THE WATER PROGRAM (IWD)

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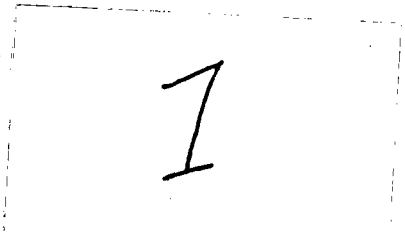
May, 1975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ORGANIZATION

The Inland Waters Directorate (IWD) plans and participates in national and international water management programs for maximum economic and social benefits, giving full consideration to environmental concerns. This requires the conduct of research and the gathering of data related to inland waters, and the implementation of water programs and policies. IWD provides for the planning and administration of most aspects of the Canada Water Act and the International River Improvements Act within the framework of the multidisciplinary resources and environmental concepts of the Environmental Management Service. The Directorate consists of three headquarters branches, five regional offices, and a major research centre.

The Water Quality Branch is responsible for national policies on water quality, for establishment of water quality objectives, for functional direction of programs of water quality research and measurement, and for assessment of changes and trends in quality of Canadian waters.

The Water Resources Branch is responsible for the assessment of water quantity and its geographical and time variations, through planning and coordinating water quantity and sediment data network programs, including those of the Water Survey of Canada. It also undertakes national programs of research in surface and groundwater hydrology, and snow and ice.

The Water Planning and Management Branch develops and interprets national policies and provides functional direction for comprehensive river basin studies under the Canada Water Act, and develops plans and policies for cooperative programs with the provinces and the United States of America for water resources management and flood damage reduction.

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Five Regional Offices (Vancouver, Regina, Toronto, Montreal, Halifax) direct the agreed-upon federal, Canada-USA, and federal-provincial water programs in their regions, including those in water quality and quantity data collection, applied research, and planning and management for improved water quality and for optimum use of water and related resources.

The Canada Centre for Inland Waters (CCIW) in Burlington is the major national fresh water research and survey centre for Environment Canada. CCIW undertakes research, in the natural and social sciences, which is designed to further the wise use of Canada's fresh water resources. The Institute provides scientific input to federal policies and programs in water resources and is recognized as the World Health Organization's International Collaborating Centre for surface and groundwater quality.

Within Directorate Headquarters, the Office of the Research Advisor undertakes the definition and coordination of research activities throughout the Branches and Regions, and also manages a research incentives program to encourage studies in universities, institutes and industry, complementary to that done in the Directorate. The Office of Program Evaluation and Liaison analyses and evaluates Directorate policies and operations, and undertakes the development of goals, program concepts, and strategies in keeping with Service and Departmental objectives; it also provides support for Directorate involvement in national and international water matters. Public information programs on water resources policies and programs are conducted from Headquarters and CCIW.

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DEPARTMENT OF THE ENVIRONMENT
INLAND WATERS DIRECTORATE

WATER INVESTIGATION, PLANNING AND MANAGEMENT ACTIVITIES IN CANADA

MINISTÈRE DE L'ENVIRONNEMENT
DIRECTION GÉNÉRALE DES EAUX INTÉRIEURES

ÉTUDE, PLANIFICATION ET GESTION DE L'EAU AU CANADA

LEGEND

CURRENT BOUNDARY WATER ACTIVITIES

1. Dickey - Lincoln School (Saint John)
2. Richelieu
3. Great Lakes Water Quality and Levels
4. Garrison
5. Skagit
6. Roseau
7. East Poplar

IMPLEMENTATION

1. Peace - Athabasca
2. Fraser Dyking
3. Southwestern Ontario Dyking
4. Metro Toronto & Upper Thames

PENDING IMPLEMENTATION

1. Saint John
2. Qu'Appelle
3. Okanagan

CURRENT INVESTIGATIONS

1. St. Lawrence-Water Quality & Flooding
2. Lake Winnipeg - Churchill Nelson
3. Souris
4. Churchill (Saskatchewan)
5. Shubenacadie

COMPREHENSIVE STUDIES UNDER NEGOTIATION

1. P.E.I. Coastal Zone
2. Lake Winnipeg Water Quality
3. Athabasca

OTHER AREAS OF ACTIVITIES

1. Fraser-Upstream Storage
2. MacKenzie Intergovernmental Liaison
3. Northern Ontario
4. James Bay
   Prairies Provinces Water Board

LEGENDE

ACTIVITÉS COURANTES SUR LES EAUX LIMITROPHES

1. Dickey - école Lincoln (Saint John)
2. Richelieu
3. Qualité des eaux et niveaux des Grands lacs.
4. Garrison
5. Skagit
6. Roseau
7. Poplar Est

MISE EN OEUVRE

1. Paix-Athabasca
2. Endiguement du Fraser
3. Endiguement de la région Sud-Ouest de l'Ontario
4. Métropole de Toronto et région en amont de la Thames

EN ATTENDANT LA MISE EN OEUVRE

1. Saint John
2. Qu'appelle
3. Okanagan

ÉTUDES EN COURS

1. Qualité de l'eau et risque d'inondation du fleuve Saint-Laurent
2. Lac Winnipeg - Churchill Nelson
3. Souris
4. Churchill (Saskatchewan)
5. Shubenacadie

ÉTUDES D'ENSEMBLE EN NÉGOCIATION

1. Région Côtière de l'I.P.-É
2. Qualité de l'eau du lac Winnipeg
3. Athabasca

AUTRES SECTEURS D'ACTIVITÉ

1. Fraser réserve d'eau en amont
2. Liaison intergouvernementale du bassin du Mackenzie
3. Région du nord de l'Ontario
4. Baie James
   Commission des eaux des provinces des Prairies

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THE CANADA WATER ACT

Traditionally, outside of projects or project elements which were federal responsibilities (such as navigation or fisheries), the role of IWD and its predecessors in water resource management was largely in data gathering and in providing financial assistance toward the cost of construction where a project was in the national interest, or provided for in federal legislation such as the Canada Water Conservation Assistance Act.

Beginning in the early Sixties, however, concern was being expressed about the adequacy of the federal government's merely responding to such requests for implementation funding on an ad hoc basis without having input to the planning phase. Additional factors were the limited scope of many of the proposed projects and the heavy emphasis on structural solutions to the neglect of other alternatives. Somewhat later in the Sixties, pressures developed for a higher degrec of public participation in the planning process, and a special concern was raised over the degradation of water quality of the Nation's rivers and lakes and its concomitant social, economic, ecological and environmental effects.

The outcome of these concerns was the Canada Water Act. Part I of the Act provides for the establishment of formal federal-provincial consultative arrangements for water resource matters; and for cooperative agreements with the provinces for the development of comprehensive plans for the management of water resources and for implementation of these plans. 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 on any aspect of the water resource.

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Although the Act was not proclaimed until September 30, 1970, consultative arrangements were established before this date with British Columbia (Okanagan River Basin Agreement - October 1969), with New Brunswick (Saint John River Basin Agreement - June 1970) and with Saskatchewan and Manitoba (Qu'Appelle River Basin Agreement - August 1970). Since the Act was proclaimed, consultative committees have been formed with all other provinces.

Since 1967, the Department has made commitments in the order of $15 million as its share towards joint planning and investigation activities. This figure excludes monies expended in furtherance of its other programs such as in the areas of data gathering and international investigations, and its share of large implementation programs such as the Fraser River Dyking and other flood control programs, and the cost of Boards such as the Prairie Provinces Water Board. The agreements have been widely varying in scope - some comprehensive (Okanagan, Qu'Appelle, Saint John, Souris), some water quality oriented (Lower Great Lakes, St. Lawrence), and some primarily environmental impact (Churchill, Churchill-Nelson and Peace Athabasca).

In addition to basin planning studies, IWD carries out most of its other programs under Part I of the Act including data collection, research and economic analysis.

Part II of the Act, simply stated, envisages federal-provincial agreements where water quality has become a matter of urgent national concern. It 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. No water quality management areas, as defined under the Act have been set up,

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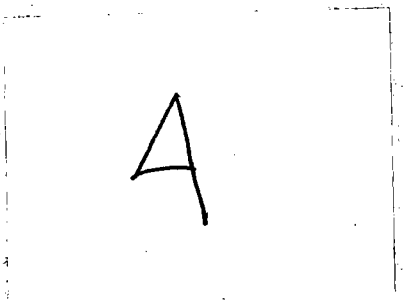
although the Canada-US and Canada-Ontario agreements on the Great Lakes meet many of the objectives of such an agency.

Part III of the Act provides for the passing of 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. It provides one of the principal means of controlling the rate of eutrophication of water bodies by restricting input of nutrients into water bodies. Initially the phosphorus content was limited to not more than 20% by weight of phosphorus pentoxide and subsequently, as of January 1, 1973 to 5%. It has been estimated that the 20% limitation meant a reduction of 13 million pounds (from 57 million pounds) and that the 5% limitation has meant a further reduction of 33 million pounds (to a current level of 11 million pounds from this source).

Under Part IV are provisions for the general administration of the Act. In addition, it permits the Minister to establish Advisory Committees (Section 26) and either directly, or in cooperation with any government, institution or person, to undertake public information programs.



BASIN PLANNING AND IMPLEMENTATION

a) The Link with Scientific Activities

Prior to the Canada Water Act the main approach was to influence, by strong scientific and technical competence, policy discussions on international water management and on federal-provincial water management.

We were limited to this "influence" role domestically by provincial resource jurisdiction and internationally by the leadership role of External Affairs. However, through the development and application of its knowledge of water resources, the Directorate has established itself as Canada's major water adviser and manager. With the passage of the C.W.A., active participation in management became possible and the implications of this are discussed at length below.

In international lakes and streams, our knowledge of water flows and levels has served as the basis for regulating levels and controlling allocation of the use of water to each country since 1911. Waters controlled by IJC Boards now include the Great Lakes and the major rivers serving both Canada and the USA.

Our investigations formed the basis for the Canada-US Columbia River Treaty and Protocol of 1961-64. This development permits the installation of over four million kw of generating capacity in Canada at far lower cost than if this were done by Canada alone, and provides effective flood protection to settled areas on the lower Kootenay and Columbia Rivers in Canada.

Recently, our scientific and technological competence led to the first major international step towards the clean-up of the lower Great Lakes. In 1967, scientists from the Canada Centre for Inland Waters in Burlington undertook concentrated monitoring of these lakes to identify their problems, and began searching for solutions to these problems. Progressive consultation with US

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officials and development of plans for international management to improve the lakes led to the Canada-USA Great Lakes Water Quality Agreement signed in April, 1972 by Prime Minister Trudeau and President Nixon. As directed by the Agreement, the IJC has established and staffed an office (in Windsor) to oversee its implementation. A Research Advisory Board and a Water Quality Board have been established as well as reference groups on the upper lakes and on land drainage. IWD personnel are active as chairmen, members and technical advisors to these bodies. CCIW continues to provide the main inputs of competence and knowledge to work related to the agreement such as quality monitoring, surveillance, contingency planning, research into nutrient removal, etc.

Provincial water policies are and have been significantly influenced by federal knowledge and policies. For over sixty years streamflow measurements have served as the basis for planning water management and control projects in the provinces. The offer of federal funds for water conservation and control works in 1953 (Canada Water Conservation Assistance Act, replaced in 1970 by the Canada Water Act) added financial leverage to the federal influence; engineering and benefit-cost evaluations of provincial proposals often led to project improvement or to shelving of uneconomic proposals.

During the past ten years there has been a phenomenal growth in public concern for environmental quality, and particularly for water quality. IWD's part in satisfying the water quality objective is to provide, through research, the scientific, technological and economic knowledge by which the effects of effluents on water quality can be assessed. This research led to the Minister's policy decision to sharply reduce the content of phosphates in detergents and provided the rationale for the development of waste management guidelines for major water-using industries. Since 1970, the estimated level of detergent phosphate discharged per capita has been reduced from about 2.6 pounds per year to 0.5 pounds.

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Water affects many related resources. Data that we have on water flows, availability, quality, use, etc., and our research findings are made available to a multitude of agencies for consideration in managing the resources for which they are responsible. Information that we provide influences development in agriculture, power production (hydro and thermal), forestry, fishing, transportation and urban and industrial growth.

In order to influence policies through competence in science and technology, that competence must be organized, developed, and kept current. The required knowledge of the water resource is of three types: what to we have, and what quality is it? - what do we need? - how do we balance these?

In the first case, we examine and measure our water resource in its quality and its quantity (amount, location, time) aspects. Our intention here is to develop a fully integrated data and information collection, interpretation, and dissemination system to serve as the data base for all federal water management programs, and to integrate this system with provincial and private sector data and information systems or sources for national use.

Secondly, we examine our needs, present and future, for water in Canada. Our aim is to develop, or provide access to, information systems providing knowledge and understanding of current water demand and use and to develop the capability to forecast future water needs. The understanding of present demands on the water resource is an essential factor in the supply/demand equation for water management; as future water requirements expand, the need for knowledge of the demand for water for municipal, recreational, power and other uses will become even more essential.

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In the third case, the type of knowledge needed is an adequate understanding of the chemical and physical characteristics and behaviour of water as a resource, and of the chemical, physical and biological reactions and interreactions that occur in it in the natural state and as a result of man's activities. Research is also directed towards improving methods and technology for treating waters and towards resources affected by water, e.g. erosion and deposition processes. A recent addition is socio-economic research to examine perceptions of and reactions to water use and to improve the definition of the economic role of water. Our research produces much of the scientific, technological, economic and social knowledge necessary for the development and implementation of water management plans and programs.

b) A New Strategy

Our old strategy of influencing decisions through scientific and technical know-how has had some disadvantages. Too often we became involved too late, and found ourselves in the position of a yes-or-no choice on a completed proposal in which significant funds and loyalties had been invested. To remedy this situation, we developed the concept of federal-provincial partnerships for "comprehensive water management" in individual regions or river basins. This far more active approach became the basis for the Canada Water Act of 1970.

This comprehensive water management strategy differs from the "influence" strategy, first, by consideration of a broader range of values - economic, recreational, ecological, aesthetic - at the beginning of basin planning, and second, by federal participation in the initial stages of water management projects.

Study boards are formed to examine river and lake basins, determine their problems, identify their opportunities, involve interested publics, and apply the latest available knowledge to arrive at the best possible plan. The participating governments contribute funding, information and talents in agreed ratios and implement the plans under similar arrangements.

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This new strategy solves many of the problems we found previously:

- joint participation bypasses the conflicts of jurisdiction which are a fact of life under the British North America Act;
- both cost-sharing partners have a voice in developing proposals;
- the initiative is not left solely to the provinces, so a system reflecting both national and provincial priorities can be used;
- all uses or aspects are more likely to be considered through broader participation, and
- increased public participation improves public acceptance of solutions.

These advantages do not, however, come without disadvantages:

- the process is time-consuming;
- no dramatic visible benefits appear in the short-term, and
- we are still dependent on provincial willingness to proceed wherever the jurisdiction is not uniquely federal.

Included in the comprehensive water management strategy is the potential of long-range conceptual planning, made possible by being an active partner, rather than only a financier, in water management. Looking at water on a national scale, we intend to identify, and propose solutions to, the problems of the future. Much research effort is aimed at solving problems now visible; more attention must be given to speculating on problems likely to become apparent in 10, 20 or 50 years, and to developing and examining concepts to avert or solve these problems.

Legislation existing prior to the Canada Water Act fell far short of being adequate for comprehensive water management purposes. Water problems have often been neglected due to uncertain and overlapping jurisdictions; clarification of juriscictions and creation of organizational structures able to coordinate all

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involved levels of government are required. Our intention is to put in place a legislative and institutional base adequate for water management for the next ten to twenty years.

Water quality improvement must have some specific goal in view if it is to be effective. To set this goal, it is necessary to determine scientifically the quality requirements or criteria for designated uses of waters, and, from these, to select and apply, as objectives or standards, those criteria appropriate to the uses which a water management plan seeks to support. This process is a direct part of management planning and implementation. Because of the wide range of possible water uses, with their differing requirements to be considered, establishing a management plan that will produce the greatest benefits from water necessarily involves many federal and provincial agencies and the private sector. While development of objectives and standards is continuously affected by new scientific knowledge (criteria) and by emerging and changing management programs, it affords the means of establishing minimum acceptable quality levels on a localized, watershed, regional, or national basis while management plans are being formulated.

Social science research, already mentioned in our science and technology discussion, is being developed further to support the comprehensive water management strategy. All water management programs are aimed at satisfying needs which, in the final analysis, are social, or public. This research will be directed towards improved understanding of social needs, behaviour, and reactions, and towards developing public understanding of water problems and participation in their solutions.

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c) Activities Under the Canada Water Act

Since 1967, the federal government has made commitments in the order of some $15 million as its share towards joint planning and investigation activities under the Canada Water Act. (See attached Table for details). This figure excludes monies expended in furtherance of its own programs such as in the areas of data gathering and international investigations, and its share of large implementation programs such as the Fraser River Dyking and other flood control programs and the costs of Boards such as the Prairie Provinces Water Board.

Already the results of this investment are coming in. Reports on the Saskatchewan-Nelson Supply Studies, the Peace-Athabasca Delta Study, the Qu'Appelle Basin Study and the Okanagan Basin Study were released in 1973, and the Saint John Basin Study and the Lake Winnipeg, Churchill and Nelson Rivers Study reports are due in 1975.

Various recommendations under the plans include among other things recommendations on structures, (such as the Rivière des Roches Weir to restore water levels in the Peace-Athabasca delta), additional treatment and nutrient removal (Qu'Appelle), flood plain zoning (Okanagan) as well as water, land use and other adjustments. In many cases environmental assessment impacts have formed a major component of the studies leading up to the recommendations, while in others such as the Saskatchewan-Nelson Supply Studies, a solid base been laid for any further environmental impact studies required.

d) Implementation Under the Canada Water Act

It should not be assumed that the completed planning studies will inevitably lead to an implementation agreement, complete with a joint board, project director and reporting procedures to the Ministerial levels. It may be possible to solve the problems and achieve the opportunities which the plan has identified through use of existing federal and provincial programs. Thus,

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at the federal level, there will be an assessment as to whether an implementation agreement is in fact, warranted. Therefore, planning and implementation will be regarded as two distinct steps, rather than a continuous process.

Where implementation agreements appear warranted, full use of existing federal and provincial programs is anticipated, although there is no guarantee that the plans will be in accord with the priorities of the agencies administering these programs. With regard to other costs, the Canada Water Act does not specify a cost-sharing formula so that cost-sharing of program elements will have to be negotiated. It can be expected that this determination will take account of jurisdictional responsibilities, economic and equity considerations as well as many revenue producing (or cost saving) activities which would flow from the implementation of plans.

Three imminent basin implementation activities are summarized below. As has been the case in the past, in some cases IWD will be the major actor in these activities while in other cases it will provide a coordinating or support role to facilitate activities led by other federal agencies.

Okanagan

An implementation agreement is being developed by a Federal-Provincial Task Force. This Task Force is setting out the implementation procedures in line with the recommendations of the study report. It is expected that this agreement will be signed within the next few months. The main components of the program will be improvements in the regulatory capability of existing control structures, and the installation of pollution control works.

Peace-Athabasca Delta Project

The Intergovernmental Implementation Committee (Canada-Alberta-Saskatchewan) recommended construction of remedial works on the Rivière des Roches in line with the findings of the Peace-Athabasca Delta Report. Work on the weir will be carried out during 1975-76.

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Qu'Appelle

A federal-provincial working group has developed an implementation agreement under the DREE General Development Agreement with Saskatchewan. The primary objective of the agreement will be to develop the resource based recreation industry, as recommended in the study. DOE will be involved in flood control and water quality aspects.

STATUS OF PRINCIPAL PLANNING STUDIES, IMPLEMENTATION AGREEMENTS AND OTHER COOPERATING ARRANGEMENTS UNDER THE CANADA WATER ACT

PLANNING STUDIES

Under Negotiation in 1974-75	New During 1974-75	Ongoing During 1974-75	Completed
Lake Winnipeg	Souris Basin	Canada-Ontario Agreement on Lower Great Lakes Water Quality	Peace-Athabasca Delta (1972)
Athabasca Basin	Flow Regulation - Montreal Region	Lake Winnipeg, Churchill and Nelson Rivers	Saskatchewan-Nelson Basin (1973)
Shubenacadie-Stewiacke Basin		Churchill River (Saskatchewan)	Okanagan Basin (1973)
		Fraser River Upstream Storage	Qu'Appelle Basin (1973)
		St. Lawrence River Water Quality	Saint John Basin (1975)
		Northern Ontario Water Resources	Canada Ontario Great Lakes Shore Damage Survey (1975)
		Flood-Hazard Mapping Pilot Project	

IMPLEMENTATION AGREEMENTS

Under Negotiation in 1974-75	New During 1974-75	Ongoing During 1974-75	Completed*
Okanagan Basin	Peace-Athabasca Delta	Fraser River Flood Control Program	Upper Thames (CWCAA)**1975
Qu'Appelle Basin		Southwestern Ontario Dyking	
Saint John Basin		Metro-Toronto (CWCAA)**	

OTHER COOPERATIVE ARRANGEMENTS

New During 1974-75	Ongoing During 1974-75
Lower Saskatchewan Basin Task Force (pre-planning)	Mackenzie Basin Intergovernmental Liaison Committee
	Prairie Provinces Masters Agreement on Apportionment

*The Winnipeg Floodway and Red River Dyking Programs predated the Canada Water Act.

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FLOOD DAMAGE REDUCTION

Over the past 20 years, IWD has spent about $100 million on our share of federal-provincial flood control works. The attached table and map demonstrate the areas covered under these activities.

Over the past two years, through two Memoranda to Cabinet, our basic philosophy towards flood damage reduction has drastically changed. Although the federal government will continue to participate in traditional flood control projects such as dams where these offer the best solution, a greater emphasis will be placed on a combination of structural and non-structural alternatives. Experience has shown that a flood damage reduction program based on structural works alone may not be effective.

A long-range approach has been developed to provide a series of federal-provincial Accords to reduce potential flood damages and to provide national flood hazard mapping.

The proposed Accords would be based on the principles that:

a) Flood risk areas must be clearly defined and mapped;

b) Information on flood hazards must be communicated to the public, industry, municipalities and the provinces;

c) Construction of federal facilities, federal housing loans and other grants and loans should not be made in flood risk areas or be made conditional upon adequate flood proofing or other damage reduction measures;

d) Disaster assistance should be refused for further development in identified high flood risk areas where the public has been made fully aware of the hazard, and

e) Provinces and municipalities should be encouraged to consider appropriate restrictions on land use in high flood risk areas.

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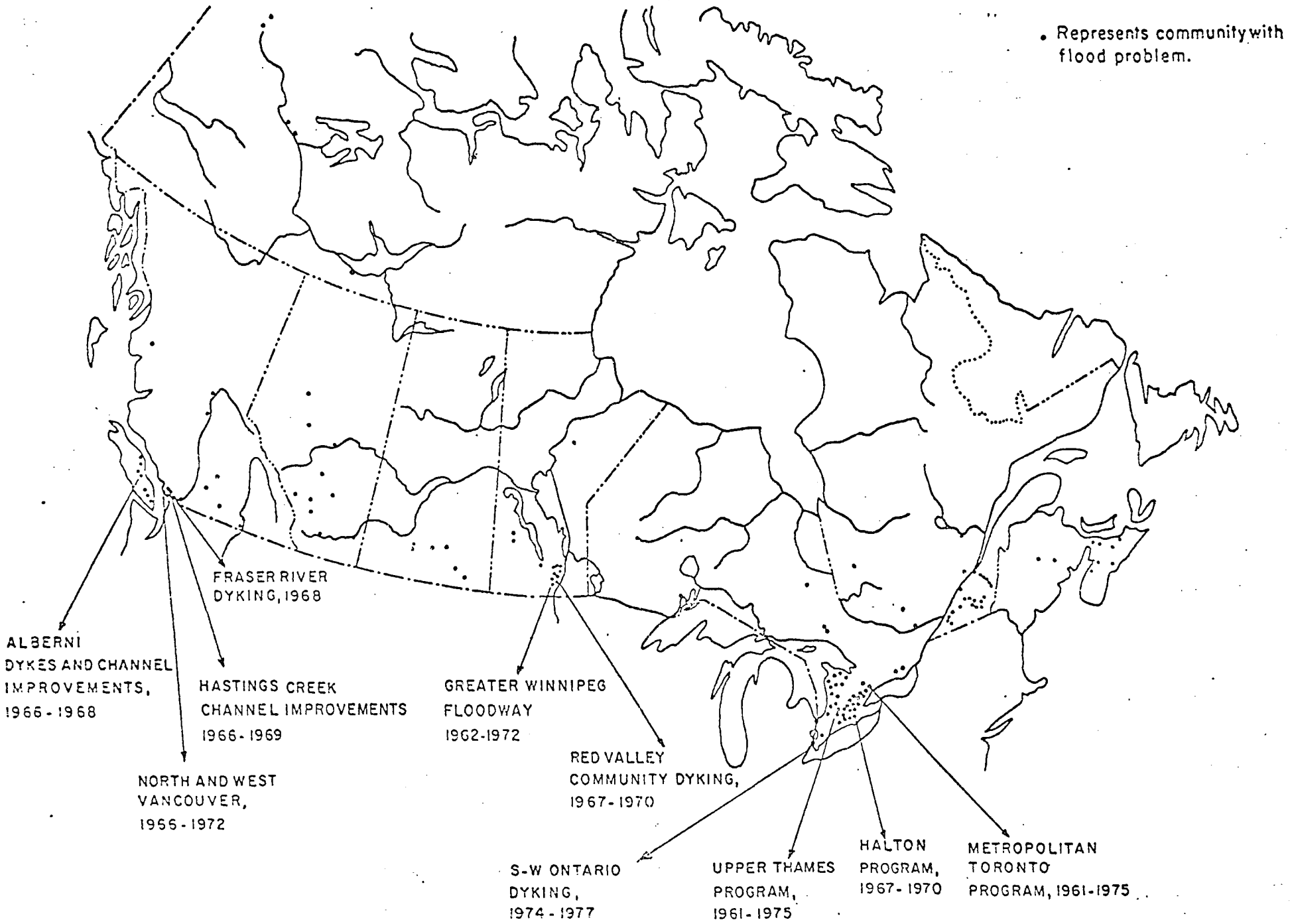
Federal-provincial cooperation in keeping with these principles is developing in five pilot flood hazard mapping projects now underway. A flood risk map for Fredericton, New Brunswick, is almost complete and maps for Carman, Manitoba, Moose Jaw, Saskatchewan, and Oshawa and Sault Ste Marie, Ontario, are being drafted.

As a key part of this new approach to flood damage reduction, a national flood hazard mapping program has been approved. The mapping program may cost up to $20 million with costs shared equally by the Federal government and the provinces. Priorities for mapping flood risks for more than 200 rural and urban communities affected by floods will be worked out jointly.

Alternatives to be considered include land-use adjustments such as acquisition and zoning, flood warning and forecasting, flood routing through property easements, flood proofing of structures, upstream storage, stream straightening, flood by-passes and dykes.

The program has been approved by Cabinet, and informal discussions have indicated that the Provinces are in favour of the approach. Letters will go out shortly to each province to initiate detailed discussions on the federal-provincial accords.

FLOOD PROBLEMS & FLOOD PROGRAMS



IWD FLOOD CONTROL PROGRAMS 1950-74

AGREEMENT (Duration)	COST ($1000) Total	Federal	PROGRAM DESCRIPTION	STATUS
Fanshawe Dam (1951-54)	4,799	1,738	Dam	Complete
Conestogo Dam (1953-60)	4,802	1,741	Dam	Complete
Upper Thames* (Jan. 1961 to Jan. 1975)	9,640	3,615	6 Dams 2 Channel Improvements	4 Dams Complete
Parkhill Dam (May 1961 to May 1966)	825	310	Dam	Transferred to ARDA Dec. 1966
Metropolitan Toronto* (June 1961 to June 1975)	24,000	9,000	8 Dams & 4 Channel Improvements	2 Dams Complete 2 Channels Complete
Red River Floodway (May 1962 to May 1972)	63,212	36,974	26 mile Floodway	Complete
North & West Vancouver* (Feb. 1966 to Feb. 1972)	2,301	863	6 Channel Improvements	3 Channels Complete
Alberni Dyking* (Feb. 1966 to Dec. 1969)	1,400	525	Dyking and Channel Improvements	Complete
Hastings Creek* (Nov. 1966 to Nov. 1969)	700	262	Diversion	Complete
Halton* (June 1967 to June 1971)	2,386	895	Diversion Channel Channel Improvement	Complete
Red River Valley Community Dyking (Dec. 1967 to Oct. 1970)	2,750	1,900	Ring Dyking of 7 Towns	Complete
Fraser River (May 1968 to May 1978)	over 60,000	30,500	Dyking Lower Fraser River	On-going
South-West Ontario Dyking (May 1973 to March 1977)		7,312	Dyking	On-going

* Indicates an agreement under the CWCAA

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WATER QUALITY PROGRAM

The program of IWD on water quality was organized within the Water Quality Branch and at the Canada Centre for Inland Waters, initially in the Department of Energy, Mines and Resources to provide for:

1. the collection of data and information on the ambient quality of waters in Canada that were of significance to the Federal government by reason of legislative responsibilities, international and interprovincial movement of water, federal or joint federal-provincial programs or funding, or because of the occurrence of pollution problems that were deemed to be of national concern;
2. analytical support to departmental water programs and to international, federal-provincial or private sector programs in which there was a national interest;
3. research into analytical methods and the development of new and improved methods for water analysis, and for the development of nationally accepted standard methods of analysis;
4. research on the movement and fate of pollutants in water and specifically to provide an understanding of chemical, physical and biochemical processes in water;
5. innovative research on the treatment or re-use of water and wastewaters;
6. a comprehensive computerized system for the storage, retrieval, analysis and interpretation, and publication of water quality data and information; and to
7. undertake a lead role in the identification of specific water quality objectives as a basis for water quality management and specific pollution control programs to be implementated for multiple water use.

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Although the program as developed under Energy, Mines and Resources has been modified to a great extent during the past several years to meet the changing needs of the Department (environmental assessments, detection and measurement of hazardous and toxic substances, support of international and federal-provincial programs, etc.) the program elements indicated in the foregoing are still valid. It should be noted, however, that the program on wastewater treatment research has been largely moved to the Environmental Protection Service, with a limited program of fundamental research still remaining in the Inland Waters Directorate.

Field Monitoring and Survey Programs

The collection of ambient water quality data and information is undertaken, in part, through the repetitive sampling and analysis of water taken from points that are representative of baseline water quality in the major watersheds of Canada. Added to these points of determination are selected downstream and tributary samplings that provide:

a) information on changes in quality from point to point as a result of natural or man-made impacts or pollution inputs;

b) information on quality changes occurring over time. The numbers and locations of sampling points, the frequency of sampling, and the range of parameters that are measured, are determined on the basis of perceived and anticipated user needs in each watercourse, taking into account natural influences on water quality, inputs of municipal and industrial wastes, non point-source run-off, and so on. User needs in addition to the internal needs of IWD, are generally identified by inquiries reaching the Branch from the government, university, and private sectors and by user surveys undertaken at both the national and regional levels by contract or through staff inquiries.

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Sampling of approximately 1,000 points across Canada ranges from weekly to annually, depending on the variation in water quality, the impact of pollution or other influences, and the demands being placed on the water resource. The statistical validity of the data so-derived is improved, as required, with increased frequency of sampling and with the continued accumulation of data over time.

In addition to the on-going monitoring of water quality at specific locations, an important, expanding program of intensive water quality surveys (or studies) has been undertaken. It is the purpose of this program to examine specific water areas in some detail for limited periods of time, to enlarge upon the background and regular monitoring data to permit a more definitive description of the status of water quality and to relate it to pollution input data and information acquired at the same time and to provide a comprehensive understanding of the movement and fate of pollutants in the water, sediment and biotic systems. It is intended that such studies, requiring from perhaps a few weeks to several months, will be repeated every three to five years (some may require more, some less) with minimal monitoring and surveillance of a small number of "indicator" parameters undertaken at selected points in the intervals between the detailed studies.

It should be noted that the implementation of intensive surveys of this type can only be undertaken with the joint involvement of a number of Departmental, provincial or private agencies, the latter usually under contract although direct participation by industry need not be ruled out. Provincial agencies provide water quality data from their sampling programs to the national water quality data system.

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A third significant aspect of the field survey program is the undertaking of studies in support of federal-provincial agreements, Canada-US treaty obligations or joint agreements, and environmental impact assessments relative to Canadian developments in which there is a direct federal interest or involvement. As in the preceding portion of the program, emphasis is on intensive, comprehensive surveys or studies of limited duration.

Operational Laboratories

The Water Quality Branch operates laboratories in Moncton, Burlington, Calgary, and Vancouver, each with a broad capability to undertake routine and highly sophisticated organic, inorganic and physical analyses. Emphasis has been placed, in the development of these laboratories, on the use of automated analytical methods that facilitate the processing of large numbers of samples on a routine basis, while, at the same time, recognizing the need for accuracy in a wide range of parameters.

The laboratory at Burlington, in addition to providing routine analytical services, is equipped and staffed to undertake special analyses that cannot, at this time by reason of equipment costs, be provided in all Branch laboratories. A tandem Gas Chromatograph-Mass Spectrometer, an Electron Microscope (asbestos fibres) and a radiochemistry lab unit are among such facilities which serves both operational and research programs.

The development of new DOE laboratory facilities for the Quebec Region at Longueuil, Quebec, has provided the opportunity for Environmental Protection Service and Inland Waters Directorate to develop an integrated laboratory operation in that Region. Although details of work-load integration have not been completed, it is expected that a wide range of analytical services will be available with an amalgamation of manpower and physical resources in a joint program arrangement.

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The Inland Waters Directorate conducts research programs in microbiology (bacteriology and virology); operational water quality laboratories in Moncton, Burlington and Calgary have been staffed and equipped to carry out operational bacteriological identifications and analyses. Plans are being developed, also, to undertake Algal Assay Tests, first at Burlington and, if desirable, at the other laboratories, based on procedures now in use in EPA in the US at Corvallis, Oregon.

Collaboration with the Water Resources Branch of the Department of Indian and Northern Affairs in the Northwest Territories led in 1973 to an extension of the services of the Calgary laboratory through the development of a small laboratory operation at Yellowknife. This facility, operated by DINA, is supported by the assignment of one Water Quality Branch chemist and two term casuals to it, operating under the on-site management of DINA.

Standard Methods of Analyses and Lab Intercomparisons

The Water Quality Branch has, as far as practicable, standardized all analytical procedures used in the laboratories and has assembled and published the descriptions for general reference in Canada. Revisions are entered into the manual on a case-by-case basis.

The Burlington laboratory has also been assigned the lead role in the Branch for the conduct of a laboratory quality control program that is applied in all laboratories and for round-robin (inter-laboratory) testing. Approximately forty government, university and private sector laboratories participate in this important program.

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Research

Research in IWD at the Canada Centre for Inland Waters is conducted on movement, interaction and effects of pollutants in lake and river systems; on analytical chemistry microbiological remote sensing and instrumental methods of measuring water quality; on chemical and microbiological processes in natural water systems and in artificial systems potentially applicable to wastewater treatment; and on water treatment; and on hydraulics aspects of water quality (storm and combined sewers, etc). Research in the Hydrologic Sciences Division is undertaken on groundwater quality and impacts of subsurface disposal of wastes.

Future Thrusts

One of the high priority activities in the water quality program over the next period will be the establishment of water quality objectives. For federal-provincial and provincial waters, the objectives will be subject to federal-provincial agreement. We are working towards full agreement on nationally applicable general objectives and case-by-case agreement on specific objectives to meet the requirements of specific waters or areas. We are currently working with the provinces to develop objectives for the Great Lakes, and the Yukon, Saint John, and Souris rivers, and would expect these to be the basis for a set of national objectives.

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THE WATER QUANTITY PROGRAM

a) Water Surveys

The federal government began maintaining an inventory of surface run-off data as early as 1894. Since that time, programs for the systematic collection and compilation of streamflow, water levels, sediment transport, groundwater, and related information on glaciers, snow and ice have continued to expand in support of water management basin studies such as those being carried out on the Souris, St. Lawrence, and others.

The principal water resource data collection agency is the Water Survey of Canada. Through a system of seven main offices and a large number of sub-offices, the Water Survey currently reports on 2,500 gauging stations maintained throughout the country for the collection of data on streamflow, water levels, and sediment transport in rivers. Some 300 of these gauging stations serve as part of the national water quality program which serves to monitor the quality of water mainly in the Atlantic and Western Regions.

During the closing months of fiscal year 1974-75, Canada and the provinces signed Memoranda of Agreement to share the costs of water quality surveys in proportion to designated federal and provincial interest in the surveys. To be implemented on April 1st, 1975, the total cost of $8,760,200 in 1975-76 will be shared as follows: Canada $7,004,100; Provinces $1,756,000. The agreements have the objective of maintaining a viable and efficient national water quantity survey and of giving recognition to joint federal and provincial responsibilities in this activity. Joint federal/provincial Coordinating Committees are to be established in each Province to be responsible for planning and reviewing water quantity survey networks and to ensure the maintenance of standards. The agreements may be terminated by either party on March 31st of

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any year, provided that 18 months notice is given. At present all but two agreements have been signed.

b) Future Thrusts in Related Programs

The retransmission of data by satellite has proved to be very reliable. This technique shows real promise, both technically and economically, both for conventional data transmission and for real time data.

IWD and the Province of Manitoba have agreed to cooperate on a pilot project to establish the best methods for observing sediments, in order to permit effective sediment measuring networks to be designed.

IWD is in the process of developing standard methods and procedures and preparing a manual of standard field and laboratory practices for sediments.

Irregular demands for data on the "square grid" physiographic data file are being received. The latest request (from Ontario) is for data from Northern Ontario, the only area in Canada other than the Arctic Islands not yet covered by the square grid system. Alternative ways of fulfilling this request (e.g. satellite data, map scanning) are now being evaluated.

The principal objectives of Water Quantity Research in IWD are:

1. to develop hydrologic techniques and methodologies for water resource management;
2. to identify operational areas in the water resource field where there are needs for research and to implement appropriate research projects and programs.
3. to undertake hydraulics research to improve knowledge of flow and movement of water, ice and sediments and effective methods of controlling such flows and movements.

Work is now being extended or redirected towards six major areas:

a) groundwater quality, especially with respect to trace metal contents and quality changes caused by agriculture, e.g. irrigation return flows.

b) the effects of excavations (such as open-pit mines) on groundwater quality. Although the initial studies are concerned with conventional mining, the project may be extended to study tar-sand operations.

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c) the effects of oil spills on groundwater, and on methods of minimizing adverse effects.

d) northern hydrogeology, especially the heaving of ground ("frost heave") around pipelines. The initial work of IWD in this area has proved to be extremely valuable. Frost heave is now a major concern of pipeline designers.

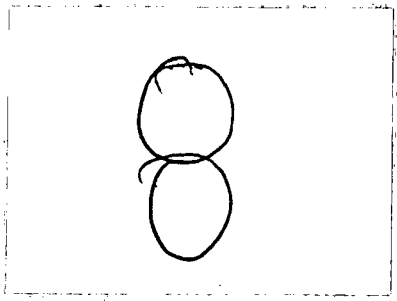
e) urban runoff and storm sewer design criteria.

f) wave forces on shorelines, shore structures and oil spill containment techniques.

The objective of glaciology research is to maintain within the federal government a centre of expertise in basic and applied studies of snow and ice in relation to our inland water resources.

In Northern Canada, applied research is directed towards the needs of northern resource and transportation developments and the assessment of the environmental impact of highway and oil/gas pipeline development, in particular the Mackenzie Valley pipelines and highway. Work in the Eastern Arctic has been accelerated. The Interaction between ice and oil is being investigated with particular emphasis on arctic oil spills. Work on the factors contributing to avalanche occurrence is being undertaken with a view to avalanche hazard zoning.

The Hydraulics Laboratory at CCIW provides facilities for current meter calibration, as well as for research on a wide range of hydraulics applications including dispersion of sediments and point source pollutants, ice and oil spill studies, wind-wave and shore erosion studies, storm sewer design, river aeration, etc.



THE RESEARCH PROGRAM

This section includes a list of the components of the IWD research program followed by the highlights of IWD research over the past year, and a brief description of the proposed Hydrology Research Institute, the principle new thrust which we would see the research program taking in the next few years.

a) Components of the Research Program

1. Groundwater hydrology
2. The hydrologic cycle
3. Perennial snow and ice
4. Snow and ice hydrology
5. Floating ice
6. Ice properties
7. Arctic hydrology
8. Remote sensing
9. Avalanche research
10. Mathematical modelling of lake and river systems
11. Analytical methods research
12. Water treatment research
13. Trends in water quality
14. Chemical and biological processes in lakes and rivers
15. Physical processes in lakes and rivers
16. Sediment deposition and movement in lakes and rivers
17. Sediment biogeochemistry
18. Oil in water

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19. River system hydraulics
20. Wave dynamics
21. Urban run-off quantity and quality
22. Cold environment hydraulics
23. Microbiology
24. Hydrodynamics
25. Instrumentation research and development
26. Social science research

b) Highlights 1974-75

The World Health Organization in 1974 designated IWD's principal research laboratory, the Canada Centre for Inland Waters, as its International Collaboration Centre for Surface and Ground Water Quality; and CCIW continued to act as lead institute in the lake eutrophication measurement program for the Organization for Economic Cooperation and Development.

CCIW primarily focussed on studies related to the Canada-US Agreement on Great Lakes Water Quality. Field work for the Upper Lakes Reference Group was completed and studies for the Reference Group on Pollution from Land Use Activities were continued. Monitoring surveys on the Great Lakes and interconnecting channels were carried out to assess water quality changes brought about by major Canadian-US clean-up programs.

Research on environmental contaminants got considerable attention as did development of integrated physical, chemical and biological models of the Great Lakes. A computer model for Lake Erie simulated transport of nutrients and one for Lake Ontario showed movement of possible toxicant spills. Another model was developed to simulate future waste loadings of 50 nutrients and contaminants in the Upper Lakes.

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Improved methods for water quality surveillance, from on-site to remote sensing, were investigated. A technique for removing asbestos fibres from water was perfected. And field measurements were taken for a joint water quality study with B.C. of Kamloops Lake and Thompson River.

Knowledge of northern groundwater resources, their sensitivity to contamination and their reaction to permafrost was gained from studies related to the Mackenzie pipeline program. Research was initiated on urban hydrogeology and simulation of streamflow; and an avalanche research group was set up in Calgary.

Water-related studies in 24 Canadian universities were funded by IWD in a million dollar program complementing its own studies.

c) Hydrology Research Institute

In terms of change over the next few years, the most significant happening is likely to be the establishment of a National Hydrologic Research Institute in Western Canada.

While basically a research establishment, it is visualized that appropriate mechanisms will be incorporated to provide interfaces with operational activities for application of research results in the day to day activities of IWD as a whole. As it will provide the centre for hydrological research in Canada, it must be conceived as a national institute, that is to supplement national programs and to complement other IWD institutes such as CCIW and a possible estuarine institute that may be formed in the future - all dealing with inland waters or waters at the fresh-saline interface.

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The nucleous of the new institute will be the Glaciology and Hydrology Research Divisions from Water Resources Branch (WRB) Headquarters in Ottawa. As such, the new institute will have some basic strength in hydrological research relative to the following:

1) Snow and Ice

2) Surface Water

3) Hydrogeology

The prime objective will be to conduct research relative to questions that have arisen and to improve the understanding of the hydrologic processes and groundwater and to relate these to the remainder of the hydrologic cycle.

It is understood that the research and studies carried out will be restricted to "inland waters" but will include waters in the form of ice and snow, water on the ground surface and in lakes and streams, and waters below the ground surface. Of necessity a strong interface will have to be developed with the Atmospheric Environment Service to ensure information transfer and cooperation regarding the contribution of precipitation and the processes of evaporation and transpiration. Strong interfaces will have to be developed with the Branches of the Directorate - particularly relating to water quality, water supplies and demand forecasts, and, the application of research results to operational activities.

DATA AND INFORMATION SYSTEMS

Following is a brief description of the principle data and information systems in IWD:

1. WATDOC

WATDOC is an information project undertaken by the Inland Waters Directorate of Environment Canada. Its purpose is to increase the exchange of knowledge on all aspects of research, planning and management of Canadian water resources. The project provides a centralized source of bibliographic references to published and unpublished reports, studies, analyses, research activities, matters of public interest and newspaper reports.

A group of participating agencies and university research centres cooperate in this information system on the basis of a simple barter arrangement. This means that the users will have access to a large computer data base on condition that they, in turn, contribute to the maintenance and expansion of the base by providing bibliographies and abstracts of references in their fields of specialty.

As part of this system, a set of sophisticated computer programs, developed and operated by the QUIC/LAW Project at Queen's University, is available to the user for carrying out literature searches in a conversational mode. By this means, on-line interactive cathode ray terminals produce instant response to queries in plain English. In addition, batch mode searches (the University of Alberta's batch retrieval programs) permit the screening of massive files through various levels of boolean logic.

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2. Hydrometric Data System

The Water Survey of Canada and its predecessors have been collecting and publishing streamflow and water level data for over 60 years. The present hydrometric network consists of more than 2,400 gauging stations, excluding those in Quebec, where the provincial government has conducted its own surveys since 1964.

Automated data processing techniques were initiated in Water Survey of Canada in 1966 along two fronts:

(i) automation of daily discharge computations with the use of a digitizer,

(ii) storage of historical daily discharge data on magnetic tape.

Both of the above programs are now in operation.

To date, over 30,000 station-years of daily discharge data have been collected, and about 8,000 station-years of "water level only" data. All of these data are published, and daily discharge data are available on magnetic tape for computer processing.

3. Water Quality Data Bank

For the past few years, the Water Quality Branch of the Inland Waters Directorate has been operating a data storage and retrieval system, known as NAQUADAT (National Water Quality Data bank). Before this system was developed, an interdepartmental task force had set down some guidelines for the storage and retrieval of all types of scientific data collected from field surveys. Examples of these guidelines are the use of latitude and longitude for storing the location of the field site, and the use of time, rather than sample number, as a key variable.

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The system employs an IBM 360/85 computer in Ottawa, with data inputs from the Branch's four laboratories at Vancouver, Calgary, Burlington and Moncton. As a large proportion of the samples being analyzed in these laboratories are for other federal and provincial agencies, the system now contains a large amount of water quality data that is relevant on both the national and local scales.

Identical systems are being operated by provincial agencies at Winnipeg, Edmonton and Saskatoon.

The central Ottawa system will soon be acting as a water quality data bank for all of the Atlantic Provinces to store both federal and provincial data. NAQUADAT is capable of storing all types of water-relevant analyses (chemical, physical, bacteriological, biological and hydrometric) for surface water, groundwater, waste water and sediments.

4. Groundwater System

The development of an automated groundwater data storage and retrieval system in the Inland Waters Directorate began in 1965. It was intended initially to store data for a groundwater observation well network, but GOWN has since expanded into a general purpose data processing system for the large volume of data available in the field of hydrogeology.

The data come from many sources, such as provincial water well drillers' reports and drilling programs for federal research projects. Data on fluid potentials are usually collected with analog or digital recorders. Floats or Keck sensors are normally used as the water level sensing devices.

5. Great Lakes System

Data collected from Great Lakes vessel surveys for the Inland Waters Branch/Directorate have been filed under the STAR code system since the surveys

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began in 1967. In addition, the same system stores data collected on contract by the Great Lakes Institute, University of Toronto, from 1960 to the present.

STAR is a card-based code system of data entry, with the basic layouts of the cards somewhat modified. The Canada Centre for Inland Waters (CCIW) at Burlington, Ontario, has developed a storage/retrieval system for this extensive data base, using the modified fixed format cards, which are punched from special coding sheets, as the input medium. Thereafter, tape is used for long-term storage, and a tape/disc system (EROS) for retrieval.

6. Others

Several other systems are in various stages of development, including the following types of data:

a) Glaciology

b) Sediment

c) Water use data

In the future, we would envisage these data systems remaining as separate entities, but will work towards standardization of formats and documentation. We also expect to work towards improving user accessibility to the systems by establishing a centralized "data window" concept within the Directorate.

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BOUNDARY WATER ISSUES

Canada's investigatory and administrative relations with the United States on most matters concerning the two countries' boundary and transboundary lakes and rivers are the responsibility of the International Joint Commission (IJC). The IJC was established under the Boundary Waters Treaty of 1909 and consists of six members, three appointed by Canada and three by the United States. The Canadian Section of the IJC reports to the Secretary of State for External Affairs. The Commission's approval is required for any use, obstruction, or diversion of boundary waters in one country affecting the natural level or flow of boundary waters in the other country; and for any works, in waters flowing from boundary waters, or downstream of the boundary in rivers flowing across the boundary, which raise the natural level of water on the other side of the boundary.

The IJC is also empowered to investigate and report upon questions and matters referred to it by either government. The reports of the Commission in such referred cases are not regarded as decisions either on the facts or on the law; they are reports to the governments. In addition, questions or matters or difference between the two countries may be referred to the Commission for decision, provided that both countries consent.

The Commission itself has only a small staff, and to assist it in its functions, it calls upon the services of engineers and other specially qualified personnel in government agencies in both countries. In its deliberations, it sets up essentially three kinds of ad hoc boards. Boards of Control generally supervise agreements reached through the IJC on the maintenance of lake levels, water flows or the operation of remedial works which affect transboundary waters; Investigatory and Advisory Boards undertake technical investigations or studies for the IJC on water quality and pollution problems for specific boundary waters to recommend remedial measures.

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The main International Boards currently in operation are listed below. IWD provides federal members on all these Boards, except a few of the Advisory Boards on Pollution, where EPS provides the members.

(a) Boards of Control

Osoyoos Lake Board of Control

Lake Memphremagog Board

Kootenay Lake Board of Control

St. Mary-Milk Rivers Accredited Officers

Souris River Board of Control

Prairie Portage Board of Control

Lake of the Woods Control Board

Rainy Lake Board of Control

Lake Superior Board of Control

St. Lawrence River Board of Control

Niagara Board of Control

Lake Champlain Board of Control

St. Croix River Board of Control

Skagit River Board of Control

(b) Investigatory and Advisory Boards

Columbia River Treaty Permanent Engineering Board

Souris-Red Rivers Engineering Board

Pembina River Engineering Board

Great Lakes Levels Board

Champlain Waterway Board

Saint John River Engineering Board

American Falls Engineering Board

Roseau River Engineering Board

Richelieu-Champlain Engineering Board

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Red River Water Pollution Board

Advisory Board on Water Pollution: Rainy River and Lake of the Woods

Advisory Board on Control of Water Pollution: St. Croix River

Great Lakes Research Advisory Board

Great Lakes Water Quality Board

Although most of the above-mentioned Canada-US water relations are administered under the IJC, certain Boards and Committees fall outside its jurisdiction. The Columbia River Treaty Permanent Engineering Board is one Board with two members each from Canada and the United States who report directly to the two governments and who are required to keep the governments advised on matters which will ensure that objectives of the International Columbia River Treaty are met. Amongst others reporting directly to the two governments are the Lake Memphremagog Board, and the Canada-US Committee on Water Quality in the Saint John River.

Over the next year or two, there are a number of other boundary water issues which will require a substantial effort on the part of IWD. A few of the more interesting ones are outlined below:

Pembina River

The proposed Pembilier flood control dam in the United States is viable only if Canada contributes to its costs in proportion to the benefits received. An

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ad hoc study group has reported that the costs and benefits to Canada would be about equal. Canada must decide whether or not to contribute. A more immediate problem in the same general area is the need for improvements to the Aux Marais Drain primarily in Canada to handle spring run-off, a matter which is complicated by farmers in the region building dykes which have adverse transboundary effects. Canada-US committees have been set up to study these two matters further.

Garrison Diversion

The Garrison Diversion Unit in the US as proposed, would result in an increase in dissolved solids reflected in the Souris, Assiniboine and Red Rivers in Canada. The result would be increased water processing costs in order to produce water of acceptable quality for domestic and industrial use. Where processes would be inadequate for the task, municipalities and industries would face less than satisfactory finished water. The project would also increase flooding along the Souris River. Canada has made strong representation to the United States on this matter, and the matter is likely to be referred to the IJC to seek modifications to the project which render it non-injurious to health or property in Canada.

Dickey-Lincoln School

This hydro-electric project, if built on the Saint John River in the US, would flood 5,000 acres of Quebec territory. However, there would be some power benefits to downstream New Brunswick hydro-electric facilities. The status of the project is currently uncertain. A bill passed by Congress authorizing environmental and engineering studies has received Presidential approval. Mechanisms are being established to pursue this matter further with provincial and US officials.

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Lake Champlain

There is a serious flooding problem on the Richelieu River in Quebec. Joint Canada-US studies regarding the possibility of regulating Lake Champlain for flood control purposes have been carried out. However, Canadian and US officials are in disagreement regarding the potential environmental effects of the proposed works. More studies on the environmental and benefit-cost aspects are being carried out, simultaneously with development of flood control plans and projects.

Poplar River

Saskatchewan plans to proceed with construction of a thermal plant on the East Poplar River. This would cause the flow to be reduced substantially at the boundary and, unless counter-measures are taken, there may be a reduction in water quality as a result of coal mining operations, and evaporation in the proposed cooling pond. A licence has been issued to Saskatchewan under the International River Improvements Act, with several provisions to protect legitimate US interests, and discussions are continuing with the US regarding probable transboundary effects of the project.

OTHER INTERNATIONAL ACTIVITIES

Aside from its role in boundary waters matters, IWD supports activities under numerous international agencies, and bilateral agreements. It would be impossible to cover all of these in this presentation. However, a few representative examples are discussed briefly below.

1. United Nations

Since water is essential to life, the United Nations Organization has developed an active program to promote the orderly development of water resources. This is carried out through cooperation with appropriate specialized agencies, for example, the United Nations Educational, Scientific and Cultural Organization, (UNESCO), the World Health Organization (WHO), and the World Meteorological Organization (WMO), through such programs as the U.N. Development Program and through its constituent agencies such as the Resources and Transport Division. Dealing with water planning and management matters for the U.N. is the Economic and Social Council (ECOSOC), with its Committee on Natural Resources, on which Canada is represented. Both UNESCO and WMO have extensive programs in hydrology, the former agency concerned primarily with research in the field and the latter with operational hydrology. At the request of the WHO, Environment Canada (CCIW), has agreed to prepare, under contract, an extensive "Guide to Water Quality Management".

The International Hydrological Decade (IHD, 1965-1974), sponsored by UNESCO, came to an end in 1974. The program has provided benefits to Canada through increased activity in hydrologic research. Canada is expected to contribute to a long term program being planned by UNESCO to follow the

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International Hydrological Decade. It is generally agreed that the momentum in research activity and interest in hydrology in Canada built up by the IHD must be maintained.

2. Organization for Economic Cooperation and Development (OECD)

Representing a large number of countries, including many in the NATO group, OECD has established an Environment Committee to be responsible for water, air, transportation, and urban policies. Carried out by ad hoc task forces, the work in the Water Management area currently covers eutrophication control, policy instruments for control of water management decisions, the impact of energy generation and use, and pollution control technology.

3. North Atlantic Treaty Organization (NATO)

Within NATO, cooperation in various fields of science and technology over the past 15 years has helped pave the way for the setting up in 1969 of NATO's Committee on the Challenges of Modern Society (CCMS). This Committee is the vehicle for cooperation by member countries in attacking a wide variety of environmental and social problems of modern society. The Committee has implemented several studies using the "pilot country" concept which requires that an individual NATO nation assume leadership in carrying out the study. National agencies, experts, and funding must be committed to the project with a view to preparing a final report, with recommendations, to NATO. Canada was the pilot country, while the United States, Belgium and France, were co-pilot countries involved in the CCMS Inland Waters Pollution Project which is drawing to a close. One element of this study is the preparation of a monograph on comprehensive river basin planning and management, using as a model the Canada-United States Saint John River basin. Canada is also assisting in a study of coastal water pollution for which the pilot country is Belgium.

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4. Bilateral Arrangements

An agreement between Canada and Belgium provides for exchange of information on the modelling of river and lake systems, involving the use of modelling techniques to study urban water management systems and problems. Several areas of fresh water research are to be studied jointly under a Canada-Germany agreement. An exchange of information with Japan is taking place on water quality and water management problems, including eutrophication and toxic substances in water. A Canadian delegation visited Mexico in 1974 to discuss areas of water planning and management. Preliminary contacts between the Canada Centre for Inland Waters and a number of Soviet research establishments have been established with a view to the exchange of information dealing with fresh water. Scientific assistance is provided on a regular basis to developing countries through CIDA.

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RELATIONSHIP BETWEEN THE WATER PROGRAM AND EARP

As is the case with all components of DOE, the water program is being influenced more and more by the Environmental Assessment and Review Process. In this section, a brief resumé of IWD's probable involvement in the EARP in 1975-76 is provided, along with a brief discussion of how we see the relationship between Canada Water Act studies and the Environmental Assessment and Review Process.

a) Probable involvement in 1975-76

1. Routine Support to EAR Process

Referrals are made from the Regional Screening and Coordinating Committees for comments on the water related effects of various federal activities registered in the process. Responding to these referrals has become a major and time consuming function for the IWD regions; for example, in the Atlantic Region, approximately five referrals per week are received for comment. These routine referrals will require about 12 man years, $180,000 in salaries, and $54,000 in O&M in 1975-76.

2. Major Environmental Impact Studies

IWD is involved in various major studies such as the impact of the Mackenzie pipeline on permafrost, flow characterization of tributaries to be crossed by the pipeline, rates of sedimentation and scouring, etc., and similar studies for the Mackenzie highway. This will require about 8 man years, $120,000 in salaries, and $280,000 O&M in 1975-76.

3. Other Assessments of Water Related Projects

Many other activities, which may have an impact on water resources, but which are not yet far enough advanced to be registered in EARP require studies of varying degrees of detail from the water viewpoint; e.g. Lower Churchill, Nauskpi, Eagle River, James Bay, Great Bear, Poplar River, Upper Salmon, Terra Nova and Cat Arm power developments, Nova Scotia Causeway, Nuclear Power developments in Quebec and Ontario, siting of steel mills in B.C. etc. This will require

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about 4 man years, $60,000 in salaries, and $80,000 in O&M in 1975-76.

b) CWA-EARP Interface

The following general principles have been agreed upon in discussions with the Chairman of the Environmental Assessment Panel.

Comprehensive studies undertaken under the terms of the Canada Water Act would in themselves have no effect on the environment since they are intended to (1) examine the state of the environment, (2) assess the nature and consequences of man's activities as they relate to the water environment, (3) identify the options for further water use and the technical-social-economic consequences of exercising one or more of these options and then (4) develop a framework plan for action that would provide assurance that the exercise of one option would not rule out another, or would at least clearly identify what would be foregone if one (or more) option were taken up at the expense of the others. The ideal framework plan would, then, optimize a mix of options, and would avoid the implementation of an irreversible action without consideration of its impact on the others.

Up to this point, the exercises under the Canada Water Act do not represent actions that impact on the environment, and there will be no active role for the EARP at the study stage. However, it may be productive to register the study (for information purposes only) and for the panel to provide the study group with whatever relevant general guidelines are available at the time. The study group would presumably use these guidelines in such a way that they will have the information needed to prepare an environmental impact statement if need be at a later stage.

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It should be stressed that IWD is against the concept of the panel developing specific guidelines for each study. We feel the development of specific guidelines may prejudice the basic philosophy of comprehensive studies, in which we attempt to maintain a healthy balance between environmental, economic and social issues. Specific guidelines may also cause serious problems in federal-provincial negotiations of the study plan.

In summary, Canada Water Act studies will be registered with EARP for information, and any generalized guidelines which are available will be provided to the study group. If such federal-provincial studies develop into implementation programs, and if the federal government is financing a portion of the implementation costs, the assessment and review of the actual projects can then shift to the EARP, in the same manner as for any other federal or federal-provincial physical undertakings.

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CANADA WATER YEARBOOK

One new public information program in IWD is the Canada Water Yearbook. The first edition of the Yearbook is presently at the printers, and will be available to the public by mid June. The two objectives which this annual publication will attempt to meet are:

1) to bring together under one cover many of the statistics on water which are presently widely dispersed, and

2) to introduce new information which has never been made available to the public before; for example, water use statistics, and detailed descriptions of federal water programs.

Following is a list of topics covered by the first issue of the Yearbook:

Water

The World's Water

The Hydrologic Cycle

Canada's Water Resources

Historical Significance of Water in Canada

The Climate of Canada

Canada's Principal Drainage Basins

Surface Water and Groundwater

Administration of Water Resources in Canada

Government Activities in Water Development

Principal Water Resources Agencies

Water Use and Development in Canada

Current Trends in Canada's Economic and Social Development

Municipal and Rural Domestic Use

Industrial Use

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