific geographical locations while others are national in scope.

- (a) Hydraulic Research: Research on river processes has included the mixing as well as the mass and heat exchanges taking place in open channel flow, with emphasis on the development of models which can predict the mixing of effluent and the response of rivers to man-made changes. Other related projects include the mechanics of ice-jams, the conveyance capacity of an ice-covered river, and the effects of frazil ice on river flow. Work has also been done on techniques for control and recovery of oil in ice-covered waters. Urban water resources research has emphasized the development and verification of models for urban runoff quantity and quality and the effect of urbanization on urban drainage in order to improve management and design of stormwater systems.

Studies of surface waves have concentrated on air/water interaction such as the generation and propagation of waves. Shore resources and geological influences were documented by conducting technical surveys and interpretation of nearshore sediments, mainly in the Great Lakes. Studies in shore dynamics investigated nearshore waves and currents, nearshore sediment movements, and mechanisms of bluff behaviour. Studies are under way to evaluate the environmental risks associated with artificial islands.

- (b) Aquatic Ecology: Nutrient pathways research has included projects on biologically available phosphorus in the water and sediments, the effects of various nutrients on algal growth, and the composition of organic compounds in lake water and their role in the aquatic environment. Original discoveries were made in terms of phosphate availability and its turnover time, nitrogen cycle in prairie lakes and identification of high-molecular colloidal fibrils in fresh water.

Studies have been completed on the Bow and Oldman Rivers of the South Saskatchewan River system to determine seasonal and distance effects upon partitioning of nutrients and contaminants among solution, suspended sediments and aquatic plants. Studies of benthic communities in the Qu'Appelle River Lakes and elsewhere are continuing in order to determine historical and contemporary anthropogenic stress in prairie aquatic ecosystems.

Great Lakes research has included the investigation of hypolimnetic oxygen depletion in Lake Erie, the mechanisms by which phosphorus is eliminated from lakes or regenerated from sediments, and the development of a new oxygen-profiling system for large lakes. Special attention has been given to long-term trends in Great Lakes recovery.

Research studies on the impact of acid rain have emphasized changes in lake chemistry and ecology due to human action as evidenced in the sedimentary record. Particular studies include the effect of lake acidification on cycling of organic matter in lakes, release of metals and nutrients from acidified sediments, the sulphur cycle and paleoecology, with emphasis upon biota that indicate the acid



status of lakes. Macrophyte studies on the Eurasian milfoil and other aquatic weed infestations concentrated on the long-term impact of macrophyte harvesting, physiological response of aquatic weeds to mechanical and chemical control, and survival and spreading of exotic aquatic plants in Canada.

- (c) Environmental Contaminants: Research on environmental contaminants including organics, inorganics and radionuclides has been in three categories.

The first, associated with the study of actual pathways at contaminated sites, involves chemicals of public concern such as PCBs, chlorophenols, arsenic, and plutonium. The major study sites in 1982 were the Niagara River, Lake Ontario, and Canagagigue Creek.

The second category encompasses experimental sites where investigation of processes controlling environmental responses were studied or where additions of contaminants were made and their fates traced. These include the Turkey Lakes Watershed north of Sault Ste. Marie where the processes controlling responses to acid rain and atmospheric contamination were being investigated, and the 50-Point Conservation area where 2, 4-D has been added to a set of experimental ponds.

The third category included laboratory determinations and theoretical physical-chemical calculations. The laboratory work included tests of microbial and fungal biodegradation, photodegradation, hydrolysis, surface water properties, water lipid partitioning, sorption and volatility, and algal bioaccumulation. The theoretical calculations included structure-activity correlations to predict environmental hazards, electron orbital calculations to predict degradation products, and assessment of computer models for contaminant fate in aquatic ecosystems.

The Tobin Lake reservoir in Saskatchewan is the site of an inter-agency study of response of benthic organisms to contaminant stress in the North Saskatchewan River system. Mercury cycling in aquatic foodwebs and its implications for human health in northern Manitoba reservoirs and the Qu'Appelle River Lakes continue to receive special attention in western Canada.

- (d) Analytical Methods: Analytical methods research has concentrated on the use of techniques such as high pressure liquid chromatography, gas chromatography, gas chromatography-mass spectrometry, atomic spectroscopy and electrochemical techniques. Projects recently completed include methodologies for polynuclear aromatic hydrocarbons, carbamates, trace metals, total organics, 2,3,7,8-Tetrachlorodibenzo-p-dioxin and other dioxin isomers. These methods have been transferred to Water Quality Branch analytical laboratories for routine use. A radioimmuno assay screening technique for dioxins is being developed and should be available early in 1983-84.

Research work was also carried out in the area of identification and confirmation of trace organics in samples from the Great Lakes using high resolution gas chromatography-mass spectrometry. A special clean and hazardous chemicals laboratory, completed in 1981, is being used primarily for methods development research involving hazardous compounds such as dioxins, or ultra-trace contaminants requiring a special ultra-clean working environment.

Regional, national and international interlaboratory quality assurance programs are operated to ensure that data generated by different laboratories are comparable.

Microbiological toxicity testing procedures have been assessed and a yeast test for mutagens was improved to eliminate weaknesses that became apparent in testing. Bacteriological surveys of Lake Ontario have been undertaken and microbiological studies of lakes stressed by acid rain indicated that several microbial species were adversely affected.

- (e) Aquatic Physics: Research was completed on the development and validation of a five component optical water quality model for Lake Ontario, and a two dimensional hydrogeological model of contaminant transport in an unconfined homogeneous aquifer. Water quality and aquatic ecosystems models were developed to simulate the temporal and spatial distributions of dissolved and suspended materials in the nearshore and off-shore lakes. Based on a general modelling framework, basic limnological research results in the physical, chemical and biological sciences can be combined into an overall model capable of simulating the effects of contaminants in the aquatic ecosystem. A comprehensive model to simulate the water quality and oxygen depletion in Lake Erie was completed. Investigation of the physical factors influencing contaminant transport in the Niagara River plume and modelling of that transport is now under way.

In western Canada, field and theoretical studies are focussed on physical dynamics of prairie lakes in order to improve understanding of the eutrophication processes. Instrumentation was developed for measuring baroclinic mass exchange under ice in northern Manitoba lakes. Measurements of the mass exchange under the ice of Yukon lakes have been undertaken with the objective of modelling such processes.

## 2. The National Hydrology Research Institute (NHRI)

NHRI specializes in research related to underground waters, snow and ice, and surface water.

- (a) Ground Water Research: Ground water contamination from many sources, for example, landfills, mining developments and acid rain, is becoming of increasing concern. A number of investigations are being conducted to study the natural processes involved

in the movement of contaminants in the subsurface and to solve the problems they present. They include a study at Chalk River, Ontario, using tracer tests, and a major intensive study of toxic chemical migration at Gloucester, Ontario, where the emphasis is on the development of remedial technologies. Solute exchanges between water and aquifer are being investigated. Arsenic contamination due to natural geochemical processes or mining operations is a potentially significant hazard in many parts of the country and has been studied at selected areas in New Brunswick, Nova Scotia and Ontario. Pesticides can also present ground water contamination problems and a study is under way near Osoyoos, British Columbia, where it is suspected that surface waters are becoming contaminated by pesticide-bearing ground waters. A major research project sponsored by Atomic Energy of Canada Ltd. is examining ground water aspects of the underground disposal of nuclear wastes in crystalline rocks. Data from boreholes up to 1000 metres deep are subjected to various analytical and numerical analysis techniques to determine hydraulic parameters. The effect of the ground water-aquifer system in mitigating the adverse effects of acid rain is under investigation, principally at a field site near Sault Ste. Marie.

In the North, research is directed towards ground water discharge and recharge under permafrost conditions, the effect on the ground water regime of engineering structures and developments such as pipelines and roads, and the relationships between ground water flow systems and mining excavations.

An investigation is under way into the deep water bearing formations of the western Canada sedimentary basin in the vicinity of the International Boundary. This is in response to concerns regarding the potential transboundary effects on ground water which might be created by the proposed deep aquifer developments for water supply for coal development in the United States.

Geophysical studies are being carried out in support of the solution of ground water problems. Modelling is a fundamental part of ground water studies and the models developed are used to solve both quality and quantity programs. An increasing amount of assistance is being provided to various Environment Canada agencies pertaining to the ground water aspects of the environmental impacts of various developments.

- (b) Snow and Ice Research: Glacier research is an important element in snow and ice research. An ice coring project on Mount Logan, Canada's highest mountain, is starting to yield information on past climate changes on the basis of isotope and other analyses performed on portions of the ice cores by laboratories in Canada and abroad. Concurrently the ice drill is undergoing further modification in the light of past experience and a new electrothermal drill is under construction. A site survey of Cathedral glacier is the first step in determining the discharge

mechanisms for a summer supraglacial lake which empties down unstable slopes above the spiral railway tracks at Kicking Horse Pass. In some years, this causes mud slides which damage the railway track and Trans Canada Highway.

A study of the application of photogrammetric techniques to the determination of mass balance for an Arctic glacier was completed. In other mass balance studies negative mass balances were observed on the three representative glaciers being studied in the Iskut River basin. Flood Lake, a glacier-dammed lake in the same area, which has been under periodic surveillance for several years, was observed to be filled again to capacity (about  $200 \times 10^6 \text{ m}^3$ ). It discharged partially twice during August 1982. The potential influence of the Tiedemann and Bench glaciers on proposed dam sites in the Mt. Waddington area is being assessed. Investigations continued on the Bridge River glaciers in order to determine their effect on basin runoff and to evaluate seasonal and operational forecast models. Measurements continued on Sentinel and Place glaciers. With support made available through the federal government's Summer Canada Program, the glacier inventory of the Stikine River basin was undertaken in 1982. By the end of the fiscal year, over 7,500 glaciers had been inventoried. Bibliographies for glaciers and ice shelves on Ellesmere Island and for ice islands in the Arctic Ocean were published.

The problem of measuring the liquid water content of wet snow has been examined to establish a laboratory reference standard to calibrate field methods. Also, work on the metamorphism of dry snow is continuing, and together, these projects will assist greatly in predicting the runoff expected from a snow-covered area.

In the laboratory, work on the mechanical and electrical properties of ice and permafrost is continuing. The strength and deformation properties of ice, frozen sand, and frozen clays are being studied in order to determine the amount of unfrozen water present in such materials, and its hydrologic significance. Experimental and theoretical work on the effect of impurities on the electrical properties of ice, is continuing. This work is of particular importance to the development of sound engineering practices in the North, and to the interpretation of remotely sensed data on ice covers.

- (c) Surface Water Research: Surface water research emphasizes the investigation of watershed processes, particularly those that characterize elements of the hydrologic cycle other than the ground water and perennial snow and ice regimes, and the development and testing of precipitation-runoff models. Hydrologic processes in permafrost, alpine and prairie environments are of particular interest. This array of studies includes the interactions between Arctic streams and permafrost, lake dynamics and flooding in the Mackenzie Delta, and an interrelated mix of studies on freeze-up, break-up, ice jamming and other fluvial processes in the Liard-Mackenzie River system and the Mackenzie Delta, and the processes controlling the impact of

land drainage on the streamflow characteristics of watersheds. Studies are also being conducted in four tundra/taiga basins along the proposed route of the Inuvik-Tuktoyaktuk Highway. Modelling activities include the design of statistical streamflow forecasting models with and without climatic forecasting ability, the Monte Carlo analysis of the sampling, time-dependent and distribution properties of rainfall-runoff models, the design of a model to relate runoff volumes to antecedent values of tension storage, gravity storage and snow cover in a basin, the development of a physically based model of water flow in snow-covered terrain, the development of a new methodology for determining baseflow recession curves, the sensitivity analysis of a passive microwave snow cover model to a range of snow cover and soil moisture conditions and the operational testing of a modified UBC precipitation-runoff model that accounts for contributions of meltwater from glacierized areas. This division also conducts remote sensing studies including the application of gamma ray and passive microwave to the measurement and observation of snowpack water equivalent, the use of aerial photography for surface water velocity measurements in rivers with moving ice and the application of conductivity and time domain reflectometry to ice thickness measurement.

Significant advances have occurred in a number of research areas during the past year. In the remote sensing field, the development of an operational system for measurement of snowpack water equivalent, based on airborne gamma ray techniques, is now complete. A software package which includes techniques for energy calibration, energy resolution and radon estimation is available for operational use and technology transfer to provincial agencies, hydro utilities and other interested parties. Technical assistance is also available in the application of previously developed mathematical models for estimating areal evapotranspiration and lake evaporation from routine climatological observations. Further investigations are planned to determine the possibility of extrapolating model estimates from locations with required humidity, temperature and insulation records to other nearby stations with only temperature records. A field portable time domain reflectometry system for measuring soil moisture and for tracing the freezing plane will be field tested this year at a site where land drainage is a factor influencing field conditions to a depth of one metre.

Northern research has been expanded by the addition of a number of studies related to the effects of proposed regulation of Liard-Mackenzie River flow. These studies include examination of the Liard and Mackenzie Rivers thermal regime above and below their confluence at Fort Simpson, ice jamming in the vicinity of the town, and the effects of break-up on the stability of shoals and islands near the junction of the two rivers. In the Mackenzie Delta, regulation of flow may affect the replenishment of numerous delta lakes and the stability of delta channels. As a consequence the water balance of a closed delta lake, as well as the patterns and processes of delta channel change, will be studied over a period of some years.

### 3. Water Resources Research Subvention Program

In 1982-83, 13 universities across Canada received a total of \$250 000 in grants to carry out research as an adjunct to the Inland Waters Directorate in-house research programs. The 19 water-related environmental research projects supported were focussed on regional and national water research topics associated with acid rain, toxic substances, the socio-economic impact of flood damage reduction, water conservation, aquatic nutrients and snow and ice. The aims of the program are to stimulate development of water resources research across Canada, to encourage development of innovative ideas by non-governmental scientists, and to foster closer contact between those scientists and their counterparts in Environment Canada.

#### ACTIVITIES RELATED TO THE CANADA WATER ACT

Not to be overlooked in the review of operations under the Canada Water Act are various activities which provide indispensable information for effective water planning and management.

Socio-Economic Studies: Within the framework of the Canada Water Act, socio-economic techniques are developed in the interest of conducting studies and providing technical and policy inputs in support of water management in Canada. During the year, a number of studies were completed or under way including a review of the national Flood Damage Reduction Program and its future directions, a discussion paper on Federal Water Strategy, and summary tabulations for the 1981-82 National Census Survey of Industrial Water Use.

Participation in a number of interdisciplinary and intergovernmental teams was considerable during the year including the Canada/Manitoba Draft Studies Advisory Committee (Working Group on Environmental Criteria for the Siting of Thermal Generating Stations) and the Socio-economic Sub-committee for the Long Range Transport of Pollutants Program. Evidence of increasing water shortages in a number of river basins, primarily in western Canada, prompted the initiation of a Phase II Study Assessment of Water Supply Conflicts to Energy Development, to be completed in 1983.

On the international scene, nine papers were prepared for presentation to international workshops and seminars including the Economic Commission for Europe, the World Meteorological Organization, the Organization for Economic Cooperation and Development, and the International Water Resources Association. A number of papers were also presented at various resource-oriented conferences across Canada, for example, at the Canadian Water Resources Association Conference on Water-Based Recreation Issues and Strategies, at Minett, Ontario in June 1982. Socio-economic policy advice was provided during the year on wide-ranging topics including public information for the National Flood Damage Reduction Program, other departmental information programs and workshops, Canada-U.S. boundary water conflicts, proposed hydroelectric developments, and annual

meetings with non-government organizations under the departmental public consultation policy.

Public Consultation: In September 1982, more than 30 citizens and members of various non-governmental organizations participated in a two-day workshop in Ottawa to discuss Canadian water issues. This meeting was one of several held throughout Canada under the Environment Canada Public Consultation Policy. These meetings and further consultations with representatives from other federal departments, industries and universities, are providing a sounding board for the many ideas and recommendations which may some day become accepted policy.

Water Data: Programs for the systematic collection and compilation of data on streamflow, water levels, sediment transport, ground water, water quality, and related information on glaciers, snow and ice predated the Canada Water Act but have continued to operate in support of water management basin studies and implementation programs. A newer innovation is the collection of background data on water use in Canada.

At the National Water Research Institute in Burlington, Ontario, water data activities in support of water data collection include programs of quality assurance and analytical methods adaptation for the water quality program and current meter calibration for the water quantity program.

Data Management Systems: Data and information reference systems continue to be operated in support of water resource activities. WATDOC, the water resource document reference centre, gives direct access nationwide by computer terminal to an inventory listing of published water-related papers and reports through a publicly available on-line interactive storage and retrieval system. This reference system was recently broadened to cover environmental baseline data in general. NAQUADAT, the national water quality monitoring program's data bank, was designed to store and retrieve chemical, physical, bacteriological, biological and hydrometric data relevant to water quality for surface waters, ground waters, wastewaters and sediments. STAR, a data storage and retrieval system, was developed to handle limnological data from Great Lakes monitoring cruises. WATENIS, the water effluent national information system, provides an inventory of industrial and municipal water pollution sources including data on physical, chemical, and toxicological characteristics of effluents and information on water effluent regulations and guidelines. MUNDAT, a data-base covering municipal waterworks and wastewater systems from coast to coast, including data on federal facilities, was developed in close cooperation with the provincial governments and the Federation of Associations on the Canadian Environment (FACE). HYDAT, the national surface water data bank has been developed to store and retrieve streamflow, water levels, and sediment transport information collected under the Federal-Provincial Water Quantity Agreements,

and a Glacier Data and Information System has been designed to contain a compilation of physical dimensions of Canadian glaciers and a bibliography of Canadian glacier documents. CHOMS is a database which provides an inventory and summary description of selected operational techniques and procedures used to collect, process and manipulate hydrologic data in water resources studies. The CHOMS database was developed as the Canadian contribution to the HOMS project of the World Meteorological Organization (WMO) for the organized transfer of hydrological technology operationally used in water resources investigations by member countries of WMO.

## PART II: Water Quality Management

No water quality management areas, as defined under Part II of the Canada Water Act, have been set up. However, there are a number of federal-provincial implementation agreements under which water quality management programs have been or are being implemented. These include programs in the Great Lakes basin and in the Okanagan and Qu'Appelle basins. While these agreements do not provide for the establishment of water quality management agencies under Part II of the Act, they nevertheless have the same objectives of maintaining and improving water quality and are managed by joint federal-provincial Boards. The federal government, in concert with provincial governments, has completed the development of water quality management strategies for the St. Lawrence River (Quebec), the Souris River (Manitoba-Saskatchewan) and the Shubenacadie-Stewiacke Rivers (Nova Scotia). Also, a Canada-Ontario-Quebec Coordinating Committee is working to establish a water quality monitoring plan for the Ottawa River, a Canada-Ontario Task Force is producing a final report on mercury contamination in the English-Wabigoon rivers system and a Canada-Manitoba Team is undertaking to monitor and study mercury in the Churchill River diversion.

During 1981-82, a Task Force report to the Canadian Council of Resource and Environmental Ministers (CCREM) recommended that a proposal be made to the United States to set international water quality objectives at boundary water crossings in advance of development. The proposal was not accepted by CCREM and alternative approaches to setting transboundary objectives are now being explored in conjunction with the provinces which concur.

## PART III: Regulating Nutrient Inputs

In the late 1960s, when phosphorus from laundry detergents was identified as a significant contributor to the over-enrichment of many Canadian lakes, the federal government launched its phosphorus concentration control program.

In 1970, regulations to control the amount of phosphorus in laundry detergents were written under the nutrient control provisions of the Canada Water Act. Initially, the regulations limited the maximum phosphorus content of laundry detergents to 8.7%



elemental phosphorus by weight, or 20% as phosphorus pentoxide ( $P_2O_5$ ) and an inspection program began under which product samples were collected from manufacturers and importers for government analysis. It is estimated that these first regulations resulted in a 22% reduction in the amount of phosphate discharged from all detergent sources (from 26 000 000 kg to 20 000 000 kg) per annum.

On January 1, 1973, the maximum permissible phosphorus content for laundry detergents was reduced to a maximum of 2.2% elemental phosphorus by weight, also expressed as 5%  $P_2O_5$ . This further limitation is estimated to have reduced the preregulation levels of detergent phosphates discharged by 80% (from 26 000 000 kg to 5 000 000 kg) per annum.

In 1973, a national network of regionally based inspectors was formed to more efficiently ensure compliance with the regulations. This network has carried out a complete national round of sampling and analysis of imported and Canadian manufactured laundry detergents annually since then.

Over the years the number of detected violations has declined. Those occurring have generally been "technical" violations, resulting from a misunderstanding of some aspects of the regulations or improper mixing, formulation or clean-up procedures which result in the production of small batches of product which exceed the 2.2% limit by fractional amounts. To date, all such problems have been rectified without resorting to formal prosecution and it should be noted that the largest manufacturers and importers of the nationally advertised laundry detergents, which account for the bulk of the retail Canadian sales, have not been involved in these incidents.

As in past years, the 1982 round of sampling and analysis has been completed without major problems. Compliance, monitoring, liaison and public information activities are continuing.

The reduction of phosphorus in laundry detergents has contributed to improved water quality conditions both by reducing the phosphorus content in the sewage treated at municipal facilities, and also in the load from untreated sources.

#### PART IV: Public Information Program

While the number of announcements pertaining to water management programs increased during the year, the Flood Damage Reduction Program continued to be the most important focus of information activities. The latter program has been designed to increase public awareness of the potential hazards from flood plain development and of the ways in which both the public and governments can deal with flood problems.

Numerous important announcements were made under the national Flood Damage Reduction Program. One announcement dealt with the signing of the revised Canada-Ontario Flood Damage Reduction Agreement on November 5, 1982. Another announced the signing of the Canada-Manitoba Ring Dyke Upgrading Agreement on March 10, 1983.

Other releases, seven in all, dealt with designation of flood risk areas in Quebec (L'Assomption River, May 1982 and Saint François, October 1982); Ontario (White River, August 1982 and Toronto, December 1982); New Brunswick (Sussex, September 1982 and Keswick, March 1983) and Manitoba (La Salle, Sanford and Starbuck, November 1982).

Two announcements were made during the year to highlight new or renewed federal-provincial agreements. On July 12, 1982, an announcement was made when the Canada-Ontario Great Lakes Water Quality Agreement was renewed for a further three years, while on March 10, 1983, a new agreement was announced for the Canada-Manitoba program to study mercury in the Churchill River Diversion System.

Three releases were issued during the year to announce the completion of important water management reports including the Ottawa River Water Quality Report in October 1982, the Okanagan Implementation Report in January 1983, and the Prairie Provinces Water Board's Water Demand Study Report in February 1983.

An "open house" was held at the Canada Centre for Inland Waters in April 1982. The event was highly successful with attendance in excess of 20 000 persons.

The 1981-82 Canada Water Year Book, the fifth in the series on freshwater resources in Canada, was released in March 1983.

A brochure for use with the Canada-Ontario Flood Damage Program was published in both official languages. Entitled "A New Approach to an Old Problem", the brochure was widely distributed in Ontario by the FDR Program Committees and local Conservation Authorities.

TABLE 5 - CURRENT AND PROJECTED RELEASE DATES OF FINAL REPORTS  
ARISING FROM CANADA WATER ACT STUDIES

<u>Report</u>	<u>1982-83</u>	<u>1983-84 and Later</u>
Okanagan Basin Implementation	February 1983	
Prairie Provinces Water Board		
Water Demand Study Report	February 1983	
Ottawa River Water Quality Report	October 1982	
English-Wabigoon Mercury Study Report		late 1983
Yukon River Basin Study Report		late 1984

Available upon request from: Director, Water Planning and Management Branch, Inland Waters Directorate, Department of the Environment, Ottawa, Ontario, K1A 0E7, except for the Water Demand Study Report for which there is a charge and which must be ordered from R.B. Godwin, Executive Director, Prairie Provinces Water Board, 306-1901 Victoria Avenue, Regina, Saskatchewan, S4P 3R4.

## PRINCIPAL FEDERAL-PROVINCIAL COOPERATIVE ARRANGEMENTS UNDER THE CANADA WATER ACT

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## REGULATION, APPORTIONMENT, MONITORING AND SURVEY PROGRAMS

### 1. WATER QUANTITY SURVEY AGREEMENTS

- Objective:** To maintain a viable and efficient national water quantity survey network and to give recognition to joint federal and provincial responsibilities in this activity.
- Duration of Agreement:** Agreements between Canada and each province were signed in 1975 and letters were exchanged between the Department of Environment (DOE) and the Department of Indian and Northern Affairs (DINA) agreeing to joint survey operations in the territories. The programs are continuous but there is a provision in each agreement for termination on 18 months written notice.
- Participants:** CANADA.....Department of the Environment, and the Department of Indian and Northern Affairs representing the Yukon and Northwest Territories.  
ALL PROVINCES
- Arrangements:** This is a shared-cost program, with the federal government carrying out field and office procedures and invoicing the provinces quarterly. An exception is Quebec which operates its own program and invoices the federal government quarterly except for international and navigable waters, and waters crossing federal land in Quebec, which are surveyed by the federal government. DINA transfers funds annually to DOE for the territories' share of costs.
- Funding:** 1982-83 (provisional costs)
- |                                |              |
|--------------------------------|--------------|
| Total Program Costs            | \$18 868 000 |
| Total Recovered from Provinces | 3 674 000    |
| Total Paid to Quebec by Canada | 887 000      |
- Total Program Costs are the expenditures required to conduct the National Water Management Data Program.
- The Total Recovered from Provinces is the amount reimbursed by the provinces, except Quebec, to Canada. These costs are determined according to schedules specified in the Agreement.
- The Total Paid to Quebec by Canada is the amount paid by Canada to the Province of Quebec for operating stations of federal interest in that province. These costs are also determined according to schedules specified in the Agreement.
- Status:** Coordinating Committees, established for each province, convene at least annually but normally more frequently to review the water quantity survey networks and to determine annual cost sharing.

### 2. Prairie Provinces Water Board

- Objective:** The equitable apportionment of interprovincial prairie waters flowing eastward. The agreement ensures one half the natural eastward flow of waters arising in or flowing through Alberta for Saskatchewan, and one half the eastward flow arising in or flowing through Saskatchewan for Manitoba.

Duration of Agreement:

Continuous since October 30, 1969.

Participants and Funding:

CANADA  
ALBERTA  
MANITOBA  
SASKATCHEWAN

(Funding to be borne one-half by Canada and one-sixth by each of the provinces.)

Arrangement:

Schedule C of the Agreement provides for the reconstitution of the Prairie Provinces Water Board whose responsibility is to oversee and report on apportionment of waters flowing from one province into another province; to take under consideration comprehensive planning, water quality management and other management problems referred to it by the entities concerned; to recommend appropriate action to investigate such matters; and to submit recommendations for resolution of the problems.

Status:

The Agreement is administered through the Prairie Provinces Water Board, its five Committees, and its Secretariat.

The Board's Committee on hydrology has recommended procedures for the determination of natural flow and streamflow forecasting for five major interprovincial basins in the area. Natural flows are now being calculated on an annual basis for each of these five drainage basins. Similar natural flow reports are being prepared for other basins crossing provincial boundaries. The Committee also has prepared a report for the Board that describes the mechanisms required to administer the 1969 Apportionment Agreement and is preparing similar reports on the apportionment implications of westward flowing streams and westward flowing tributaries of eastward flowing streams.

At the request of the Board, the Water Quality Branch of Environment Canada reports monthly on water quality at eleven monitoring sites. These stations are part of the basic long-term network proposed by the Board to monitor water quality in the prairie provinces. The Board's Committee on Water Quality is now preparing site specific water quality requirements for the eleven stations starting with the Beaver River at the Alberta-Saskatchewan boundary. The Committee, under the direction of the Board, also has established a task force on analytical methodology to provide a means of coordinating water quality laboratory results for the prairie provinces. It also has prepared a draft report suggesting administrative procedures that could be used in defining, monitoring and administering the water quality requirements.

The Board, in 1978, undertook a study to report on historic and current water uses in the three prairie provinces. That report entitled "Water Demand Study - Historical and Current Water Uses in the Saskatchewan-Nelson Basin" was jointly released on February 10, 1983 by the five ministers responsible for the Board. It consists of a main report and seven appendices and makes recommendations that are designed to establish and maintain an ongoing data base of water use information for the Saskatchewan-Nelson basin. This information could be used by future researchers either on a basin wide or sub-basin basis to

do further water resource studies in the Saskatchewan-Nelson basin.

The Board's Committee on Interjurisdictional Agreements Administration has completed a study of the implications of interprovincial apportionment of water on Battle, Lodge, and Middle Creeks, three streams that flow from Alberta to Saskatchewan and then to the United States. The report, along with recommendations, was completed in the spring of 1981 and, after review by the Board, was forwarded to the Board's member agencies.

The Board established a Committee on Ground Water in the fall of 1980. The Committee plans to establish commonly accepted cross-sections or profiles to describe ground water conditions at interprovincial boundaries. The first step in this procedure is to establish and maintain a bibliography of ground water reports and data related to interprovincial ground water evaluations. This will be done by placing such reports on WATDOC, a federal information storage and retrieval database.

The Board also evaluates the effects that proposed projects might have on streamflow in downstream provinces. The results of these evaluations are reported to the respective ministers.

### 3. OTTAWA RIVER REGULATION PLANNING BOARD

**Objective:** To plan and recommend criteria for regulating the Ottawa River, taking into account hydro-power production, flood protection, navigation, low water problems, water quality needs and recreation.

**Duration of Agreement:** Continuous since March 1983

**Participants:** CANADA (3 members)  
ONTARIO (2 members)  
QUEBEC (2 members)

Canada assumes responsibility for financing the cost of the Agreement up to \$450 000 annually, of which Ontario and Quebec will contribute up to \$112 500 each.

**Prior Action:** As a result of recommendations made following a study of flooding in the Montreal region in 1976, a Canada-Ontario-Quebec Ottawa River Regulation Planning Committee was established in 1977 by an exchange of letters between the federal minister of the Environment, the Quebec minister of the Environment and the Ontario minister of Natural Resources. The final report of the Planning Committee was submitted in December 1980 recommending that a tripartite regulation agreement be negotiated. Negotiations then followed, culminating in the signing on March 2, 1983 of a Canada-Ontario-Quebec Agreement Respecting Ottawa River Basin Regulation.

**Arrangement:** The Ottawa River Regulation Planning Board will administer the agreement. It will also formulate and review regulation policies and criteria leading to integrated management of the principal reservoirs.

A regulating committee, composed of operators of the principal reservoirs, is responsible for ongoing operation of the reservoirs, within the guidelines established by the Board.

Status:

A secretariat is being established within Environment Canada to act as the executive arm of the Board.

During the spring flood period (March 1 - May 30), forecasts on a real-time basis are being provided daily for the principal reservoirs in the Ottawa River basin and at selected points where flooding takes place.

The regulation planning mathematical model is being operated on a real-time basis and ready for testing of alternative storage operations. Additional storage and diversion opportunities will also be analyzed.

4. OTTAWA RIVER WATER QUALITY COORDINATING COMMITTEE

Objective:

To review and modify the proposed monitoring plan and oversee its implementation; to undertake or recommend special studies as needed; and to recommend water quality objectives for the river.

Duration of Agreement:

Continuous from 1983

Participants:

CANADA  
QUEBEC  
ONTARIO

Prior Action:

A Technical Work Group on Water Quality in the Ottawa River was formed in 1980 to study problems related to bacteria and toxic substances in the Ottawa River basin; to identify quantities and sources of nutrients, and to evaluate the importance of agriculture and other diffuse sources of phosphorus. It was hindered from carrying out its mandate by gaps in the data available and, in its report of October 1981, recommended the establishment of a committee to coordinate monitoring, and proposed a monitoring plan to obtain the data needed.

Status:

The Coordinating Committee has been set up and arrangements have been made for its initial meeting on April 6, 1983.

5. MACKENZIE RIVER BASIN COMMITTEE

Objective:

To exchange information on potential water-related developments in the basin and to formulate a program of studies to gather data on the basin's water and related resources.

Duration of Agreement:

Continuous since 1973.

Participants:

CANADA....Department of the Environment, Ministry of  
Transport, Department of Indian and Northern Affairs, Yukon  
Territory, and Northwest Territories.  
ALBERTA  
BRITISH COLUMBIA  
SASKATCHEWAN

Prior Action:

The Mackenzie Basin Intergovernmental Liaison Committee was established in 1973 and reconstituted as the Mackenzie River Basin Committee in a Memorandum of Understanding between the

participating governments in May 1977. In May 1978, a \$1 600 000 program to study the water and related resources of the basin was endorsed.

The study has been completed and the final report was released by the Ministers on February 26, 1982. The main recommendations call for early negotiations toward a transboundary water management agreement, an expanded network of water data stations, follow-up field studies on ice breakup and a major study of the Mackenzie Delta.

Status: The Mackenzie River Basin Committee continued to meet during 1982-83 to fulfil its liaison responsibilities and to consider study designs and budgets associated with future implementation.

6. WATER QUALITY MONITORING RELATED TO THE GARRISON DIVERSION PROJECT

Objective: To establish baseline water quality conditions on the Souris River at the International Boundary in both Saskatchewan and Manitoba by means of continuous, automatic monitoring equipment.

Duration of Agreement: Continuous since 1977

Participants: CANADA

Status: Two auto-monitors were operated from 1977 to July 1982. Evaluation of the data with respect to establishing baseline conditions is now being undertaken. The auto-monitors provide a great deal of data for a limited number of parameters, suggesting the need for additional monitoring activities to establish baseline conditions for other parameters. The decision to start up the monitors again will be made following evaluation of the data.

7. NORTH SHORE RIVERS ECOLOGICAL INVENTORIES PROGRAM

Objective: To conduct joint ecological studies of rivers flowing into the St. Lawrence River from its north shore in order to facilitate future assessments of ecological impacts from major developments.

Duration of Agreement: April 1978 to September 1983 (extended)

Participants and Funding: CANADA.....\$1 220 000  
QUEBEC.....\$1 220 000

Status: Final Reports on studies and geophysical inventories were continued during the year under review and the final report of the Committee was under preparation.

8. LAKE OF THE WOODS CONTROL BOARD

Objective: To control and regulate certain major waterways in the Winnipeg River Drainage basin so as to achieve water flow and level conditions that are reasonably acceptable to the various interests.

Duration of Agreement: Continuous since 1912. The Board was formed in 1919 under a Dominion Order-in-Council, and was confirmed by federal legislation in 1921 and by Ontario legislation in 1922. At that



time, jurisdiction of the natural resources of the four western provinces was vested in Canada, and therefore the member for Canada acted on behalf of Manitoba. Manitoba gained active membership in 1958.

The Board was established under the Lake of the Woods Control Board Act and is included here only because of its association with other water management programs.

Participants and Funding:

Canada - one member  
Ontario - two members  
Manitoba - one member

Canada pays one-third of the Board's annual operating costs in the interest of navigation. The remaining two-thirds is paid by Manitoba and Ontario in the proportion of developed hydropower head in the basin in each province.

Arrangements:

The Board fulfills its responsibilities by directing what the outflows of Lake of the Woods and Lac Seul (and at times the flows diverted from Lake St. Joseph) should be.

To assist it in making its decisions, the Board has traditionally maintained a full-time engineering support group in Ottawa within the Inland Waters Directorate of Environment Canada. This group was formally established as the Board's Secretariat with the signing of a Memorandum of Understanding in 1981.

To ensure two-way communications with interests within the basin, the Board has recognized a number of specific interest groups, each of which has appointed a representative to the Board. Groups represented include hydropower utilities, pulp and paper industries, native people, cottage owners and tourist outfitters.

The Board holds public meetings each year in the basin to provide detailed information to the public and to obtain feedback on the effects of levels and flows. Also, the Board maintains a phone-in information service to ensure that the public has ready access to information on current conditions in the basin.

Since the Lake of the Woods is an international boundary water, the federal member of the Board serves as Member for Canada on the International Control Boards for Rainy Lake and Lake of the Woods, to ensure coordination with the United States.

Status:

The Board has a program under way designed to computerize its current methodologies and to introduce new mathematical modelling activities to assist it in its deliberations. A brochure was prepared to inform interested persons in the basin about the area in question, its history, and how it is being managed.

## 1. WINTER RIVER BASIN

## 1. WINTER RIVER BASIN

Duration of Agreement: Continuous since 1977.

**Status:** Preplanning studies have been completed and a proposal for a \$250 000 basin planning study has been developed. Funding is being sought from federal, provincial and local agencies.

## 2. FRASER RIVER ESTUARY - PHASE II

**Duration of Agreement:** October 1, 1979 to March 31, 1982 (extended).

During 1981-82, the level of funding was raised to \$580 000 from \$300 000 (\$150 000 each).

**Status:** Field work has been completed and a final report was distributed in 1982. Review of the study's proposals is now under way involving government agencies, industry and the public. This is expected to result in an implementation strategy for the management program. A report from the Federal/Provincial Review Committee is expected in 1983.

### 3. YUKON RIVER BASIN

Duration of Agreement: November 1980 to December 31, 1983

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Prior Action:

Preplanning activities were completed and the Preplanning Task Force's report was submitted in September 1979. The report identified new resource development initiatives in the fields of energy, transportation, mining and recreation, and outlined decisions and studies required to assess alternative uses of water, conflicts and associated impacts.

Status:

A three year Canada-British Columbia-Yukon study agreement was signed in November 1980. Representatives of the governments were nominated to a four-member Yukon River Basin Committee and, in September 1981, a Study Director was hired and a study office established in Whitehorse. With support from a Technical Advisory Group and associated Work Groups, projects were initiated in the wildlife and fisheries programs as well as for the socio-economic analysis of the Basin's economy.

Work continued on activities initiated in the 1981/82 fiscal year. These included furbearers and moose inventories in the wildlife program and studies on the development of socio-economic data for the basin. New projects initiated included the tagging and radio-tracking of adult salmon, a study on sediment effects on graylings and stream habitat inventory in the Mayo and Atlin Placer Mining Districts and studies on waterfowl/raptors and waterfowl spring staging.

Work commenced on projects within the hydrology program. A study of ice break-up and ice-jamming processes on the Yukon River began in Spring 1982 and will cover two field seasons. Also, a computer model was being developed to simulate discharges in the Yukon River. A basin-wide water quality network was initiated and will operate for 14 months to describe water quality in the basins. In conjunction with the water quality program, a study of dissolved oxygen content in the ice-covered rivers was initiated.

Work commenced on a number of energy related studies for the basin. A study to describe the placer industry in the basin was completed. An information officer was hired and an information exchange program initiated. A community tour was conducted to encourage public involvement in the basin study.

Overall program expenditures for 1982-83 fiscal year were approximately \$1 000 000. At the end of March 1983, the Yukon River Basin Committee was in the process of seeking a nine-month extension to the agreement to enable it to complete the studies under way and prepare its final report.

4. WABIGOON-ENGLISH MERCURY CONTAMINATION STUDY

Objective:

To evaluate methods to reduce high mercury levels in the English-Wabigoon river system in northeastern Ontario. (Work under the agreement focussed on ways in which mercury travels, or is deposited and retained within the river system, as well as methods to reduce the adsorption of mercury by fish and other water life.)

Duration of Agreement:

June 1978 to June 1980 (extended)

Participants and Funding:

CANADA.....\$150 000  
ONTARIO.....\$150 000

Both governments also agreed to undertake related studies outside the agreement, including engineering and economic evaluation of measures selected to reduce mercury contamination, a shoreline study to determine potential sources of clay and a cost estimate for the construction of a dam to raise the level of Clay Lake.

Status:

Field studies to determine the dynamics of transport, deposition, and retention of mercury in the Wabigoon-English system have been completed. A number of amelioration techniques have been proposed and reviewed. An interim report on the first year's work was released in July 1980 and the final report is scheduled for release late in 1983.

5. WATERFORD RIVER BASIN

Objective:

To examine the effects of urbanization on the water resources of the basin, and to develop criteria for urban development which minimize impacts.

Duration of Agreement:

1980-1985

Participants:

CANADA  
NEWFOUNDLAND

Status:

Agreement to proceed with this study was arranged through an exchange of letters between Environment Canada and the Newfoundland Department of Consumer Affairs and Environment early in 1980. Steering and Technical Committees have been formed to administer the program and data collection is ongoing; models have been selected for use in describing and identifying the urbanization impacts on streamflow and water quality; a fully urbanized catch basin has been instrumented for model calibration in the Newfoundland environment; and maps have been prepared to show changes in land use.

6. OKANAGAN BASIN

Objective:

To implement recommendations arising from the 1969-1974 Okanagan Basin Study.

Duration of Agreement:

February 1976 to September 1982 (extended).

Participants and Funding:

CANADA.....\$2 500 000  
BRITISH COLUMBIA.....\$2 500 000

Canada Mortgage and Housing Corporation loans and grants of approximately \$5.5 million also have been made available for construction of waste treatment facilities.

Status:

This program was completed in September 1982. The final report and summary reports were released in February 1983.

Major construction works under the program included upgrading of the Okanagan Flood Control system, lowering of intakes on the Okanagan River, modifications to the Kelowna floating bridge and construction of a new outlet control structure for Kalamalka

Lake. These projects were directly funded by the Implementation Program.

During the Implementation Program development of waste treatment facilities in the basin continued. This included expansion of the facilities in Vernon and Penticton and development of new systems for Kelowna and Osoyoos. Development of these facilities was partially funded through CMHC grants and loans. Plans for waste treatment systems in other areas of the basin have been developed.

A review of the framework plan was carried out in the final two years of the Implementation Program in order to develop an ongoing water management program. The review of the framework plan included public feedback, economic projections and analysis of results of water quality and water quantity monitoring. It was concluded that, with proper management, all present and future water resource needs in the Okanagan basin could be met.

The final and summary reports outline 25 recommendations comprising the ongoing plan for management of the water resource in the Okanagan basin. The Implementation Board recommended that British Columbia, through its Ministry of Environment, be responsible for the management functions outlined in the plan.

## 7. QU'APPELLE BASIN

Objective: To implement recommendations arising from the 1970-1972 Qu'Appelle Basin Study.

Duration of Agreement: April 1974 to March 31, 1984.

Participants and Funding:

CANADA.....	\$18 000 000
SASKATCHEWAN.....	\$15 700 000

An additional \$2 000 000 is available on a loan basis from Saskatchewan. CMHC funding infrastructure changes have decreased the loan of \$8 400 000 anticipated in the Agreement to about \$2 700 000.

In 1981, Treasury Board approved an amendment to the Agreement which allows transfer of funds within the program without affecting total program funding.

Status: The Department of Regional Economic Expansion is acting as the project coordinator.

Nutrient monitoring has been ongoing since 1980 in an effort to quantify loadings to and from the Fishing Lakes. Status reports for these data are prepared annually. This activity will be terminated in the summer of 1983 to allow time for preparing a final report. Other studies in the basin are assessing nutrient and contaminant speciation and bio-availability and the effects of toxic substances and eutrophication on the biological community of the lakes.

The Qu'Appelle Valley Management Board established by the Agreement continues to oversee work on the implementation programs within the Environmental Improvement and Management, Tourism and Recreation Development, and Implementation sectors.

Projects completed include flood control works for Regina, Lumsden, Tantallon and Moose Jaw, and Phase I of the Regina tertiary sewage treatment plant and the Land Use Planning and Development Controls Program. Phase II, sludge handling alternatives, is still in the investigative stage.

The Moose Jaw Flood Protection and the Livestock Pollution Control programs are in the implementation stage. The Flood Prone Land Purchase Program has essentially met its objectives and is currently halted while undergoing review.

Some upstream works to increase the conveyance capacity of the Qu'Appelle River have been completed. Downstream projects are in abeyance pending negotiations with Indian bands and a consultant study of overall conveyance effects.

Tourism and recreation development strategies in the form of Master Plans have been prepared for the Qu'Appelle Valley. Construction has begun on various fisheries and wildlife developments. A number of commercial developments have received funding under the incentives and loans programs. The public involvement program is well under way.

#### 8. LOWER FRASER VALLEY FLOOD CONTROL

Objectives: To provide protection from flooding of land in the lower reaches of the Fraser River Valley and other areas upstream by rehabilitating existing dykes, constructing new dykes, increasing river bank protection, and improving internal drainage facilities.

Duration of Agreement: 1968 to March 31, 1984 (extended).

Participants and Funding: CANADA.....50%  
BRITISH COLUMBIA.....50%

(Local authorities are responsible for providing construction and access right-of-way.)

In 1974, the federal government increased its contribution to the Flood Control Program and Storage Studies from \$18 000 000 to \$30 500 000 and British Columbia agreed to increase its share by the same amount. In fiscal year 1976-77, both parties agreed to a further increase in funding and to extend the expiry date. The present funding level is \$60 000 000 for each party, and the Agreement now extends to March 31, 1984. A further extension to December 31, 1986 with no additional funding, is under consideration.

Status: Construction has been completed at Kent, Matsqui, Surrey (Serpentine-Nicomex Dams), New Westminster, Coquitlam, Kamloops and Surrey (South Westminster), is approaching completion in Richmond and is well advanced in Delta and Pitt Meadows. Construction continued in Abbotsford and at Vedder River but is temporarily suspended in Chilliwack. Estimated expenditures under the program to March 31, 1983 are \$98 200 000. The current annual funding rate is \$4 000 000 from each government.

9. CANADA-ONTARIO AGREEMENT ON GREAT LAKES WATER QUALITY

Objective: To renew and strengthen cooperation between Canada and Ontario in meeting the obligations under the revised 1978 Canada-U.S. Agreement and to provide for cost-sharing of specific programs which the province will undertake with the federal government in meeting these obligations.

Duration of Agreement: August 1971 to March 31, 1985; agreement renewed in 1976 and 1982

An initial agreement from August 1971 to December 31, 1975 authorized \$3 million for feasibility studies and joint sewage treatment technology and urban drainage research. Loans totalling \$250 million for sewage treatment facilities from CMHC and the Ontario Government were also called for in the initial agreement. (Funding for municipal sewage treatment between 1976 and the signing of the new agreement in 1982 was the subject of a separate agreement with CMHC under the National Housing Act.)

The agreement was renewed in March 1976, retroactive to 1 January 1976, as a basis for establishing joint water quality objectives, and to serve to coordinate and implement federal and provincial input to Canadian responsibilities under the international agreement, and to conduct research. This agreement expired on March 31, 1980 but, because a revised agreement was then under negotiation, the 1976 agreement was extended to March 31, 1982, through exchanges of letters between ministers.

The agreement was renewed again in July 1982, retroactive to April 1, 1982.

Participants and Funding: CANADA  
ONTARIO

The participants each pay half the cost associated with the research and surveillance programs. For each fiscal year, the total amount payable by Canada shall not exceed an amount to be agreed upon between Canada and Ontario, taking into account:

- (a) the recommendations made by the International Joint Commission respecting surveillance of the whole of the boundary waters;
- (b) the decisions taken, as a result of such recommendations, by the parties to the Canada-U.S. Agreement with respect to such surveillance;
- (c) the recommendations of the Board of Review.

The federal share in fiscal year 1982-83 was set so as to not exceed \$1 200 000 and was entirely allocated to surveillance and information programs.

A further \$65 million is being made available to Ontario for the period 1982-1985 to assist in the completion of municipal sewerage facilities construction to meet the requirements of the Canada-U.S. Agreement. This extra funding was formalized under the 1982 Canada-Ontario Agreement.

The principle of work-sharing was introduced into the new agreement to effect better coordination of federal-provincial activities to meet program requirements of the international agreement.

**Status:**

In February 1981, a joint Canada-U.S. team of scientists began a comprehensive investigation of toxic chemicals in the Niagara River. This joint investigation will make recommendations as to what should be done to reduce or remove the contamination and to monitor the effectiveness of clean-up programs. A non-technical interim report on this joint investigation was released to the public in February 1983.

The 1980-81 and 1981-82 Annual Reports of the Review Board for the Agreement were submitted to the respective parties to the Agreement.

Because, as already noted, the Canada-Ontario Agreement is being undertaken to provide a basis for implementing the Canada-U.S. Agreement on Great Lakes Water Quality, a brief outline of activities under the latter agreement is also provided.

**CANADA-U.S. AGREEMENT ON GREAT LAKES WATER QUALITY**

**Objective:**

To improve the quality of the water in the areas of the Great Lakes now suffering from pollution; to ensure that Great Lakes water quality will be protected in the future; and to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem.

**Duration of Agreement:**

Continuous since April 1972; revised Agreement signed November 22, 1978.

**Participants:**

CANADA  
UNITED STATES

**Commitment:**

The concept of the Great Lakes basin and its human resources as an ecosystem is explicitly recognized in the new Agreement. Numerical water quality objectives for some 40 compounds have been specified. Approximately 99 percent of the sewered population on the Canadian side of the basin is now served by adequate municipal wastewater treatment facilities. Programs to control and prevent pollution from industrial sources entering the Great Lakes System have been designated and are being implemented. A commitment has been made to eliminate the discharge of toxic substances into the Great Lakes. New interim phosphorus loading targets, defined for each lake, are designed to achieve desirable levels of water quality. Binational negotiations are in progress to ratify the loading targets and reach agreement on Canadian and U.S. programs to meet these targets.

**Arrangement:**

The International Joint Commission was given primary responsibility for overseeing implementation of this international water quality Agreement. The Commission has established a number of Boards and Committees to carry out the various provisions of the Agreement. Activities are carried out under four programs: Objectives Development, Controls, Assessment, and Special Projects (including toxics, eutrophication, health hazards, etc.).



**Status:** Canada continued negotiations with the U.S. on the Annex III Supplement on Phosphorus Reductions. Both Canada and Ontario joined recently with the United States in acceptance (at the officials level) of a text of a supplement to Annex III which provides for confirmation of the target loads and makes provisions for new targets and schedules to achieve these goals.

In November 1982, the Water Quality Board submitted its report to the IJC under the terms of the 1978 Canada-U.S. Great Lakes Water Quality Agreement. This report focussed on the environmental quality of the Great Lakes Basin Ecosystem. In particular, the report focussed on the 18 Class "A" areas of concern identified by the Board and the adequacy of existing remedial programs in addressing the pollution issues identified in the areas.

Under the surveillance program ten intensive surveillance cruises of Lake Ontario were carried out as part of the second year of a two-year intensive study of Lake Ontario. A total of 94 sampling points on the lake were sampled during each cruise. Daily sampling at Niagara-on-the-Lake and at Wolfe Island in the St. Lawrence River, were completed.

#### 10. SOURIS BASIN

**Objective:** To implement the framework plan for the management of the water and related resources of the basin arising from the 1974-1978 Souris Basin Study.

**Participants:** CANADA  
SASKATCHEWAN  
MANITOBA

**Prior Action:** The Souris River Basin Board report, containing a main report and nine supplements, was jointly released by Canada, Saskatchewan and Manitoba on August 25, 1978. An Advisory Committee on Implementation of the Joint Canada-Manitoba-Saskatchewan Consultative Committees, and a Souris River Study Implementation Working Group were established.

**Status:** The Advisory Committee on Implementation suggested that the majority of the recommendations could be undertaken under existing federal programs, provincial programs, federal-provincial agreements and proposed federal-provincial agreements. A number of recommendations have been covered under the Canada-Saskatchewan Interim Subsidiary Agreement on Water (SAW) and the Canada-Manitoba Interim Agreement on Water. These agreements will expire on March 31, 1984. In the Saskatchewan portion of the basin, the problem of flooding is covered under the SAW agreement whereas, in Manitoba, flooding comes under the Flood Damage Reduction Agreement.

#### 11. MERCURY IN THE CHURCHILL RIVER DIVERSION SYSTEM

**Objective:** To determine the degree to which mercury is present in the Churchill River Diversion system and to identify sources; to study pathways and mechanisms by which mercury moves from water to fish and wildlife through the food chain; to monitor the concentration of mercury in aquatic plants and fish and compare it with available data on the presence of mercury in people

living in this area and; where possible, suggest remedies to local mercury problems and means of predicting future occurrences of mercury contamination.

Duration of Agreement: March 1983 to December 1986

Participants and Funding:

CANADA	\$380 000
MANITOBA	\$380 000

Background: This study arose from concern over increased levels of mercury in fish along the diversion route. Area soils and mineral deposits contain background levels of inorganic mercury, which may have been released when the area was flooded. This problem was first addressed under the Northern Flood Agreement that the Department of Indian and Northern Affairs negotiated on behalf of Canada in 1977-78 between Canada, the Province, Manitoba Hydro and the Northern Flood committee (a collectivity of various Indian lands). An arbitrator, appointed in March 1980 under the terms of the Northern Flood Agreement, to arbitrate claims from any of the four parties concerned, identified the mercury agreement as a priority federal-provincial responsibility.

Status: The agreement committing the two governments to a joint scientific study was signed on March 10, 1983. A steering committee composed of two federal and two provincial members was established and initiation of the joint study was undertaken.

#### FLOOD DAMAGE REDUCTION PROGRAM

##### 1. FLOOD MANAGEMENT - MARSH CREEK, N.B.

Objective: To reduce the damage from floods in the Marsh Creek Watershed through acquisition of lands, construction of a flood control reservoir, channel improvements, excavations and changes in structures.

Duration of Agreement: September 1977 to March 1984 (extended).

Participants and Funding:

CANADA.....	\$670 000
NEW BRUNSWICK.....	\$670 000
CITY OF SAINT JOHN....	\$670 000

Prior Action: Studies conducted under the Canada-New Brunswick General Agreement Respecting Flood Damage Reduction contained recommendations for appropriate measures to reduce flood damages in the watershed.

Status: Work is proceeding under the agreement. All reservoir and channelization work, as well as reconstruction of Marsh Bridge, has been completed. Indications are that expropriation of the forebay may not take place. Alternative approaches have been, and continue to be, explored.

##### 2. FLOOD DAMAGE REDUCTION WORK AND DYKES - MONTREAL REGION

Objective: To plan and construct dykes to prevent flood damage in the municipalities of Pointe-Calumet, Sainte-Marthe-sur-le-Lac, Roxboro, Pierrefonds and Châteauguay; and to determine the feasibility of enlarging the storage capacity in the upper

Ottawa River basin, and of reducing the maximum flow of Rivière des Mille Îles to approximately 700 cubic metres per second by means of a control structure.

Duration of Agreement: June 1981 to March 1984.

Participants and Funding: CANADA.....45%  
QUEBEC.....55%

Under the Agreement Respecting Dykes and Flow Regulation Works in the Montreal Region, signed in October 1976, total funding was doubled from \$5 million to \$10 million in October 1977, and was increased in March 1980 to \$11 556 000. Further funding in the amount of \$4 500 000 is provided under the new agreement signed on June 26, 1981.

Prior Action: Between June 1974 and October 1976, a study was conducted to determine the means of reducing the frequency of both flooding and extreme low water levels in the Montreal Region water bodies. The Committee on Flow Regulation, Montreal Region, which conducted the study, submitted an interim report in 1975 and its final report in October 1976. The first implementation agreement was signed in October 1976 on the basis of the recommendations in the interim report, because the extensive damage caused by floods in 1974 and 1976 in the Montreal Region made it important that these recommendations be implemented immediately.

Status: Construction of dykes at Roxboro, Pierrefonds, Pointe-Calumet and Châteauguay was completed while similar work at Sainte-Marthe-sur-le-lac was nearing completion. Studies to determine the feasibility of a control structure on the Rivière des Mille Îles were completed. Following a series of provincial public hearings concerning additional storage capacity in the Quinze Reservoir, the province has indicated that it does not wish to pursue the option of increasing storage in that reservoir.

### 3. UPGRADING RING DYKES - RED RIVER VALLEY

Objective: To increase the level of protection afforded by ring dykes in the communities of Rosenort, Morris, St. Adolphe, Dominion City, Emerson, St. Jean Baptiste, Latellier and Brunkild.

Duration: Three years

Participants and Funding: CANADA.....\$2 025 000  
MANITOBA.....\$2 475 000

Prior Action: Between 1967 and 1971 Canada and Manitoba cooperated in the construction of dykes around seven Red River basin towns that had suffered damages during the 1950 flood and again in 1966. Subsequent experience demonstrated, most recently in 1979, that the dykes constructed under the 1967 agreement did not provide a sufficient margin of safety, nor did they meet the standards of the Canada-Manitoba Flood Damage Reduction Agreement signed in 1976. Thus, a new agreement was signed on March 10, 1983 to upgrade the seven ring dykes which were jointly built earlier, as well as an eighth dyke, around Brunkild, which had been built and fully paid for by Manitoba.

Status: An agreement was signed on March 10, 1983, and a committee was being formed to administer the agreement.

4. MILLE ILES FLOOD CONTROL STRUCTURE

Objective: To reduce the level of flood damage along the Rivière des Mille Iles in Montreal Region.

Duration: Six years.

Participants: CANADA  
QUEBEC

Prior Action: Studies to determine the feasibility of a flood control structure on the Rivière des Mille Iles were conducted under the Agreement Respecting Dykes and Flow Regulation Works - Montreal Region.

Status: Negotiations for an Agreement to build a flood control structure were completed in 1982 and federal Treasury Board approval was received in March 1983.