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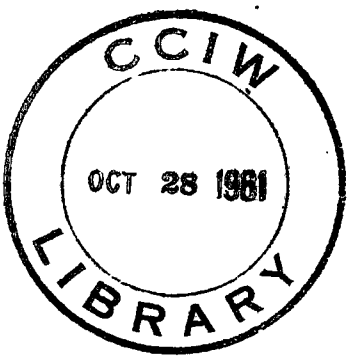
# The Canada Water Act

# Annual Report

# 1980-1981



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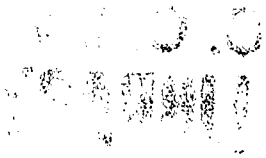



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Minister
Environment Canada

Ministre
Environnement Canada

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, 1981.

Respectfully submitted,

John Roberts



Ottawa, Canada
K1A 0H3

Deputy Minister
Environment Canada

Sous-ministre
Environnement Canada

Ottawa, Canada
K1A 0H3

The Honourable John Roberts
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, 1981.

Respectfully submitted,

J.B. Seaborn

TABLE OF CONTENTS



TABLES

# 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 each fiscal year. This, the ninth annual report, covers operations to March 31, 1981.

Up to and including fiscal year 1975-1976, Canada Water Act funding was provided on the basis of individual projects. In fiscal year 1976-1977, 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 $12 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.

The report first highlights the provisions of the Canada Water Act and then briefly discusses the individual programs which have been or are expected to be undertaken to meet those provisions.

Table 2, a recent addition to this series of reports, illustrates the progress in designations of flood risk areas under the national Flood Damage Reduction Program. Also, a special events section provides an overview on spring runoff in 1981 and briefly summarizes prairie drought studies conducted under the Canada Water Act.

This report is the first edition to give expanded coverage to the role of water research under the Canada Water Act. Until now, a number of activities under the Act have been briefly described in a manner that does not reflect their true importance; this approach has been altered herein with the provision of a broader overview on this relatively complex subject.

## 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 prescribed 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 Resources Management

### Federal-Provincial Cooperation

The Canada Water Act provides for joint consultation between the federal and provincial governments in matters related to water resources. Discussed briefly in the following are joint planning and implementation programs as well as the national Flood Damage Reduction Program and other cooperative programs conducted throughout Canada directed towards water resources planning and management.

In 1980-81, there were no meetings of the Consultative Committees, established at the outset of the Act to provide continuing consultation on water resource matters; however, numerous informal meetings of federal-provincial staff took place to discuss new or ongoing projects and events of common concern.

### 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, by March 31, 1981, held 47 meetings.

A total of 19 departments and agencies with an interest in water matters, are represented on this 24-man committee. Subcommittees and Working Groups are set up as required. During the year under review, there were four such groups:

1) Subcommittee on the Great Lakes Water Quality Agreement
2) Subcommittee on Water Quality
3) Subcommittee on Floods
4) An ad hoc subcommittee to prepare responses to IJC reports

Topics considered over the past year included the National Flood Damage Reduction Program, mercury studies in northern Manitoba, water quality objectives at the International Boundary, Sault Ste. Marie water management issues, heritage rivers, the Yukon River basin planning study, Montreal dyking, Ottawa River regulation, the Thompson River preplanning study, federal-provincial water quality agreements, the Shubenacadie-Stewiacke basin study, amendments to the Northern Inland Waters Act, federal involvement in hydroelectric development, and the Lachine Rapids development.

### Federal-Provincial Agreements

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.

Progress in Water Planning and Management Programs

Table 1 shows a breakdown of current cost-shared agreements and other cooperative arrangements under the Canada Water Act and indicates the stage each has reached. Each of the programs is referred to briefly in the following and described in more detail later in this report.

Continuous 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.

The federal government has been involved in the collection of water quantity data since the late 1800s. The hydrometric networks were operated under informal arrangements with the provinces until April 1, 1975, at which time ongoing cost-sharing Water Quantity Survey Agreements were implemented with all provinces and with the Department of Indian Affairs and Northern Development 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. A total of 2827 gauging stations were operated under the Agreements in Canada during 1980-81. The terms of all Agreements require that Canada publish the data; also, all data are stored on computer files and are retrievable on request for use in water programs. A national meeting of all Coordinating Committees is convened each year to review annual progress reports and to discuss any concerns arising under the agreements.

The federal and provincial governments also operate networks for the monitoring of water quality parameters. At the request of several provinces, an assessment is now under way to determine the advisability of negotiating federal-provincial agreements in this area as well.

The Prairie Provinces Water Board, a federal-provincial agency 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, which now includes a Committee on Ground Water, recommended procedures for natural flow determination, stream forecasting and apportionment, and were working on administrative mechanisms, water quality objectives

at the provincial boundaries, and a major study of historical and present water demands in the three prairie provinces.

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 not only investigate the concerns expressed, but 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.

In May 1979, the federal and British Columbia Ministers of the Environment signed an agreement to conduct an eight month preplanning study of the Thompson River basin at a shared total cost of $60,000. Because of the complexities of the study and the volume of data involved, the preplanning report was not completed until February 1981. That report makes recommendations for action on specific problems that can be resolved without further study as well as on the need for specific planning studies.

A preplanning study of the Winter River basin (Prince Edward Island) has been undertaken to determine the reliability of the existing water supply system in Charlottetown, Prince Edward Island. A consultants report has outlined several approaches to the study. The need for further federal involvement in the project is currently being evaluated.

Planning Studies: Field work for planning projects associated with the Ottawa River and the Wabigoon-English River system was brought to completion, while a new project, located mainly in the Yukon Territory, got under way during 1980-1981.

The Canada-Ontario-Quebec Ottawa River Regulation Planning Committee's final report containing recommendations for regulating the Ottawa River was published in December 1980. The Committee's mandate was extended to March 1982 to provide continuity in anticipation of the establishment of a permanent body with responsibilities for coordinated operation of principal reservoirs in the Ottawa River basin. A three-party water quality study of the Ottawa River was in the final report stage.

In northwestern Ontario, the federal and Ontario governments found it necessary to extend the duration of a joint study by one year and the funding (from $50,000 each in 1978-1979 to $100,000 each in 1979-1980) to identify ways of reducing high mercury levels in the English-Wabigoon River system, and to investigate the source, transport, distribution and biochemistry of mercury in the river system. A Canada-Ontario report was released in July 1980, identifying possible remedies for mercury in the system.

In Yukon Territory, a Preplanning Task Force report, published in September 1979, recommended a 3-year, $2.2 million Canada-British Columbia - Yukon Planning Study to develop an information base leading to the formulation of a planning framework which will focus on alternative uses of water and related resources in the basin. A submission to the respective governments was made in mid-1980 and a planning study

Table 1 STATUS OF FEDERAL AND FEDERAL-PROVINCIAL COST-SHARED PROGRAMS UNDER THE CANADA WATER ACT

CONTINUOUS MONITORING AND SURVEY PROGRAMS

| Under Negotiation | New during 1980-1981 | Ongoing during 1980-1981 | Completed |
|---|---|---|---|
| Water Quality Surveys | | Water Quantity Surveys<br>Prairie Provinces Water Board | |

PREPLANNING STUDIES

| Under Negotiation | New during 1980-1981 | Ongoing during 1980-1981 | Completed |
|---|---|---|---|
| | | Winter River basin | Lower Saskatchewan-Basin Task Force<br>Yukon River basin (1979)<br>Thompson River basin (1981) |

PLANNING STUDIES

| Under Negotiation | New during 1980-1981 | Ongoing during 1980-1981 | Completed |
|---|---|---|---|
| Northern Manitoba Mercury Study | Lake Winnipeg Water Quality*<br>Yukon River basin | Planning Committee on Ottawa River Regulation<br>Shubenacadie-Stewiacke basin<br>Mackenzie River basin<br>Fraser River Estuary<br>Waterford River basin (Nfld) | Peace-Athabasca delta (1972)<br>Qu'Appelle basin (1972)<br>Saskatchewan-Nelson basin (1973)<br>Okanagan basin (1974)<br>Saint John basin (1975)<br>Lake Winnipeg, Churchill, and Nelson Rivers (1975)<br>Fraser River Upstream Storage (1976)<br>Flow Regulation-Montreal Region (1976)<br>Churchill River (Sask.-Man.) (1976)<br>Northern Ontario Water Resources (1978)<br>St. Lawrence River Water Quality (1978)<br>Souris basin (1978)<br>English-Wabigoon Mercury Contamination (1981) |

IMPLEMENTATION AGREEMENTS

| Under Negotiation | New during 1980-1981 | Ongoing during 1980-1981 | Completed |
|---|---|---|---|
| Souris basin (Manitoba)<br>Lake Winnipeg, Churchill and Nelson Rivers | | Lower Fraser Valley Flood Control Program<br>Okanagan basin<br>Qu'Appelle basin<br>Canada-Ontario Agreement on Great Lakes Water Quality<br>Saint John (being implemented under regular programs)<br>Souris basin **<br>Floodproofing - Red River Valley*** | Peace-Athabasca delta (1976)<br>Metropolitan Toronto (1978)<br>Upper Thames (1979)<br>Southwestern Ontario Dyking (1979) |

FLOOD DAMAGE REDUCTION PROGRAMS

| Under Negotiation | New during 1980-1981 | Ongoing during 1980-1981 | Completed |
|---|---|---|---|
| Programs with Alberta, British Columbia, Newfoundland and Yukon Territory | Amending Agreement with Manitoba | Programs with New Brunswick, Nova Scotia, Quebec, Manitoba, Saskatchewan Ontario and the Northwest Territories | Southeastern New Brunswick Dyking (1978) |
| Amending Agreements with Saskatchewan, New Brunswick and Ontario | Manitoba Flood Forecasting | Memorandum of Understanding, NWT (Hay River) | |
| | | Flood Management - Marsh Creek, N.B. | |
| | | Dykes and Flow Regulation Works, Montreal Region | |
| | | New Brunswick Flood Forecasting | |

OTHER COOPERATIVE ARRANGEMENTS

| Under Negotiation | New during 1980-1981 | Ongoing during 1980-1981 | Completed |
|---|---|---|---|
| | | Water Quality Monitoring Garrison Diversion | Canada-Ontario Great Lakes Shore Damage Survey |
| | | North Shore (St. Lawrence) Ecological Inventories | Follow-up Programs, Canada-Ontario Great Lakes Shore Damage Survey (1981) |
| | | Technical Working Group on Water Quality in the Ottawa River | |

* deferred for the present

** conducted under a DREE Subsidiary Agreement

*** conducted under an ad-hoc agreement (not under either the Flood Damage Reduction or Disaster Assistance Programs)

agreement was signed on November 24, 1980, by officials of Environment Canada, Indian and Northern Affairs Canada and the governments of British Columbia and the Yukon.

Work on a Canada-British Columbia Fraser River Estuary Planning Agreement, signed in 1979-80, was ongoing in 1980-81 for the purpose of developing a management plan which would integrate the needs of the economy with the need to preserve the natural environment. The agreement was based on the results of the preplanning study completed in 1978 for the Lower Fraser River.

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 will be in the form of work sharing. Steering and Technical Committees have been formed to administer the projects, and work in several project areas is now under way.

A Memorandum of Understanding which formalized intergovernmental cooperation in the Mackenzie River basin was signed in September 1977 by seven ministers representing Canada, Alberta, British Columbia and Saskatchewan. A three-year Study Agreement Respecting Federal-Provincial Studies and Investigations of the Water Resources of the Mackenzie Basin was signed in May 1978 for a $1,600,000 study program. Studies in the third year of the program were completed on schedule and the final study report was under preparation.

Planning studies designed to develop a framework plan for the management of the water and water-related resources in the Shubenacadie-Stewiacke River basin have been ongoing since 1977. All background studies were completed and preparation of the final report, which experienced delay, is now scheduled to be completed by mid-1981.

The agreement signed in 1977 by Canada and Manitoba (but not yet initiated) to carry out a water quality study of the Lake Winnipeg basin has been deferred indefinitely by mutual agreement due to provincial financial constraints and the province's wish to re-evaluate the study program.

Implementation Programs: Although there were no major implementation programs initiated during the year under the Canada Water Act, action continued within existing programs to implement certain planning recommendations requiring early action in the Souris and Saint John River basins. Also, while reference is made below to new federal assistance to Manitoba to move or raise rural homesteads in flood prone areas of the Red River Valley, this assistance was not funded under the Canada Water Act and is included here only because of its association with other water related programs.

Prompted by the severity of flooding in the spring of 1979, a special ad hoc program, not under the Flood Damage Reduction program, was approved under which the federal government is contributing up to $4.25 million over two years to help Manitoba protect rural homeowners against future flood damage in the Red River Valley. The federal and provincial governments share equally 75% of the costs of moving, raising or dyking some 1500 to 2000 homes and farms. By year's end, $3,250,000 of federal funds had been expended.

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 $82 million of a total joint commitment of $120 million was spent up to the end of March 1981.

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 and Phase I of the Regina tertiary sewage treatment plant. For the Canada-British Columbia Okanagan Implementation Program, emphasis has been directed towards improvements to existing water intakes and continuation of several projects: walkway replacement, the water quality monitoring program initiated in 1976-1977, and the review of the framework plan.

The Canada-Ontario Agreement on Great Lakes Water Quality, which expired on March 31, 1980, was extended to March 31, 1981 through an exchange of ministerial letters, pending the drafting and signing of a new agreement. When signed, the new agreement will provide for the cost-sharing of research, surveillance and information activities and will reflect the commitments undertaken by Canada in the 1978 Canada-U.S. Great Lakes Water Quality Agreement.

Implementation arrangements for the Saint John River basin have been under consideration for some time. A federal-provincial task force has reviewed the recommendations of the Saint John River Basin Board and has reported that the planning recommendations can be met through regular programs and that no formal implementation agreement will be required.

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 and Canada-Manitoba DREE Subsidiary Agreements on Water.

Canada, Manitoba, Manitoba Hydro and the Northern Flood Committee signed an agreement in 1977-1978 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. Discussions continued with Manitoba to develop a mercury study, which would partially fulfil Canada's commitment under the four-party agreement.

Flood Damage Reduction Program: During 1980-1981, 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 reducing 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. Areas designated to date in Canada are listed in Table 2.

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 Manitoba General Agreement beyond the ten-year period and negotiations with other provinces are expected to extend other agreements as well.

PARTICIPANTS AND FUNDING: Canada and the provinces share the costs (see Table 3).

RELATED AGREEMENTS: Several ongoing studies and implementation agreements dealing with flood prone areas in Canada were in force when the Flood Damage Reduction Program

Table 2 Designations - Flood Damage Reduction Program

March 31, 1981

| | |
|---|---|
| Montreal Region (22 maps) | May 1978 |
| Chaudière Basin, Quebec (8 maps) | March 1979 |
| Gatineau-Ottawa, Quebec (15 maps) | October 1979 |
| Melita, Manitoba (1 map) * | December 1979 |
| Wawanesa, Manitoba (1 map) * | December 1979 |
| Fredericton, New Brunswick (1 map) | February 1980 |
| Perth/Andover, New Brunswick (1 map) | February 1980 |
| Winnipeg, Manitoba (1 map) * | February 1980 |
| du Gouffre River, P.Q. (2 maps) | April 1980 |
| Upper Richelieu River, P.Q. (11 maps) | April 1980 |
| Roche Percee, Saskatchewan (1 map) * | August 1980 |
| Estevan, Saskatchewan (1 map) * | August 1980 |
| Oxbow, Saskatchewan (1 map) * | August 1980 |
| Souris, Manitoba (1 map) | October 1980 |
| Elie, Manitoba (1 map) | November 1980 |
| Saint John River, N.B. (Oromocto-Jemseg) (1 map) | March 1981 |

* Interim designation

Table 3 Federal-Provincial Flood Damage Reduction Agreements
March 31, 1981

| | Duration (years) | Total Cost* (dollars) | Number of Locations |
|---|---|---|---|
| **New Brunswick** | | | |
| General Agreement | 10 | - | - |
| Flood Risk Mapping Agreement | 5 | 1 000 000 | 24 |
| Studies Agreement | 5 | 200 000 | 3 |
| Flood Forecasting Agreement - Saint John River basin | 5 | 600 000 | - |
| Flood Damage Reduction - Marsh Creek | 4.5 | 2 010 000(a) | - |
| Petitcodiac Sea Dykes Agreement | 3 months | 160 000 | - |
| **Nova Scotia** | | | |
| General Agreement | 10 | - | - |
| Flood Risk Mapping Agreement | 5 | 600 000 | 12 |
| Studies Agreement | 5 | 300 000 | 2 |
| **Quebec** | | | |
| Combined General and Flood Risk Mapping Agreement | 10 (mapping 6) | 5 000 000 | 183 |
| Dykes and Flow Regulation Works - Montreal Region | 5.5 | 11 556 000(b) | - |
| **Ontario** | | | |
| All Inclusive Flood Damage Reduction Agreement | 10 (mapping 5) | 1 200 000<br>8 000 000 | ** |
| **Manitoba** | | | |
| General Agreement | 14 | - | - |
| Flood Risk Mapping Agreement | 8 | 2 190 000 | 45 |
| Studies Agreement | 9 | 310 000 | 14 |
| Flood Forecasting | 5 | 600 000 | 4 |
| **Saskatchewan** | | | |
| General Agreement | 10 | - | - |
| Flood Hazard Mapping and Studies Agreement | (mapping 5)<br>studies | 1 300 000<br>480 000 | 30<br>14 |
| **Northwest Territories** | | | |
| Memorandum of Understanding | 2 | 225 000 (c) | Hay River |
| Memorandum of Understanding | 10 (mapping 5) | 400 000 (c) | 7 |
| General Agreement | 10 | - | - |

* 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 and the Department of Indian and Northern Affairs

**This agreement applied to flood vulnerable sections of streams and rivers under the jurisdiction of 38 Conservation Authorities, 10 rivers, 4 lake shorelines

was launched. These include several agreements described elsewhere in this report under the titles: Lower Fraser Valley Flood Control Program; Qu'Appelle Basin; and Canada-Ontario Great Lakes Shore Damage Survey.

REPORT ON PROGRESS

Newfoundland: Both the Treasury Board and Provincial Cabinet approved a General Agreement and a Mapping Agreement but the end of the fiscal year went by without formal signing of these agreements. The General Agreement, with a duration of 10 years, will bind both parties to the basic approach and policies of the national Flood Damage Reduction Program. The Mapping Agreement will provide $350,000, to be equally shared, to map two flood prone areas (Steady Brook and Stephenville).

Nova Scotia: The FDR Agreement with Nova Scotia expires in 1981-82, and the need for extending the agreement is under consideration. A regional flood frequency study for mainland Nova Scotia was completed by a contractor. The design flood flows from this study are being used as input to the hydraulic studies.

Flood risk mapping continued for the Truro and the Sackville River portion of the Bedford-Sackville River floodplain, and similar work for the Antigonish and New Glascow-Stellarton areas was initiated. The Sackville River flooplain is expected to be the first designated.

Hydrotechnical studies were under way for the Antigonish, New Glasgow-Stellarton, Truro and Sackville River areas. Working maps for Antigonish and New Glasgow-Stellarton were under preparation, while floodline plotting on the Truro and Bedford-Sackville working maps was ready to proceed.

New Brunswick: During the 1980-81 fiscal year work continued on the flood risk mapping of the Maugerville-Sheffield-Lincoln and Sussex areas. The Perth-Andover and Fredericton flood risk mapping had already been completed and designated.

A draft agreement to amend the Canada/New Brunswick General, Mapping, Studies and Forecasting Flood Damage Reduction Agreements is being considered. The proposal will, among other things, extend the General Agreement to 1991, increase the total funding for the Mapping Agreement to $2,000,000 (equally shared) from $1,000,000 and extend its duration to 1986, revise Schedule A, and extend the Studies Agreement to 1986. Provisions for flood forecasting include increasing the equally shared total funding to $1,400,000 from $600,000 and extending the termination date 5 years to March 1987.

The Flood Forecasting Agreement continued to be implemented through 1980-81. The Technical Committee for Flood Forecasting is directing the planning of activities to improve flood forecasts.

The Marsh Creek Agreement was extended to March 31, 1982 with no increase in funding. This was necessary to complete the Marsh Bridge and forebay acquisition projects.

Quebec: Work was continued on the flood risk mapping of the Yamaska, Nicolet, Bécancour and Lower Richelieu Rivers. Designations of flood risk areas on the du Gouffre and Upper Richelieu Rivers were made on April 15, 1980. Previously, flood risk areas in the Montreal Region and on the Gatineau/Ottawa, and the Chaudière Rivers had been designated.

The Mapping Agreement was extended by one year until 1982 to complete flood risk mapping as planned.

Work under the Montreal dyking and flow regulation agreement continued at Sainte-Marthe-sur-le-Lac and Châteauguay with projects at Pointe-Calumet, Roxboro, and Pierrefonds completed. An amendment to this agreement was completed in March 1980 extending it until March 31, 1982 and providing $1,556,000 additional funding that will be shared on a 45% federal, 55% provincial basis. This brought total funding by both parties to $11,556,000. A further draft amending agreement entitled "An Agreement Respecting the Study and Implementation of Flood Damage Reduction Works and Dykes in the Montreal Region" was negotiated during the year. Engineering and economic studies of the Mille Iles control structure and the feasibility of increasing storage capacities in the Ottawa River basin, as well as increased funding of existing projects are among items under consideration. The draft agreement, which has been approved by Treasury Board, defines expenditures that are, and are not, eligible for funding under the agreement, increases total funding by $4,500,000 (shared 45% federal, 55% provincial), and extends the termination date to March 1984.

Ontario: Negotiations between officials of Environment Canada and the provincial Ministry of Natural Resources produced a revised Ontario Flood Damage Reduction Agreement during 1980-1981. The revised agreement, which has been submitted for approval, provides for a two zone approach to flood risk mapping and extends the mapping and general portions of the Agreement 2 years to 1985 and 1990 respectively.

During the year, work was initiated or continued on thirty-two studies in twelve Conservation Authorities and four municipalities in the province at a total shared cost of $1.45 million.

Work was completed on a study of Lake Nipissing/French River flood problems which was initiated after the severe spring flooding of 1979. The study was funded (federal share - $130,000) under the Canada-Ontario Flood Damage Reduction Agreement which incorporates funding for all aspects of the program. The objective of the study was to prepare plans to reduce current and future flood related damage on the Sturgeon River, Lake Nipissing and French River system. A final study report will be released early in 1981-1982. Work is now underway to produce floodline maps for this system in 1981-1982.

Following recommendations for designation of flood risk areas in Toronto and Thunder Bay, the preparation of 1:25,000 scale public information maps was

initiated and the designation procedure defined. Designation of the Metropolitan Toronto and Region Conservation Authority in late 1981-1982 will be the first designation in Ontario. A request to proceed with the designation of the Central Lake Ontario Conservation Authority area has been made by the Authority itself.

Manitoba: Flood risk mapping was either initiated or continued for some 20 communities. Of the 20, Brandon, Carman, La Salle and Sanford were closest to completion. Designations occurred for Souris (October 1, 1980) and Elie (November 5, 1980). Flood risk areas had previously been designated, on an interim basis, in Melita and Wawanesa (December 1979) and Winnipeg (February 1980).

An agreement, amending the General, Mapping and Studies Agreement, was signed at the end of March 1981. The amending Agreement provides for additional studies, revision of Schedule A, additional funding of $1,490,000 (equally shared), and time extensions of 4 years for the General Agreement to December 1990, 3 years for the Mapping to December 1984, and 4 years for the Studies Agreement to December 1985.

An ad hoc task force was appointed by the Steering Committee to study various flood mitigation proposals for several Manitoba communities. The task force's recommendations will determine to what extent, if any, the federal government will participate in implementing these proposals.

Canada and Manitoba also signed "An Agreement Respecting Flood Forecasting". The five-year Agreement will provide $600,000 to be shared equally, to develop an improved flood forecasting capability on the Red, Assiniboine and Souris Rivers. A pilot project on the Boyne River is included in the Agreement.

Saskatchewan: Flood risk mapping was under way for 18 communities during 1980-81 with maps for Moose Jaw, Melfort, Weyburn, Swift Current and Eastend near completion. On August 1, 1980, the Souris basin communities of Roche Percee, Oxbow and Estevan were designated on an interim basis. Flood risk maps of all three communities together with explanatory information on the program have been released in a single booklet.

A draft amending agreement, similar to that for Manitoba, was prepared and approved by the Steering Committee, designed to extend the General Agreement by 4 years to March 1991, and the Mapping and Studies Agreement by 4 years to March 1986. An additional $800,000 funding (equally shared) is recommended for mapping, bringing the total allocation by each party since mapping began to $1,050,000. In addition, Schedule A is to be revised.

Alberta: There were no concrete developments in negotiations with Alberta towards participation in the Flood Damage Reduction Program, although negotiations are expected to recommence before the end of 1981.

British Columbia: Negotiations with the British Columbia government under the FDR Program continued through 1980-1981. At year's end, British Columbia officials were finalizing their internal flood policy before responding to the latest draft proposal.

Northwest Territories: During 1980-1981, work priorities and budgets were established for the flood risk mapping of the seven Northwest Territories communities on Schedule A. Hay River flood risk maps prepared previously under a special agreement were reviewed and found to require some additional work. Targeting, monumentation, ground surveys and aerial photography was carried out in the other six communities.

Yukon: A first draft agreement, based on the standard format of federal-provincial agreements, was drafted and, at the end of the year, was undergoing review by officials of both the Department of Indian and Northern Affairs and the Government of the Yukon.

Indian Lands: Negotiations continued between officials of the Department of the Environment and the Department of Indian and Northern Affairs (DINA) for purposes of providing an agreement to reduce flood damages on Indian Lands. DINA officials have been concerned for some time with the special circumstances of Indian Reserves such as a finite land base, flood plain location, and the need for social and economic development.

Other Cooperative Arrangements: This category includes all other federal-provincial water management programs that do not fall readily within the four earlier categories.

Work continued on the Canada-Quebec ecological inventories program, initiated in 1978-1979 on rivers flowing into the Saint Lawrence River 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.

In the Ottawa River basin, a Canada-Ontario-Quebec Technical Working Group on Water Quality in the Ottawa River, set up to report on water quality of the Ottawa River, has completed its work and was preparing its final report.

On the Great Lakes, a Canada-Ontario Task Force continued to implement recommendations arising from the Canada-Ontario Great Lakes Shore Damage Survey. The five-year program for shore erosion monitoring and public awareness of shoreline flood and erosion hazards was continued for its fifth and final year. Although a request to extend the program of shore erosion monitoring and public awareness was received from the Province of Ontario, a decision was made to discontinue Canada Water Act support of these activities. A report containing guidelines and methodologies for evaluating the

feasibility, costs, benefits and impacts of various shore management strategies for reducing future flood and erosion damage was completed to the point of final editing prior to publication.

Water quality monitoring related to the Garrison Diversion Project continued to provide baseline water quality conditions for the Souris River where it crosses the International Boundary in both Saskatchewan and Manitoba.

## 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 background 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 advice in support of water management in Canada. During the year, a number of major studies were completed including a Regional Economic Base component of the Prairie Provinces Water Demand Study and Water Use Forecasts for the Canada-U.S. Great Lakes Diversions and Consumptive Uses Study. A study of the environmental (includng socio-economic) impacts of coal-mining development in Canada was also completed. A program of studies to evaluate the social and economic damages associated with, and the alternate means to reduce damages from, the long-range transport of air pollutants (LRTAP), was developed. On the international front, common approaches to evaluate the socio-economic impacts of LRTAP are being developed in cooperation with provincial and U.S. federal agencies under the auspices of the U.S./Canada Transboundary Air Pollution Impact Assessment Work Group. This group will provide part of the essential technical backup to upcoming negotiations for a U.S.-Canada Air Quality Treaty.

Several broad-ranging reviews were completed including the role of water in Canada's economy, Western Provinces Water Needs, River Basin Development in Canada, and Water and Energy Relationships. Research continued on the use of non-structural techniques for the national Flood Damage Reduction Program, for example, Flood Risk Mapping and Flood Proofing.

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 quality assurance and analytical methods adaptation for the water quality program and current meter calibration of 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 a very large number 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). A Surface Water Data System has been developed to store and retrieve streamflow, water levels, and sediment transport information, 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.

## STATUS OF 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 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) Hydraulics Research: Research on river processes has included the mixing as well as the mass and heat exchanges taking place in open channel flows, 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. Coastal engineering work has included the investigation of wave agitation problems in harbours and of remedial structures needed to reduce the waves inside the harbours.

(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.

Great Lakes research has included the investigation of hypolimnitic 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.

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 nutrients from acidified sediments, the sulfur cycle and paleoecology, with emphasis upon biota that indicate the acid status of lakes. A major study in wetland ecology has been conducted on the coastal ecology of the Hudson/James Bay coast of Ontario, with emphasis upon salt marshes. Sediment contaminant studies have been carried out on Second Marsh on the Lake Ontario shoreline. 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 1980 were the Niagara River, Lake Ontario, and Canagagigue Creek. The second category encompassed 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 hazard, electron orbital calculations to predict degradation products, and assessment of computer models for contaminant fate in aquatic ecosystems.

(d) Analytical Methods: Analytical chemical 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.

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, constructed during 1979 and 1980, will be used primarily for methods development research involving highly hazardous compounds such as dioxins, and ultra-trace contaminants requiring a special ultra-clean working environment.

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 Huron and Georgian Bay 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 of 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 simulation model which is capable of simulating the effects of contaminants in the aquatic ecosystem. Over the past year, much of the modelling effort has been concentrated in the lower Great Lakes, particularly Lake Erie.

2. The National Hydrology Research Institute (NHRI)

NHRI specializes in research related to underground waters, and snow and ice, and is developing a surface water capability.

(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. The transport of contaminants in ground water systems is complex and has been under study at several field sites, particularly at Chalk River, Ontario, using tracer tests. The geochemical controls on contaminant transport are under study at field sites where solute exchanges between water and aquifer are being investigated. Natural isotopes in ground waters (stable and radioactive) provide considerable information concerning the age, origin and flow paths of solutes in ground water systems; samples from selected Canadian aquifers are being collected for the purpose of evaluating $^{36}Cl$ as a conservative tracer in long, slow flow systems. 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. A study of ground water flow and contamination from point sources is nearing completion at the Richmond landfill site in the Vancouver area, and a similar study is being carried out at a waste disposal site in Newfoundland. Ground water contamination from toxic materials is being studied at a site near Ottawa. Currently, a major research project sponsored by Atomic Energy of Canada Ltd. is studying the 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. Also, the effect of acid rain on ground water

supplies is under investigation.

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

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.

Investigations in the National Capital Region and the Fraser Valley in British Columbia, scheduled for completion in 1981-1982, are designed to provide ground water information for water resource management in urbanizing areas.

Geophysical studies are being conducted to improve the application of geophysical techniques to 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.

(b) Snow and Ice Research: Glacier research is an important element in snow and ice research. One project involved the use of an ice coring drill at an elevation of 5340 metres on Canada's highest mountain, Mount Logan, in the Yukon Territories. Three ice cores 24, 62 and 103 metres in length were retrieved during the 1980 summer drilling season. The expectation is that the 103-metre core will yield about 500 years of proxy climatic data. These data are of value in the development of Canada's climatic history and in the synthesis of historical streamflow records for the region.

A 1:50,000 scale map of the Columbia Icefields which includes shaded relief and rock protrayal as well as an interpretive text, glacier diagrams, photos and other features on its reverse side, is nearing completion. A joint effort with Parks Canada, the map responds to the needs of the thousands of national park visitors as well as to the need to assess and monitor changes in the frozen water reserves of the Cordillera.

Three glaciers in the Iskut River basin in northern British Columbia are being studied to determine their mass balance, their response to climatic change and their potential influence on the proposed construction of river dams. The monitoring of the hydrology and climatology of glacierized and non-glacierized basins in Yoho National Park continued during the year. This work was undertaken in order that runoff from various watersheds in British Columbia could be simulated using the University of British Columbia forecasting model.

Break-up and maximum ice thickness data were gathered at more than thirty locations within the Mackenzie Delta. These baseline observations will be used in the assessment of changes to the hydrologic regime that could occur as a result of proposed dam construction on the Liard River.

In the laboratory, analyses of the mechanical properties of ice and permafrost were continuing. Studies emphasized the effect of grain size on the strength of ice and the mechanical properties of frozen sand/ice mixtures. Knowledge of these properties is fundamental to the development of sound engineering practices in permafrost regions.

Progress was made in the study of the dielectric properties of contaminated ice. Theoretical calculations of the dielectric properties of ice clathrates were carried out. This research is of particular importance to hydrocarbon exploration in permafrost regions.

Remote sensing studies were hampered to some degree by a lack of snow in the spring of both 1980 and 1981. The second of two 1980 gamma ray snow surveys for Parks Canada in southern Ontario had to be cancelled due to lack of snow.

An interesting approach to the estimation of streamflow velocities from air photographs by means of autocorrelation was examined during break-up on the Liard River. It was determined that the velocity profile across the Liard could be calculated with 3-4% of measured flow velocities.

A number of other remote sensing techniques for mapping snow conditions were investigated during the year. These included the use of airborne X- and L-band synthetic aperture radar for determining snow state and water equivalent and the analysis of Nimbus-7 satellite multichannel microwave radiometric data for resolving the distributed properties of a snow cover.

### 3. Water Resources Research Subvention Program

In 1980-81, 14 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 research projects supported were focused on regional and national water research topics associated with hydrologic modelling, airborne pollutants, water and sediment quality, ground water contamination and snow and ice research.

## 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 implementation programs by federal-provincial agreements under the Act, where water quality management programs 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) and the Souris River (Manitoba-Saskatchewan) and is in the process of preparing similar plans for the the Shubenacadie-Stewiacke rivers (Nova Scotia). Also, an ad hoc Canada-Ontario-Quebec Technical Working Group continued its study on the quality of the water in the Ottawa River, with emphasis on toxic materials, nutrients and bacteriology, and a Canada-Ontario Task Force has produced a report on mercury contamination in the English-Wabigoon rivers.

During 1980-1981, the desirability of setting water quality objectives at boundary crossing points on all rivers flowing across the Canada-U.S. boundary, was under study by a task force reporting to the Canadian Council of Resource Ministers.

## PART III: Regulating Nutrient Inputs

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

By 1970, regulations to control the amount of phosphorus in laundry detergents were written under the nutrient control provisions of the Canada Water Act. The initial 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 1980 round of sampling and analysis has been completed without major problems.

A number of studies are ongoing, investigating various effects that the reduction in phosphorus in detergents has had on sewage treatability, treatment costs, energy consumption and receiving water quality. The associated 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. A striking indication of this is the highly significant downward trend observed in phosphorus concentrations in nearshore waters of Lake Ontario in Canada.

## PART IV: Public Information Program

As in recent years, the Flood Damage Reduction (FDR) Program highlighted information activities during 1980-1981.

During the period April 1980 to March 1981 inclusive, announcements were released covering the designation of two new flood-risk areas in Quebec, three in Saskatchewan, and two in Manitoba. Designation of the Oromocto to Lower Jemseg reach of the Saint John River in New Brunswick was also effective in the year under study but an announcement was delayed because maps were not ready.

The English version of an 8 minute-film on the Flood Damage Reduction Program was completed. Entitled "Floods: The Needless Hazard", the film's primary purpose is to provide an introduction at public meetings held in conjunction with the designation of flood risk areas. The French version "Avant le dêluge" was in final stages of production.

Copies of the public service announcements describing the FDR program were distributed in response to requests from television station managers. Several stations provided a detailed breakdown of use of the announcements and stations responded positively to a reminder to concentrate use in the March to June period, the usual flood period.

Water quality displays were produced for headquarters and regional offices. The first one was set up in Ottawa in May 1980 at a meeting of the Chemical Institute of Canada.

A slide-tape show on the Water Survey of Canada was produced under contract by the Western and Northern Region.

"Water Perspective", an overview leaflet describing the work of the Inland

Waters Directorate was printed in both official languages and prepared for distribution from Ottawa and from regional offices. The leaflet is intended for the general public. The french version is entitled "Aperçu de nos eaux".

As part of the Canada-Ontario Great Lakes Shore Damage Survey Follow-up Program, a slide-tape show entitled "Coping with the Great Lakes" was completed and copies made for distribution to Conservation Authorities and other interested groups. The show depicts flood and erosion problems along the Great Lakes shores and outlines procedures that can be followed to avoid these hazards when purchasing or developing land along the shoreline.

The fourth Canada Water Year Book was nearing completion at the end of 1980-1981 while planning for the fifth edition was under way. The fourth edition is designed to highlight water research in Canada while the fifth Year Book is expected to highlight several subjects. A questionnaire sent out to all readily identifiable users of the Year Book produced a gratifying response and has provided a clearer picture of the public needs and preferences for water resources information.

In March 1981, the Ottawa River Regulation Planning Committee presented its final report to the federal, Quebec and Ontario Ministers and made it public by holding a media briefing in Hull. Extensive coverage of the briefing was received in the local and regional media.

## SPECIAL EVENTS

### Spring Runoff 1981

Record mild temperatures during the last half of February resulted in an early spring breakup across most of southern Canada, bringing abnormally high runoff for February. The mild temperatures continued into March and depleted much of the snowcover in southern regions. Northern regions also experienced above normal temperatures but the effects on snowcover and runoff were less extreme. At the end of March 1981, runoff was in the normal to above normal range in most regions except for the southern prairies and the adjacent areas of northwestern Ontario in which runoff was below normal.

Ice jams on the Moira River in southwestern Ontario caused the worst flooding in 40 years. Several areas in southern Ontario and western Quebec also reported flooding due to ice jams.

Although many extremes have not yet been documented, it is known that water supply to Lake Ontario (in February 1981) was the highest recorded for February over the past 80 years. Breakup in late March on the Red River in the Winnipeg area was the earliest date on record. Early occurrences such as these point to serious surface water supply problems later in the spring and summer, especially on the prairies. For this reason, a reporting mechanism, similar to the one employed in 1980, has been established to monitor surface, soil and ground water supply conditions in the prairie region.

## Drought in Western Canada

Drought conditions in western Canada in 1976-1977 and again in 1980 have resulted in renewed interest in the drought phenomenon. In particular, the Department of Regional Economic Expansion (through the Prairie Farm Rehabilitation Administration) and Agriculture Canada have accelerated drought research and alleviation programs. Environment Canada too has initiated a program within the Inland Waters Directorate and the Atmospheric Environment Service.

Early in 1980, the Inland waters Directorate set up a program to facilitate the exchange of information on current drought conditions. The program also serves as a vehicle for the development of new, and the modification of existing, short-term drought alleviaton measures. Over the longer term, the program is directed towards increased understanding of the drought phenomenon, its impact, and an examination of a wide range of possible drought alleviation measures. An overview report under preparation on the drought phenomenon in western Canada since the 1930s is a starting point in learning from past success and failures. Future activities in the Inland Waters Direcorate are expected to include a state of the art review of all practical water conservation theories and practices, a study of the impact of drought on water quality, and an examination of the effect of the legal and institutional framework on water management practices during low flow periods. Of particular importance will be an examination of drought alleviation measures from the perspective of regional water planning.

In late 1979, the Atmospheric Environment Service began a program of meteorological studies in support of Environment Canada's drought research and services in western Canada, and in order to provide general guidance and assistance to other federal and provincial agencies concerned with dry weather repercussions on water resources, agriculture, forestry, recreation and tourism, etc. This program is structured to initially identify the time and space aspects of historical droughts occurring since 1925, to develop objective procedures to rank the intensity of droughts and to develop statistical procedures to express drought recurrence. This is being accomplished using a climatic water balance model to specify soil moisture deficits at 300 grid-points over the Prairie Provinces which, in turn, are correlated to crop yields, streamflow, forest fires and other indicators of drought. In addition, studies are being made of upper air circulation features of the Westerlies in order to improve the understanding of why droughts occur and to identify precursor characteristics of droughts, needed for the development of monitoring and management strategies.

Table 4 Current and Projected Release Dates of Final Reports Arising from Canada Water Act Studies

| Study | 1980-81 | 1981-1982 and later |
|---|---|---|
| Shubenacadie-Stewiacke | | mid-1981 |
| Mackenzie River basin | | late 1981 |
| Prairie Provinces Water Board | | |
| Water Demand Study | | mid-1982 |
| Ottawa River Water Quality Study | | mid-1981 |
| Ottawa River Regulation Study | late 1980 | |
| English-Wabigoon Mercury Study | late 1980 | |
| Thompson River Basin Preplanning Report | early 1980 | |

Available upon request from: Director
Water Planning and Management Branch
Inland Waters Directorate
Department of the Environment
Ottawa, Ontario
K1A 0E7

PRINCIPAL FEDERAL-PROVINCIAL COOPERATIVE ARRANGEMENTS UNDER THE CANADA WATER ACT

CONTINUOUS MONITORING AND SURVEY PROGRAMS



PREPLANNING STUDIES



PLANNING STUDIES



IMPLEMENTATION AGREEMENTS



FLOOD DAMAGE REDUCTION PROGRAM



OTHER COOPERATIVE ARRANGEMENTS

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

### CONTINUOUS MONITORING AND SURVEY PROGRAM

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 Agreements: 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 that provides 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:

| | | |
|---|---|---|
| 1980-1981 | Canada's Agreement Costs | $ 5,068,100 (estimated) |
| | Payment to Quebec by Canada | 833,500 (estimated) |
| | Provincal Agreement Costs | 3,975,300 (estimated) |
| | Canada's Non-Agreement Costs | 5,158,200 (estimated) |
| | Total Program Cost | $15,035,100 (estimated) |

Canada's Agreement Costs above include operation and construction costs incurred by the federal government in all provinces and territories except Quebec.

Canada's Non-agreement Costs include overhead for all Regional and National Capital Region components to service the Agreements plus the many non-agreement activities such as involvement with Boards, Committees and hydrologic studies.

Incorporated in the Total Program Cost is the Province of Quebec's own additional costs of approximately $1,400,000.

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 and subsidiary agreements ensure 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 Master Agreement on Apportionment 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.

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

Status: 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 these five drainage basins. Similar natural flow reports are being prepared for other basins situated on provincial boundaries. The Committee on Hydrology also has prepared a report for the Board describing the mechanisms required to administer the 1969 Apportionment Agreement and is studying 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 PPWB 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 in the past year under the direction of the Board, has established a task force on analytical methodology to provide a means of coordinating water quality laboratory results of the member agencies.

The Board has undertaken a study to report on historic and current water uses in the three prairie provinces. The data gathered for this study will be presented in report form in 1982. All data gathering has been completed and the six study sub-sectors are now preparing the reports that will be combined to produce a final report for the Board.

The Board's Committee on Interjurisdictional Agreements Administration has completed a study on the implications of interprovincial apportionment of water on Battle and Lodge Creeks, two streams that flow from Canada into the United States. The report, with its recommendations, will be presented to the Board in the spring of 1981.

The Board established a Committee on Ground Water in the fall of 1980. The committee is now involved in establishing commonly accepted cross-sections or profiles to describe ground water conditions at interprovincial boundaries.

## PREPLANNING STUDIES

### 1. THOMPSON RIVER BASIN

Objective: To carry out a preplanning study of the Thompson River basin in order to prepare a plan, if appropriate, for a subsequent cost-shared planning study.

Duration of Agreement: May 1979 to March 1981 (extended)

Participants:
CANADA
BRITISH COLUMBIA

Status: On May 9, 1979, the Federal and Provincial Ministers of the Environment signed an agreement to conduct an eight month preplanning study of the Thompson River basin at a shared cost of up to $60,000.

An Intergovernmental Working Committee was established to coordinate and analyze all available information associated with the basin. Working contacts were established with various agencies in both the federal and provincial governments. Interest groups and the public at large were approached for the express purpose of obtaining their participation in the preplanning exercise.

A preplanning report has been released, recommending action on specific problems that can be resolved without additional study as well as on the need for specific planning studies.

### 2. WINTER RIVER BASIN

Objective: To carry out preliminary data acquisition and assessment of the aquifer hydraulics of the basin. This work will form the basis of subsequent studies to determine the reliability of the existing water supply system for Charlottetown.

Duration of Agreement: Continuous since 1977.

Participants:
CANADA
PRINCE EDWARD ISLAND

Status: A consultants report has been received outlining several approaches to studying the hydraulics and hydrology of the basin. The need for further federal involvement in the project is currently being evaluated.

## PLANNING STUDIES

### 1. LAKE WINNIPEG WATER QUALITY

Objective: A study of the Lake Winnipeg basin for the purpose of identifying beneficial uses of Lake Winnipeg, water quality criteria needed for such uses, and the need for more data on tributary inflows; identifying present and future contaminants and methods of controlling contaminant inflows; developing a predictive model; and determining alternative approaches to managing the water's quality.

Duration of Agreement: approximately five years.

Participants and Funding:
CANADA.....$1,450,000
MANITOBA.....$1,450,000

Status: This study has been deferred indefinitely by mutual agreement, due to provincial financial constraints and the province's wish to re-evaluate the study program. Discussions have not been held regarding future activities under this agreement.

2. 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; study agreement in May 1978.

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: Following detailed examination of interjurisdictional water resource issues, the Committee, then known as the Mackenzie Basin Intergovernmental Liaison Committee, submitted a formal agreement to the Ministers of the participating governments, in May 1977, and received endorsation of a study program.

Status: A Memorandum of Understanding and an Agreement Respecting Federal-Provincial Studies and Investigations of the Water Resources in the Mackenzie basin were signed, and a $1,600,000 study program begun in May 1978.

The study program has been completed, and the final report is expected to be completed in mid-1981.

3. OTTAWA RIVER REGULATION PLANNING COMMITTEE

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. Associated with this objective is the development of a flow forecasting model, a flood warning system and effective liaison with St. Lawrence River regulation.

Duration: February 1977 to March 1982 (extended).

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

Prior Action: The Committee on Flow Regulation - Montreal Region, established in May, 1974 by agreement between Canada and Quebec, was empowered to study the means by which damages, due to flood and low water, might be reduced in the Montreal Region. That Committee made recommendations to achieve specific objectives. In order that these recommendations might be acted upon, the then Minister of Fisheries and the Environment wrote to the ministers of interested federal and provincial departments and heads of agencies, inviting them to participate in a new committee. This Planning Committee is the result of that invitation.

Status: The Committee's final report containing recommendations for regulating the Ottawa River was published in December 1980.

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.

The Committee's mandate was extended to March 1982 to provide continuity in anticipation of the establishment of a permanent Canada-Ontario-Quebec body with responsibilities for coordinated operation of principal reservoirs in the Ottawa River basin.

4. SHUBENACADIE-STEWIACKE BASIN

Objective: To examine critical problems affecting the water resources and the interrelationships of these problems; to develop proposals for interim measures to control critical problems and to maintain options for future action; and to develop a comprehensive framework plan focusing on water quality and quantity objectives and complementary development and resource-use strategies.

Duration of Agreement: August 1977 to June 1979 (extended)

Participants and Funding:
CANADA.....$365,000
NOVA SCOTIA.....$365,000

Status: The study report is in the final stages of preparation and is expected to be available for distribution in mid-1981.

5. FRASER RIVER ESTUARY - PHASE II

Objective: To develop a Management Plan for the Fraser River Estuary.

Duration of Agreement: October 1, 1979 to December 31, 1981.

Participants and Funding:
CANADA.....$150,000
BRITISH COLUMBIA.....$150,000

Prior Action: In February 1977, the federal and British Columbia Environment Ministers authorized a preliminary assessment of the need for this study. In August 1978, a Federal-Provincial Steering Committee issued several reports describing the characteristics and prospects of the area and laying out existing policies and practices governing utilization of the estuary. A summary report contained several proposals for the development of a management plan for the estuary.

Status: A Fraser River Estuary Study Planning Committee was set up and a coordinator for the program obtained. Four federal-provincial task forces were established to coordinate program activities and a public participation program was initiated.

6. MERCURY CONTAMINATION IN THE ENGLISH-WABIGOON RIVER SYSTEM

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 absorption 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 in mid-1981.

7. 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: 5 years

Participants:
CANADA
NEWFOUNDLAND

No federal funds have been encumbered for this study. The province will provide funding of about $205,000, while the federal share, half of the total input, will be in the form of work sharing.

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 work in several project areas is now under way.

8. YUKON RIVER BASIN

Objective: To develop an information base leading to the formulation of a planning framework which will focus on alternative uses of water and related resources in the Yukon River basin.

Duration of Agreement: 3 years

Participants:
CANADA.....Dept. of the Environment
Dept. of Indian and Northern Affairs
BRITISH COLUMBIA
YUKON TERRITORY

Status: Preplanning activities were completed and the Preplanning Task Forces' 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.

In March 1980, the participants sought funding approval for a $2.2 million study agreement to develop an information base and thereafter a planning framework which will focus on alternative uses of water and related resources in the basin. Social, economic and environmental consequences of providing for each kind of use will be evaluated for the purpose of identifying alternative water management plans for the basin.

Under the terms of the agreement, 95% of the cost will be met by Canada (50% by the Department of the Environment and 45% by the Department of Indian and Northern Affairs) while British Columbia will meet the remaining 5%. A three year study agreement was signed on November 24, 1980.

## IMPLEMENTATION AGREEMENTS

1. SAINT JOHN BASIN (proposed)

Objective: To implement recommendations arising from the 1970-1974 Saint John River Basin Study.

Participants: CANADA
NEW BRUNSWICK

Status: A Federal-Provincial Task Force reviewed the recommendations of the Saint John River Basin Board and reported that the recommendations can be met through regular programs and that no formal implementation agreement will be required. A Standing Federal-Provincial Committee prepares an annual statement of the recommendations implemented during the year and deposits it with the respective Ministers.

2. LAKE WINNIPEG, CHURCHILL AND NELSON RIVERS (proposed)

Objective: To implement recommendations arising from the Lake Winnipeg, Churchill and Nelson Rivers Study.

Participants: CANADA
MANITOBA

Prior Action: The Lake Winnipeg, Churchill and Nelson Rivers Study Board concluded the three-year, $2,000,000 joint study with the release of the Summary Report (and eight Technical Appendices) on June 2, 1975. Thirteen of the 47 recommendations are of direct federal interest, ranging from water, fisheries, and wildlife to Indian Affairs and navigable waters.

Status: Manitoba Hydro and various Manitoba departments are implementing some of the Study Board's recommendations which are provincial responsibilities. The Freshwater Institute, in the federal department of Fisheries and Oceans, is continuing its major research project on the fisheries of South Indian Lake. Environment Canada is continuing its monitoring of water quality and quantity (including sediment).

Discussions continued with Manitoba to develop a joint monitoring program. Also, discussions were resumed with Manitoba on possible joint studies associated with mercury and other environmental problems.

The arbitrator under Article No. 24 of the Northern Flood Agreement of December 1977 was appointed in March 1980. He will adjudicate claims and disputes and enforce the agreement, which stipulates the monitoring of adverse effects of the diversion project pursuant to the study board recommendation of 1975.

3. LOWER FRASER VALLEY FLOOD CONTROL PROGRAM

Objective: 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 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 1976-1977, 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.

Status: Construction has been completed at Kent, Matsqui, Surrey (Serpentine-Nicomekl Dams), New Westminster, Coquitlam and Kamloops and is well advanced in Richmond, Delta and Pitt Meadows. Construction continued in Abbotsford, Surrey (South Westminster), Vedder River and Nicomen Island but is temporarily suspended in Chilliwhack. Total expenditures under the program to March 31, 1980 are $81,600,000. The current annual funding rate is $4,000,000 from each government.

4. 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: Most of the proposed improvements and modifications to the three mainstem dams were completed in 1978-1979. Modifications to the Kelowna floating bridge were completed in the fall of 1979.

Improvements and modifications for the lowering, alteration or adjustment of intakes and modifications to oxbows along the Okanagan River channel continued. Replacement of walkways for the drop structures along the river channel also continued.

A plan was prepared for orderly development of waste treatment facilities. Osoyoos and Westbank improved their waste treatment facilities by installing spray irrigation systems. Kelowna obtained a permit to construct works to improve the quality of wastewater discharge. As an interim measure, Penticton has initiated improvements to the existing sewage treatment plant by increasing the capacity of its secondary treatment facility from 1.8 to 2.5 million gallons per day.

The general process for the review of the framework plan has been developed and a number of specific review components are under way.

5. QU'APPELLE BASIN

Objective: To implement recommendations 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.

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

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. 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.

## 6. CANADA-ONTARIO AGREEMENT ON GREAT LAKES WATER QUALITY

**Objective:** To provide a basis for implementing the Canada-U.S. Agreement on Great Lakes Water Quality in the Great Lakes basin by reaching agreement on water quality objectives, by coordinating and implementing federal and provincial input in order to discharge Canadian responsibilities under the Great Lakes International Surveillance Program, and by conducting pertinent research.

**Duration of Agreement:** January 1976 to March 31, 1981 (extended)

**Participants and Funding:** CANADA
ONTARIO

The participants will each pay half the costs 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 1980-1981 was set so as to not exceed $1,200,000.

**Prior Action:** An initial agreement from August 1971 to December 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 since 1976 has been the subject of a separate agreement with CMHC under the National Housing Act.)

**Status:** The Canada-Ontario Agreement dated March 12, 1976 expired on March 31, 1980. A revised agreement was still under negotiation during the year which necessitated an exchange of letters between Ministers extending the expired agreement to March 31, 1981. The revised agreement, expected to be finalized and signed in 1981, will reflect the new Canadian commitments under the 1978 Canada-U.S. Agreement.

A report entitled, "Environmental Baseline Report of the Niagara River" was prepared by the Board of Review for the Canada-Ontario Agreement and released in June, 1980. The report focuses on toxic substances and summarizes Canadian data on water, suspended sediment, bottom sediment and biota collected in the Niagara River between 1975 and 1979. The information in the report will provide a baseline for determining trends in environmental quality, assessing the effectiveness of pollution abatement programs and predicting the effects of future developments.

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 per cent 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 designed and are being implemented. A commitment has been made directed to eliminating the discharge of toxic substances into the Great Lakes. New interim phosphorous 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: The IJC presented its report "Pollution in the Great Lakes Basin from Land Use Activities" (dated March 1980) to the governments of Canada and the United States. The report outlines and recommends a comprehensive management strategy for controlling land drainage (non-point) pollution. In a subsequent report to the governments entitled, "Supplemental Report on Phosphorus Management Strategies" (dated January 1981) the IJC confirms, as the best available estimates, the phosphorus target loads contained in the 1978 Great Lakes Water Quality Agreement and presents one strategy to reach the target loads. The governments are committed to confirming these target loads by May 22, 1981.

Under the surveillance program six intensive surveillance cruises of Lake Huron were carried out in a joint effort with the United States Environmental Protection Agency (U.S. EPA) as part of the Intensive Surveillance Year on Lake Huron. Ship-board laboratory support was also provided for 11 surveillance cruises on Saginaw Bay (Lake Huron) carried out by the U.S. EPA. The annual surveillance program on Lake Ontario was continued at a lower level of activity with only three cruises conducted in 1980.

7. SOURIS RIVER 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

Status: 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.

The Advisory Committee on Implementation has suggested that the majority of the recommendations can be undertaken under existing federal programs, provincial programs, federal-provincial agreements and proposed federal-provincial agreements. In particular, a number of the recommendations concerned with water supply and flood damage reduction are already included in the Canada-Saskatchewan and Canada-Manitoba Subsidiary Agreements on Water (under the DREE General Development Agreements) and under the Canada-Manitoba Flood Damage Reduction Agreement.

8. FLOODPROOFING - RED RIVER VALLEY

Objective: To raise and/or move rural homesteads in flood prone areas in the Red River Valley, south of Winnipeg.

Participants and Funding: CANADA.....$4.25 million
MANITOBA.....$4.25 million

Status: A $2 million contribution was made to Manitoba covering the 1979-1980 portion of the work. Another $1,250,000 of federal funds was spent in 1980-1981. This is an ad hoc program (not under either the Flood Damage Reduction Program, or the Federal Disaster Assistance Program).

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 flood control reservoirs, channel improvements, excavations and changes in structures.

Duration of Agreement: September 1977 to March 1982 (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 has been completed and some progress was made on the reconstruction of Marsh Bridge. Negotiations are under way to acquire land for forebay storage.

2. DYKES AND FLOW REGULATION WORKS - 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 Iles to approximately 700 cubic metres per second by means of a control structure.

Duration of Agreement: October 1976 to March 1982 (extended)

By March 31, 1981, a new agreement to increase the funding available and to extend the work to March 1984, had been negotiated and received federal Treasury Board approval, but was awaiting provincial approval.

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

(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 expected to be made available under the new agreement.)

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. This 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. A Flood Risk Mapping Agreement signed at the same time as this Flow Regulation Agreement is discussed in the section headed Flood Damage Reduction Programs.

Status: Construction of dykes at Roxboro, Pierrefonds and Pointe-Calumet was completed while similar work at Sainte-Marthe-sur-le-Lac is well under way. Phase 1 of the Châteauguay project was added to the agreement late in fiscal year 1979-1980. Studies are under way to determine the feasibility of a control structure on the Rivière des Mille Iles. 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.

OTHER COOPERATIVE ARRANGEMENTS

1. 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 1982

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

Status: Studies and Geophysical inventories, dealing mainly with the basins east of the Natashquan River basin, were undertaken during the year under review.

2. TECHNICAL WORKING GROUP ON WATER QUALITY IN THE OTTAWA RIVER

Objective: To report on gaps in current water quality information for the Ottawa River; to present a progress report on Ottawa River water quality, with emphasis on toxic materials, nutrients and bacteriology; and to prepare a coordinated monitoring program.

Duration: Approximately two years (1979-1981).

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

Status: The Technical Working Group has completed its work and was preparing its final report at the end of the fiscal year.

3. CANADA-ONTARIO GREAT LAKES SHORE DAMAGE SURVEY FOLLOW-UP PROGRAMS

Objective: To implement recommendations arising from the Canada-Ontario Great Lakes Shore Damage Survey.

Duration of Agreement: 1976-1981

Participants and Funding:
CANADA.....50%
ONTARIO.....50%

Programs are carried out by the province and Environment Canada on work-shared and cost-shared bases with $60,000 provided annually under Canada Water Act funding.

Status: This five-year agreement began in 1976 with the establishment of a Canada-Ontario Task Force and Canada Water Act funding was terminated on March 31, 1981. The major programs implemented during this period related to:

- shoreline erosion monitoring
- public awareness
- shoreline management.

Although the Province of Ontario requested an extension of the Agreement at the same level of funding, a decision was made to withdraw Canada Water Act support.

Programs for shoreline erosion monitoring and public awareness over a five-year period were continued for the fifth year. A report on the erosion monitoring program is pending. Slide-tape shows and public information brochures showing how to avoid the hazards of shoreline erosion were produced and distributed.

In 1977, a shoreline management study was initiated to provide guidelines and methodologies for evaluating the feasibility, costs, benefits and impacts of various shoreline management strategies for reducing future flooding and erosion damage. These methodologies were developed and tested on an 18-mile study site at the western end of Lake Erie. A report on this work was prepared and provided to the local municipalities. A comprehensive Shore Management Guide was prepared with final editing and printing pending at fiscal year end. This report includes a shore management summary and detailed guidelines for shore land use planning, the design of coastal structures, benefit-cost analysis and environmental evaluation, as well as a worked example.

4. 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 monitors have been installed and are operating. Major physical modifications have been made to ensure satisfactory cold weather operation. Preliminary studies have been undertaken to determine natural variability in selected parameters to permit assessment of the effects of the Garrison Diversion Project on the quality of the Red River. Data are transmitted continuously to the GOES satellite system and then directly to a mini-computer in Regina.