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ANNUAL REPORT 1985 INLAND WATERS DIRECTORATE ONTARIO REGION

Canada

Inland Waters Directorate
Ontario Region

ANNUAL REPORT
1985

DEPARTMENT OF THE ENVIRONMENT

TABLE OF CONTENTS

Summary

This report describes the activities and accomplishments of Inland Waters Directorate (IWD), Ontario Region during 1985. IWD, Ontario Region is a component of the federal Department of the Environment. As the lead federal agency for water management in the Ontario Region, IWD plans and participates in national and international water management programs to achieve economic and social benefits, while giving full consideration to environmental concerns. The year 1985 saw new record high water levels set on all the Great Lakes except Lake Ontario bringing with them extensive flood and erosion damages to the Great Lakes shoreline. Considerable efforts on the part of IWD staff were required to provide advice and information to the International Joint Commission, federal officials, the media and the general public concerned about the high water levels. Other important Great Lake matters included the first water quality contaminant surveys on the St. Clair River in support of the bilateral St. Clair - Detroit River Study; the implementation of an organics-in-precipitation network; and the completion for submission to the International Joint Commission of the proposed Canadian Federal/Provincial phosphorous load reduction plan for the Great Lakes.

The Ministers for Environment Canada and Ontario Natural Resources signed Amending Agreement No. 1 to the Canada-Ontario Flood Damage Reduction Agreement in 1985, providing an additional $8.4 million ($7.4 million for mapping and $1.0 million for other measures) to the agreement which was also extended to 1995. During the year a program for the mapping of Indian lands in Ontario was initiated with the Department of Indian and Northern Affairs. To date, sixty-one streams and eighty-five communities have been mapped under the Canada-Ontario agreement since its beginning in 1978. Of these, twenty-two communities along five streams accounting for almost forty percent of Ontario's population have been designated.

April 1, 1985 marked the beginning of the eleventh year of the Canada-Ontario Cost Share Agreement on Water Quantity Surveys. Under this agreement IWD through its Water Resources Branch cooperates with provincial agencies in collecting and publishing streamflow, water level, and sediment data on a cost shared basis. As of April 1, 1985, the Water Survey of Canada Division of the Branch operated a network of 377 hydrometric stations and 34 tides and water level stations in the Province. New national guidelines for the classification of hydrometric stations, approved by the Administrators of Canada-Provincial Agreements, were implemented on April 1, 1985. A Network Evaluation and Planning Sub-committee was formed to provide technical support to the Committee of the Canada-Ontario Cost Share Agreement. Phase I of a contract to review sediment issues and data needs in Ontario was completed during the year. In the fall a workshop on the sediment program review was held as part of Phase II of that contract which is scheduled for completion in 1986.

The major public information activity of IWD in 1985 was its participation in the CCIW Open House '85 which was held on April 17-21. Over 30,000 visitors attended the Open House which was a great success. IWD, Ontario Region contributed a number of displays to the Open House and in addition conducted a visitor survey to gauge visitor satisfaction with the event. IWD staff also participated in the organization and staging of several successful events in the Hamilton/Burlington area for Environment Week, June 2-8. Activities included visits to schools, a display at a local shopping mall and the screening of an environmental film at CCIW.

In 1985 IWD, Ontario Region administered and managed resources amounting to 6.9 million dollars and 87.8 person-years. The resources included operational funding under international and federal-provincial agreements as well as grants and contributions under similar agreements. Significant federal-provincial cost shared funding administered in 1985 included Canada-Ontario Flood Damage Reduction Agreement funding ($700,000 for 1985-86) and Canada-Ontario Great Lakes Water Quality Agreement funding ($1,200,000 for 1985-86). Approximately $827,000 is expected to be cost recovered from the Province in 1985/86 under the Canada-Ontario Cost Share Agreement on Water Quantity Surveys.

A list of 1985 publications and presentations by staff of IWD, Ontario Region is included in this report.

A French translation of the Annual Report is available on request.

Résumé

Le présent rapport décrit les activités et les réalisations de la Direction générale des eaux intérieures (DGEI), région de l'Ontario, pour l'année 1985. La DGEI, région de l'Ontario, fait partie du ministère fédéral de l'Environnement. La DGEI, principal organisme fédéral en matière de gestion des eaux dans la région de l'Ontario, collabore à des programmes nationaux et internationaux de gestion des eaux de façon à procurer des avantages économiques et sociaux, tout en prêtant une attention particulière aux questions environnementales.

L'année 1985 a été marquée par des niveaux d'eau record dans tous les Grands lacs sauf le lac Ontario, créant ainsi des inondations et des dommages dus à l'érosion des berges. Cette situation a demandé des efforts considérables de la part du personnel de la DGEI afin de fournir des informations et des consiels à la Commission mixte internationale (CMI), aux agents fédéraux, au public et aux media d'information. les autres réalisations importantes concernant les Grands lacs comprennent; l'exécution du premier relevé sur les contaminants de la rivière St-Clair ceci dans la cadre de l'entente bi-latérale sur l'étude des rivières St-Clair et Détroit, l'implantation d'un réseau d'échantillonnage des contaminants organiques dans les précipitations et l'élaboration et présentation à la CMI d'un plan fédéral-provincial de réduction des charges de phosphore dans les Grands lacs.

Au cours de l'année, le ministre fédéral de l'Environnement et celui des Richesses naturelles de l'Ontario, ont signés un premier amandement à l'Accord Canada-Ontario sur réduction des dommages causés par les inondations, augmentant ainsi le budget de 8,4$ millions de dollars (7,4$ millions pour les travaux de cartographie et 1,0$ million pour d'autres mesures). De plus, l'expiration des termes de l'entente a été reculée à 1995. Depuis la signature de l'Accord en 1978, soixante et un cours d'eau et quatre-vingt cinq communautés ont été cartographiés. Parmi les zones desiignées, vingt deux communautés et cinq cours d'eau representent 40% de la population de l'Ontario. Egalement en 1985, un programme de cartographie des territoires indiens de l'Ontario a été cré, ceci en collaboration avec le ministère des Affaires indiennes et du Nord canadien.

Le 1er avril 1985 a marqué le début de la onzième année de l'Accord Canada-Ontario à frais partagés sur les relevés hydrométriques. En vertu de l'Accord, la DGEI par l'intermédiaire de sa Direction des ressources en eaux, collabore, avec des organismes provinciaux à la collecte et à la publication, à frais partagés de données sur les débits, les niveaux d'eau et les sediments. Au 1er avril 1985, la Direction exploitait dans la province, 377 stations hydrométrique et 34 stations de mesure des marés et du niveau de l'eau. De nouvelles directives nationales de classification des stations hydrométriques ont été approuvées par les administrateurs de l'Accord fédéral-provincial et ont été mises en vigueur le 1er avril 1985. Un sous-comité de planification et d'évaluation des réseaux a été mis sur pied afin de fournir le support technique au Comité dé l'Accord fédéral-provincial à frais partager. La première phase d'un contrat visant à reviser les priorités en matiére de sédiment et de besoins en données pour l'Ontario a été completée durant l'année. Un atelier sur la réévaluation du programme sur les sediments a été tenu à l'automne, dans le cadre de la phase II du contrat qui doit se terminer en 1986.

Les efforts de la DGEI dans le domaine de l'information au public se sont traduits principalement en une participation intensive à la Visite libre du Centre canadien des eaux intérieures (CCEI) du 17 au 21 avril 1985. L'évènement a eu un succés retentissant alors que plus de 30,000 personnes se sont presentées aux portes du Centre. Plusieurs kiosques de la DGEI étaient en montre. De plus, une enquête visant à evaluer le degré d'intérêt des participants a été menée en cette occasion. Le personnel de la DGEI a également organizé et participé à divers évenements qui se sont déroulés dans la région de Hamilton Burlington dans le cadre des festivitées de la Semaine de l'environnement du 3 au 10 juin. Au chapitre des activités, il faut signaler; des visités dans les écoles, la tenue d'un kiosque d'information dans un centre d'achat et la presentation d'un film sur l'environnement au CCEI.

En 1985, la DGEI, région de l'Ontario, a administré et geré des resources totalisant 6,9$ millions de dollars et 87,8 année-personnes. Ces resources comportaient des fonds d'exploitation versés en vertu d'accords internationaux et fédéraux-provinciaux de même que des subventions et des contributions accordées en vertu d'accords semblables. Parmi les fonds fédéraux-provinciaux administrés en 1985 mentionnons ceux provenant de l'Accord Canada-Ontario sur la réduction des dommages causés par les inondations (700,000$ pour 1985-86) et ceux provenants de l'Accord Canada-Ontario sur la qualité de l'eau des Grands lacs (1,200,000$ pour 1985-86). De plus un montant de l'ordre de 827,000$ devrait être versé par la Province dans le cadre de l'Accord Canada-Ontario réquissant les partage des frais de relevés hydrométriques.

Une liste des publications et des réalisations du personnel de la DGEI, région de l'Ontario pour l'année 1985 se trouve jointe à ce rapport. La traduction française du rapport annuel est disponible sur demande.

1.0 Introduction

Inland Waters Directorate (IWD), Ontario Region, is a component of the federal Department of the Environment (DOE). As the lead federal agency for water management in the Ontario Region, IWD plans and participates in national and international water management programs to achieve economic and social benefits, while giving full consideration to environmental concerns.

The primary role of IWD, Ontario Region is related to the gathering and dissemination of water related information and to the explaining and predicting of the behaviour of the quantity and quality of the waters in Ontario with particular emphasis on the Great Lakes and their interconnecting channels. IWD plays a major role in water use planning and management investigations including flood damage reduction programs in cooperation with the province, and in addressing international water management problems along the Canada-United States boundary.

The Directorate consists of three Branches: Water Planning and Management Branch, Water Resources Branch and Water Quality Branch.

The Water Planning and Management Branch (WP&MB) administers and implements federal, federal-provincial, and international water management activities. The Branch provides technical support to all the International Joint Commission's (IJC) Great Lakes Boards of Control in the regulation of the water levels and outflows of Lakes Superior and Ontario and water levels at Niagara Falls. In addition, the Branch carries out special studies for IJC Study Boards, such as the recently completed International Great Lakes Technical Information Network Board, and other studies aimed at further improvements in Great Lakes regulation and water management. WP&MB also implements federal-provincial water management projects under the Canada Water Act (CWA) relating to flood damage reduction, flood control, and shoreland management. WP&MB reviews federally-initiated and federally-funded projects for environmental impact under the Environmental Assessment and Review Process. The Branch also gathers and evaluates social and institutional information and investigates the socio-economic implications of resource policies, programs and management activities.

The Water Resources Branch (WRB) operates and maintains a network of streamflow, water level, and sediment stations throughout Ontario and the Great Lakes system jointly funded with the Province. The Branch publishes annual summaries of the data collected and provides more detailed surface water and sediment information and technical advice for specific projects and programs in the region such as special requests from various IJC Boards of Control, baseline studies and environmental assessments. The Branch also complements its data collection activities with network evaluation and planning activities, as well as data interpretation studies.

The Water Quality Branch (WQB) collects, interprets and disseminates information about the quality of the surface waters of federal interest in Ontario including the Great Lakes-St. Lawrence River System, the Ottawa River, major rivers tributary to Hudson Bay and James Bay and the Rainy and Winnipeg Rivers. The Branch provides technical advice and support to the Water Quality Board of the International Joint Commission and carries out special studies for other international bodies such as the Niagara River Toxics Committee. In addition, water quality studies are carried out in support of the National Water Quality Assessment Program, the Toxic Chemicals Program, and Environmental Assessment and Baseline Studies Program.

The following is a description of the major program activities and achievements of the Directorate during 1985.

2.0 Great Lakes and St. Lawrence River Basin Water Level Control Program

Flood and erosion damage at Long Point, Lake Erie, December, 1985.

Human activities and the ecosystem in the Great Lakes-St. Lawrence basin are affected significantly by water level fluctuations in the lakes and their interconnecting channels. The fluctuations of these levels and channel flows have been recognized by the Governments of Canada and the United States as an important boundary water issue, affecting shore erosion, hydro-electric power generation, navigation, recreation, water supply for domestic and industrial purposes and the environment. The International Joint Commission was established in 1909 by the two governments to seek common solutions in their joint interest and in accordance with the agreed rules or principles set out in the Boundary Waters Treaty. This has since led to several international agreements relating to the levels and flows in the Great Lakes-St. Lawrence River System.

Inland Waters Directorate, Ontario Region, provides assistance and advice to the IJC and other bilateral entities in carrying out the terms of the various agreements between the two countries.

2.1 Great Lakes Boards of Control

The Water Planning and Management Branch (WP&MB) continued to support the IJC's International Lake Superior Board of Control and International St. Lawrence River Board of Control in regulating the outflows of Lake Superior and Lake Ontario. The Branch also supported the IJC's International Niagara Board of Control in water management activities in the Lake Erie-Niagara River area. The significance of IWD's involvement is demonstrated by the fact that IWD provides the chairmen to two of these IJC Boards and two of the Boards' Working Committees. Other support includes secretarial duties and technical studies and operations.

Throughout 1985 the Branch reviewed the various hydrologic factors, including ice conditions in the rivers, which influence the regulation of Lake Superior and Lake Ontario and provided advice in their regulation. Above average precipitation in the Great Lakes basin continued to keep the

water levels of the Great Lakes high. Record high water supplies to Lake Superior and Lakes Michigan-Huron in 1985 brought new record high levels to these lakes as well as Lake St. Clair and Lake Erie. Extensive efforts were devoted to dealing with this critical problem.

In early 1985, Lake Superior's water level was slightly above average, whereas Lakes Huron, St. Clair and Erie were well above average and were rising at an alarming rate. WP&MB assisted the Lake Superior Board in the development of alternative emergency measures to reduce Lake Superior's outflows. On May 2, the Superior Board, under the direction of the IJC, initiated a program of reducing Lake Superior's outflows in order to provide a measure of relief to downstream lakes which were suffering from record high water levels. This program of flow reduction, intended to last through October, had to be drastically modified by the end of August due to abnormally high precipitation in the Lake Superior basin as well. By the Fall of 1985, Lake Superior also set new record high water levels. Numerous previous high water level records on Lakes Michigan-Huron, St. Clair and Erie were broken in 1985. By year end, record high water levels continued and extended into the new year.

In spite of very high supplies to Lake Ontario during 1985, the lake was only slightly above average for much of the year. The completion of the St. Lawrence Seaway and Power Project almost thirty years ago makes it possible to discharge high flows out of the lake when required. However, by the year end, levels on Lake Ontario rose rapidly, thus setting the stage for higher-than-average level conditions in 1986.

The 16-gate Lake Superior Compensating Works on the St. Marys River was constructed more than sixty years ago and is a main component in the facilities used to regulate the outflow of Lake Superior. In early 1982 the Superior Board completed a report on the structural stability of the Compensating Works. In response to the findings of this report, repairs to the Compensating Works have been undertaken and are being monitored.

The St. Marys River Rapids, located just below the Lake Superior Compensating Works, have long been recognized as an important and productive fish habitat. The Rapids area has been subjected to frequent high flows, high velocities and sudden changes in flows resulting from operation of the gates at the Compensating Works. In 1974, the Superior Board issued a report outlining several alternative remedial structures to protect and enhance the fish habitat of the Rapids area. It took eleven years of discussion and debate involving several federal and provincial departments as well as the power entities at Sault Ste. Marie, before a decision was made to proceed with construction. In early 1985, WP&MB staff visited the Rapids area and later reviewed with consultants the hydraulics design of the remedial works. Branch staff provided advice to the IJC and coordinated the schedule for field topographic and geotechnical surveys. Construction of the fishery remedial works began in July and was completed in September. The completion of these works means that a much lesser amount of water is required to keep the fish habitat of the Rapids area viable, thus freeing up more water for hydro-electric power generation.

The International Niagara Board of Control was established in 1953 by the IJC following the signing of the 1950 Niagara Treaty between Canada and the United States. This Treaty established flow requirements for Niagara Falls in order to preserve their scenic beauty as well as regulations regarding the diversion of water for power purposes. During 1985 WP&MB monitored the regulation of water levels in the Chippawa-Grass Island Pool which is located upstream of the Falls, as well as flows over Niagara Falls for compliance with the Niagara Treaty.

The Niagara Board continued to advise the IJC on the operation of the Lake Erie-Niagara River Ice Boom. The boom is installed by Ontario Hydro and the New York Power Authority each winter at the head of the Niagara River to protect their power intakes from ice. Local residents have in the past opposed the use of the boom, alleging that its presence prolongs the ice season in the area. Following the completion of a study of the boom and its effects by the United States National Academy of Science, the IJC issued a new order in early 1984 governing the operation of the boom, and directed the Niagara Board to monitor the operation. WP&MB staff carried out periodic reconnaissance flights over Lake Erie and the Niagara River to survey ice conditions, and coordinate with the power entities the timing of the boom's removal.

In the fall of 1984, IWD completed a series of levelling and surveys in the upper Niagara River. The survey results confirmed the correct and common datum used at all water level gauges and their controlling benchmarks on both sides of the river. The survey also confirmed the difference in water surface elevations across the river in the vicinity of the Peace Bridge. Following the completion of the field survey, the WP&MB undertook a re-calibration of the Niagara River Backwater Model. This model is being used to determine the effect of shoreline modifications on the water levels of the Niagara River and Lake Erie. By the year end a draft report was completed.

Another study undertaken focussed on the recent recession rate of the Horseshoe Falls. With the exception of some minor erosion, the present crestline has not changed much since it was last surveyed in 1969.

WP&MB completed a study with the U.S. Army Corps of Engineers of the proposed Bird Island Pier remedial works on the U.S. side of the river. The works are intended to provide a safer environment for fishermen who fish off the pier.

The WRB, WP&MB, and U.S. Army Corps of Engineers took discharge measurements at the Welland Canal supply weir in March and November 1985 as well as in January 1986. Flows through the supply weir form a significant portion of the total flow diverted from Lake Erie and are reported by the St. Lawrence Seaway Authority on a regular basis to the International Niagara Committee. Results of the

measurements show that the rating curve presently being used needs to be revised. Additional measurements are planned for mid-1986, following which a new rating will be developed for use.

WP&MB assisted the International Niagara Committee, established by the Governments of Canada and the United States pursuant to the Niagara Treaty of 1950, in determining the amounts of water available and the amounts used for the various purposes of the Treaty. Branch staff carried out weekly power inspections at the Niagara power plants to ensure accuracy in the reporting of power diversions and flows over the Falls by the power entities.

WP&MB also monitored the existing water transfer arrangement at Niagara between Ontario Hydro and the New York Power Authority (NYPA). During 1985, some 35 million cfs-hours of Canada's share of the Niagara River water were directed to the U.S. power plant to maximize energy production. The Branch provided advice on this subject to officials of IWD Ottawa and External Affairs. Since 1982 when NYPA announced a plan to expand its power installation at Niagara Falls, WP&MB has been monitoring the proposal closely and provided advice to the Niagara Board and the International Niagara Committee. Since two of the power plants in Canada are not as efficient as the U.S. plants, the U.S. power expansion could further increase the water transfer. In August, WP&MB conducted an off-shore survey of the lower Niagara River to identify areas sensitive to extreme water levels and flows, and susceptible to potential impacts from the power expansion.

In 1985, WP&MB staff assisted the Niagara Working Committee in preparing a background paper on the New York State Barge Canal diversion. The report was subsequently forwarded to the IJC and the Governments of Canada and the United States. One of the report recommendations calls for the establishment of a monitoring program to measure, on a continuous basis, the amount of water being diverted from the Niagara River into the Canal. IWD cooperated with the U.S. Army Corps of Engineers in seeking alternatives to implement the report's recommendations.

WP&MB also reviewed a proposal by a U.S. company to re-develop the Burt Dam in New York State that would divert, for power purposes, water from the New York State Barge Canal and ultimately from the Niagara River. Advice on the Burt Dam proposal was provided to the IJC. As a result of the many objections posed regarding this proposal, the company has modified its proposal so as not to use the water from the Niagara River.

In early 1985, WP&MB initiated a joint Canada-Ontario study of the apportionment of the Great Lakes waters between Canada and the United States. The study examines the disparities between the two countries of the benefits or disbenefits concerning the use of the waters of the Great Lakes for power and consumptive uses. A report on the findings of the study is expected to be submitted to the two levels of government in early 1986.

Measuring ice thickness on Lake Erie.

In late 1984 when the lift bridge at Valleyfield, Quebec became in-operable, thus stopping all Seaway traffic, WP&MB intensified its ice-forecast surveys in the upper St. Lawrence River. Assistance was provided to the International St. Lawrence River Board in Lake Ontario regulation, as well as to the Seaway Authority in determining the Seaway closing date. In the Fall of 1985, part of the wall at Lock 7 of the Welland Canal collapsed, effectively closing the Canal to traffic for about three weeks. WP&MB monitored the situation closely and provided advice to the Niagara Board.

IWD supported the Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data, by undertaking chairman, secretarial and technical duties. WP&MB representatives coordinated data with United States officials pertaining to the Great Lakes water levels, outflows and supplies in a manner prescribed by the Coordinating Committee. Following the completion of all field surveys in 1983, the Committee commenced developing techniques and procedures to re-calculate elevations for the benchmarks in the Great Lakes-St. Lawrence River system on the International Great Lakes datum. The datum defines a reference plane for the water levels of the Great Lakes relative to sea level. This datum was last established for the year 1955, but requires updating because of the continuous, but uneven movement of the Earth's crust.

Preliminary results show that very little crustal movement has taken place since 1955, suggesting that a revision of the datum is not warranted at this time. Experts in the United States and Canada are in the process of analysing the survey data and a decision regarding datum update is expected sometime in 1986.

Ongoing Great Lakes level studies and operations include: hydrologic modelling of the Great Lakes, and the use of airborne gamma radiation survey to measure snowpack water equivalence in the Lake Superior basin. These projects were carried out in cooperation with other Canadian and United States agencies to determine the feasibility of

using real-time data and hydrologic models to forecast basin water supplies and thus, improve the regulation of the Great Lakes.

In mid 1984, IWD joined in a study led by the Atmospheric Environment Service on the effect of doubling of carbon dioxide in the earth's atmosphere on Ontario's climate and economy. The primary IWD contribution to the study was a detailed hydrologic analysis of the potential impacts on the water levels and flows of the Great Lakes carried out by WP&MB. The WRD also carried out a study on the potential impacts on watersheds in Ontario using a sample watershed in southern Ontario. By the year end, IWD inputs to the study were essentially complete.

2.2 Investigative and Engineering Boards

In 1979, the IJC established the International Great Lakes Technical Information Network Board to examine and provide advice and recommendations on unmet hydraulic, hydrologic and meteorological data needs in order to improve the data collection network in the Great Lakes region. The Canadian Chairmen of the Board and its two committees are from WP&MB. The Board submitted its final report to the IJC in late 1984, and the Committees' joint report was printed in early 1985. The report recommends improvement in the transmitting of data to users as well as automation of the data collecting stations. New hydrometeorological stations were recommended in the northern remote area where station densities are low. The Board also urged the IJC and its Boards of Control to keep pace with the rapid advancement in data collection technology, and stressed closer coordination between the data users and the suppliers. Finally, the Study Board urged the IJC to promote research in weather forecasting and Great Lakes hydrologic modelling. The IJC has since then submitted its report to the governments of Canada and the United States.

The record high Great Lakes water levels in 1985 and extending into 1986 caused extensive flood and erosion damage to the Great Lakes shoreline. All levels of government in Canada and the United States have been responding to this extreme event. It is highly likely that the governments of Canada and the United States will be requesting the IJC to investigate various means (both structural and non-structural) of reducing the flood and erosion damage on the Great Lakes.

3.0 Great Lakes Basin Water Pollution Program

The Great Lakes represent 80 percent of North America's supply of surface freshwater. They sustain life, commerce, industry, and recreation for an estimated 7 million Canadians and 30 million Americans. One out of every three Canadians live in the basin and one-half of all manfuactured goods of the country are generated there. The major urban centres in the basin rely on the Great Lakes for a ready source of water for domestic and industrial use and as assimilators of their wastes. The Great Lakes are thus a priceless resource of vital importance to all facets of life and activity in the Great Lakes Basin. The quality of their waters is a basic concern to Canada in general and the Ontario Region in particular.

On April 15, 1972, the Canadian and U.S. governments signed the Great Lakes Water Quality Agreement to prevent further deterioration of the Great Lakes and to provide a basis for improving existing water quality. A new agreement was signed on November 22, 1978. Whereas the 1972 Agreement placed its emphasis on the control of phosphorus, the new Great Lakes Water Quality Agreement emphasizes control of pollution from toxic substances and the control and prevention of pollution from industrial and municipal sources. Numerical water quality objectives for some 40 substances have been specified in the new Agreement. The IJC has been given the responsibility to overview the progress of the two governments in the implementation of the Agreement. Inland Waters Directorate, Ontario Region provides extensive membership and scientific support to the Boards and Committees assisting the IJC in its responsibilities under the Agreement. It also is a major participant in the federal response to the requirements of the Agreement. Inland Waters Directorate activities related to the Agreement include:

(a) monitoring and surveillance of pollution loadings to the lakes, conditions in the lakes, and lake-related activities to ensure the water quality objectives are being met and to determine the effectiveness of remedial measures;

(b) providing advice on the effectiveness of control policies and measures;

(c) defining and continual refining of water quality objectives; and

(d) identifying new and emerging pollution problems.

The Governments of Canada and Ontario signed the Canada-Ontario Agreement on Great Lakes Water Quality (COA) in 1971. That Agreement provided the instrument for the cooperation of the two jurisdictions in clean-up efforts in the Great Lakes and for Ontario's coordination and cooperation with government agencies in the United States. Since 1971 the Agreement has been extended (1976), revised to reflect the new requirements of the 1978 Canada-U.S. Agreement (1982) and was under renegotiation in 1985. The latest version of the Agreement is expected to be signed in 1986 and will extend to 1991. The Canada-Ontario Agreement provides for the cost-sharing of provincial surveillance activities on a 50-50 basis. In the 1985-86 fiscal year Canada's share of surveillance costs under the Agreement amounted to $1,200,000. In addition in the 1982 revision of the Agreement, $65,000,000 of federal funds were made available to the province for the period 1982-85 to assist in the completion of municipal sewage treatment facilities construction to meet requirements of the 1978

Canada-U.S. Agreement. The Director of IWD, Ontario Region is a member of the Review Board which is responsible for overseeing the implementation of the COA.

3.1 IJC Water Quality Board

Inland Waters Directorate continued to provide extensive support to the IJC Water Quality Board and its committee. Staff of IWD, Ontario Region serve on the Board, the Board's Water Quality Programs Committee and the Surveillance Work Group. IWD, Ontario Region personnel were also extensively involved in the preparation of the Water Quality Board's 1985 Report on Great Lakes Water Quality which was presented to the IJC at its June, 1985 meeting with the Board in Kingston, Ontario.

The 1985 Report of the Board addressed five issues: persistent toxic substances, areas of concern, phosphorus control, the environmental status of the lakes and connecting channels, and Agreement progress.

Persistent toxic substances is the principal issue confronting the Great Lakes. The report described the Board's dual initiatives in regard to this issue. The Primary Track is an action-oriented approach which is attacking a short list of known Critical Pollutants, about which remedial action programs are being focussed. The second Comprehensive Track involves the systematic analysis and organization of information on the approximately 1,000 substances of potential concern that exist in the Great Lakes.

The report identified 42 Areas of Concern, 39 of which had been previously identified in the Board's 1981 and 1983 reports to the IJC. In these areas, environmental quality is degraded and beneficial uses of the water or biota are adversely affected. The Board reported its revised approach to addressing these Areas of Concern. In this approach the Great Lakes jurisdictions will prepare Remedial Action Plans for each area which will describe programs and measures which when implemented should solve the identified problems. The Board's review of these Remedial Action Plans and their implementation will be its means of tracking progress in addressing the Areas of Concern.

An update on progress in the phosphorus control programs was also contained in the 1985 Report. The goal of the 1978 Agreement to reduce the concentration of total phosphorus to 1.0 mg/L or less in the effluents of all municipal wastewater treatment plans discharging more than 1.0 million gallons per day in the entire Great Lakes Basin was achieved on an average basis. Note was also made of the fact that all Great Lakes jurisdictions, with the exception of Ohio and Pennsylvania, have enacted legislation to control the amount of phosphorus permitted in household detergents.

The Board noted the encouraging trend in decreasing phosphorus concentrations in most of the Great Lakes waters which exhibited cultural eutrophication. Some declines in contaminant levels in fish were also noted.

Finally the 1985 Report detailed significant jurisdictional developments since its 1983 Report.

During 1985, IWD, Ontario Region personnel participated extensively on a number of Lake Task forces responsible for preparing Surveillance Plans for each of the Great Lakes and their Connecting Channels, and for Atmospheric Inputs. Specifically, WQB-OR staff participated in the preparation of Surveillance Plans for Lake Superior, Lake Huron, Lake Erie, Lake Ontario, the Upper Connecting Channels, the Niagara and St. Lawrence Rivers and in the Atmospheric Inputs Task Force. It is expected that the Water Quality Board will submit these plans to the IJC for furtherance to Governments by early 1986.

3.2 Canada-U.S. Open Lake Surveillance and Analysis

Lake Ontario

Two spring and three summer surveillance cruises were completed on Lake Ontario by the Canadian research ship CSS Limnos. The National Water Quality Laboratory provided shipboard analytical support and carried out shore laboratory analysis for all cruises.

Comprehensive analysis of water quality data for the years 1967 to 1984 was completed. The findings were reported in the following three major reports: "Response of Lake Ontario to Reductions in Phosphorus Load 1967-1982"; "Vertical and Horizontal Distribution of Nutrients and Particulate Organic Matter in Lake Ontario, 1981-1982"; and "Determination of Water Quality Zonation in Lake Ontario Using Multivariate Techniques". A 1984 status report was prepared on the water quality of the open waters of Lake Ontario and a report entitled "Organochlorine Contaminants in Ambient Waters of Lake Ontario" was prepared for publication in the IWD Report Series. In addition, work continued on the Lake Ontario Intensive Report, which is to be submitted to the Surveillance Work Group of the IJC Water Quality Board in 1986.

Lake Huron

Spring and summer open lake water quality surveillance cruises were conducted on Lake Huron. Samples were collected at 90 stations for the parameters identified in the Lake Huron Surveillance Plan. Trace metal samples, both filtered and total, were collected at 24 stations as part of the spring cruise.

Results of the 1984 sampling effort for organic contaminants in Lake Huron centrifuged water samples were summarized.

Lake Superior

One spring cruise, sampling 60 stations, was carried out on Lake Superior to document changes in water quality ob-

served between 1973 and 1983. Trace metal samples were collected at 20 stations as part of this cruise.

Draft reports detailing the water quality of Lake Superior as measured on the surveillance cruises in 1983 and the concentration of organic contaminants in water in Lake Superior in 1983 were prepared.

3.3 Niagara River Toxic Contaminants

The Niagara River Toxics Committee (NRTC) report released in November, 1984 assessed toxic contaminants and their sources in the Niagara River, reviewed toxic chemical control programs, recommended improvements to those programs and proposed a long term monitoring program. In late 1985, a Niagara River Monitoring Management Committee was formed with the Director, IWD, Ontario Region as chairman to develop a monitoring plan based on the Report's recommendation. The committee has three objectives: the assessment of the degree of compliance with jurisdictional control requirements; the assessment of trends to determine response to control measures, the effectivness of those measures and emerging problems; and the identification of sources of toxic substances inputs to the Niagara River.

In addition to supporting the work of the Management Committee, IWD, Ontario Region maintained its ongoing surveillance and monitoring activities on the Niagara River.

The NRTC, 1984 report, recommended that 57 Group I chemicals of concern should be monitored in the Niagara River and that differential loading estimates of each of these chemicals should be determined. In response to this recommendation, a contract was issued in late 1984 to Zenon Environmental Inc. for the analyses of both centrifuged water and suspended sediment samples collected biweekly at both the Niagara-on-the-Lake and Fort Erie stations for all 57 chemicals in the Group I list. These included several groups, volatiles (water only), chlorophenols, organochlorine pesticides and PCB's, polynuclear aromatic hydrocarbons, dioxins and furans, phthalates and chlorobenzenes. A status report, "Toxic Chemical Monitoring and the Determination of Differential Loadings to the Niagara River" summarizing the results for the period Dec. 1984 - March 1985 was completed in June 1985. A report, entitled "Evidence of Contaminant Loading to Lake Ontario from the Niagara River" was published in the Canadian Journal of Fisheries and Aquatic Sciences, July 1985. This paper was prepared by National Water Research Institute (NWRI) and IWD staff using several different statistical procedures to show changes in contaminant concentrations from the Upper to the Lower Niagara River. Data used in the preparation of the paper was provided by WQB-OR and the Ontario Ministry of Environment.

Large Volume Extraction Systems

A system for sampling organic contaminants in water and suspended sediment on a continuous basis was designed and set up in conjunction with National Water Research Institute (NWRI) at the WQB monitoring station in Niagara-on-the-Lake. Field testing of the system commenced in December 1985, and will be continued in 1986. A report detailing the design and test results of the large volume Aqueous Phase Liquid-liquid Extractor (APLE) was published in November 1985.

3.4 St. Clair River Toxic Contaminants

In July of 1984, Canadian and U.S. environmental and resource agencies agreed to undertake a coordinated multi-year environmental quality study of the St. Marys, St. Clair, and Detroit Rivers and Lake St. Clair. To direct the study, an Upper Great Lakes Connecting Channels Study Management Committee was formed. The Director, IWD, Ontario Region is a member of the Committee while other IWD staff support the activities of the many work groups involved in the study. During 1985, IWD, Ontario Region staff participated in the development of the study plan and carried out preliminary field investigations.

Four water quality surveys, designed to determine ambient levels of contaminants in the major confluences of the St. Clair River, were carried out over the period August to October. Preliminary findings indicated that flow patterns of industrial effluents containing contaminants such as hexachlorobenzene, hexachlorobutadiene and pentachlorobenzene appeared to be confined to the Canadian shoreline and the Chanel Ecarte and the South Channel. A detailed report will be completed in 1986. A draft report, "Review of WQB-OR Sampling on the St. Clair River 1967-83" detailing the water quality at the WQB sampling sites at Port Lambton and Sarnia was completed.

3.5 Interconnecting Channels Water Quality

Niagara River

During May 1985, WQB-OR marked the tenth anniversary of collecting daily water quality samples at the Niagara-on-the-Lake station. Automatic water samplers at Niagara-on-the-Lake and Fort Erie collected daily samples for nutrient determinations and weekly samples for major ion, trace metal and radioactivity analysis to determine chemical loadings from Lake Erie and to Lake Ontario. Results of these analyses were provided annually to the IJC for inclusion in the Great Lakes Water Quality Report. A draft report, "Recent Trends in Water Quality of the Niagara River" was completed. This report summarized water quality trends observed at the Niagara-on-the-Lake station during the 1976-83 period.

A new daily water quality sampler, designed to maintain the integrity of the daily samples, was assembled and lab tested in cooperation with Mantec (National Water Research

Institute) staff. The sampler will be installed at the Niagara River stations in early 1986.

St. Lawrence River

Water quality monitoring continued in the St. Lawrence River. Daily samples for nutrients, weekly samples for major ions, trace metals and radioactivity were collected with an automatic water sampler at the Wolfe Island station to determine chemical exit loadings from Lake Ontario. Monthly samples of water and suspended sediments were also collected and analysed for trace organic contaminants. Results of these analyses are being provided annually to the IJC for inclusion in the Great Lakes Water Quality Report. Two reports, "Water Quality at the Inlet to the St. Lawrence River, 1977-83" detailing changes in the water quality at the Wolfe Island station and "Contamination in the Bottom Sediments of the St. Lawrence River in June 1975" showing levels of bottom sediment contaminant determined by a survey carried out between Kingston and Cornwall in 1975 were prepared for publication in the IWD Report Series. Two draft reports, "Evaluation of the Nutrient Forms Measured at Wolfe Island" and "Trace Organic Contaminants in the Bottom and Suspended Sediments of the St. Lawrence River" were prepared.

3.6 Atmospheric Loading

Atmospheric deposition sampling array at South Baymouth, Manitoulin Island, Lake Huron.

WQB continued to operate a network of 16 precipitation stations established as part of the IJC Great Lakes International Surveillance Plan to measure atmospheric loadings in the Great Lakes Basin. A report, "Lake Superior Wet Deposition, 1983," submitted to the IJC Lake Superior Task Force and presented at The International Association for Great Lakes Research Conference in Milwaukee in May showed that atmospheric wet deposition of sulphate was 153 thousand tonnes per year, about 22% of the total load, while nitrate accounted for 55% (19000 tonnes) of the total load. Wet deposition of phosphorus was 460 tonnes per year, and 13% of the total load. These figures were consistent with calculated loading determined using a simple mass balance model.

WQB began operating a network of four organic precipitation stations, one in each lake basin (Sibley Park, Manitoulin Island, Pelee Island, and Wolfe Island), to sample wet precipitation for levels of trace organic contaminants in the Great Lakes basin. Based on two years of data from the Lake Superior Basin, wet precipitation contained significant quantities of BHC's, PCB's, methoxychlor and dieldrin. A detailed report, "Organochlorine Pesticides and Polychlorinated Biphenyls in Lake Superior Precipitation" was submitted to the IJC Lake Superior Task Force.

In a separate study, WQB, jointly with the National Water Research Institute (NWRI), operated a ten station precipitation network, using XAD resin as an in situ extraction medium, to characterize the areal distribution of organic contaminants within the Great Lakes Basin.

3.7 Phosphorus Management

Annex III of the 1978 Canada/U.S. Great Lakes Water Quality Agreement specifies total phosphorus target loads for each of the Great Lakes. These loads were confirmed by the signing in October 1983 of the Phosphorus Load Reduction Supplement to the Annex. The supplement forms the basis for the establishment of load allocations and compliance schedules for the two countries. A federal/provincial task force was established in January 1984 to develop a "Canadian" phosphorus load reduction plan for the Great Lakes in accordance with the supplement. IWD, Ontario Region was represented on the task force and provided its support by organizing/participating at various workshops and meetings. A proposed Canadian federal/provincial phosphorus load reduction plan for the Great Lakes was completed during 1985 for eventual submission to the IJC.

The proposed Canadian plan for Lake Erie calls for a 100 tonne phosphorus reduction from municipal and industrial sources, and for a 200 tonne reduction from agricultural cropland sources of phosphorus. Major emphasis is being placed on agricultural sources which could be reduced by approximately 10% through the adoption of improved soil management and conservation practices on farms located in priority management areas.

WP&MB has been involved in the identification of priority management areas for several years. During 1985, WP&MB in cooperation with the Upper Thames River Conservation Authority completed the verification and calibration of a screening model, developed by the Lands Directorate of Environment Canada and used for pinpointing high contribution areas. The study was conducted over a three year period in the Avon River and Kintore Creek basins. Spring melt and fall storm runoff were intensively moni-

tored in 12 watersheds for both sediment and phosphorus loadings. Results were compared to model predictions and relationships between landscape factors, sediment, and phosphorus delivery were investigated. Findings of the study are currently being summarized for publication in a report entitled, "Field Evaluation of Environment Canada Lands Directorate Sediment Delivery Mapping in the Avon River and Kintore Creek Basins."

During 1985, WP&MB also initiated a similar field monitoring program involving sediment and phosphorus flux measurements at 10 sites in the Ruscom, Hillman, and Big Creek watersheds, in cooperation with the Essex Region Conservation Authority. The intention of this study is to provide a means of calibrating the Lands' model in Kent and Essex counties whose characteristics are quite different from the upland portions of the Lake Erie Basin where most previous verification work was undertaken. The Pollution from Land Use Activities Reference Group (PLUARG) had earlier identified Kent and Essex counties as major agricultural contributors of phosphorus to streams in Ontario. In combination with the flatness of terrain and high water table, this area creates a set of conditions for which verification work is urgently required.

Another important component of the proposed phosphorus management plan is the question of phosphorus retention, transformation, and export in rivers. An understanding of phosphorus dynamics in river ecosystems is essential in order to devise effective strategies for the reduction of phosphorus loadings to the Lower Great Lakes. The effectiveness of phosphorus control at point/non-point sources on tributaries is currently subject to considerable uncertainty, particularly with regard to how much reaches the open lake and in what time frame. WP&MB has, therefore, undertaken a thorough state-of-the-art review and analysis of phosphorus dynamics in rivers flowing into the Great Lakes.

The review, which will be completed in early 1986, will form the basis for resolving several specific phosphorus management related issues.

Plans were made for IWD participation in the Soil and Water Environmental Enhancement Program (SWEEP). The overall program is aimed at reducing phosphorus from non-point agricultural sources in the Lake Erie Basin by 200 tonnes and at increasing the productivity of the primary agriculture sector by reducing soil erosion and degradation. WRB will construct and operate 6 hydrometric stations associated with the Pilot Demonstration Watershed Sub-program. Water quantity and quality data will be collected from 3 pairs of watersheds over a 5 year period to evaluate the effectiveness of specific farm practices by a comparison of a treated watershed with a control watershed. Results will be used to demonstrate reduction of phosphorus loadings from the basin when measures are implemented on a large scale basis. The first stations are to be constructed in the fall of 1986.

3.8 International and Interprovincial Rivers

The Water Quality Branch continued to sample at four stations in Northwestern Ontario as part of its commitment to monitor international and interprovincial waters. Two stations are located on the Rainy River, one on the Winnipeg River and one on the English River. Water samples, collected every two weeks from these locations were analysed for physical parameters, major ions, nutrients and metals. Samples for organochlorine pesticides and PCB analysis were collected on a monthly basis.

The Branch continued to provide advice to the International Rainy River Water Pollution Board on matters pertaining to an inter-agency monitoring plan for the river and proposed water quality objectives. During 1985, plans were finalized for Environment Canada's participation in a multi-agency survey of the Rainy River in 1986. The Branch will conduct sediment surveys as their contribution to the study.

The Branch provided a data summary of organochlorine pesticides and PCB monitoring data to the International Rainy River Water Pollution Board for inclusion in their annual report to the IJC.

Ottawa River

Branch staff continued to provide input and advice to the Ottawa River Coordinating Committee. The committee is charged with coordinating the activities of Ontario, Quebec and Environment Canada, as well as finalizing an aquatic monitoring strategy for the river. Branch staff provided significant input to the preparation and review of the Coordinating Committee's annual report to the Ministers.

In 1985, the Water Quality Branch, in conjunction with National Water Research Institute (NWRI) carried out a special survey on the Ottawa River to evaluate contaminant levels in various aquatic compartments. Field work will continue in 1986 and findings from the 1985 survey will be reported.

A technical report entitled, "Trace Organic Contaminants in the Ottawa River, National Capital Region" was published in the IWD Report Series. This report summarized data from three surveys in 1980 and describes distribution of a variety of organochlorine pesticides and PCB's in water of the Ottawa River.

A draft report, "Bottom Sediment Quality of the Ottawa River" describing metal and trace organic contaminant concentrations found in bottom sediments of the Ottawa River in 1982 was prepared.

4.0 Flood Damage Reduction Program

The federal government is committed to alleviating human suffering and minimizing damage caused by floods through strategies such as identifying high flood risk areas, dis-

couraging new investments in these areas, and participating in traditional flood damage reduction measures where these offer the best solution.

The Inland Waters Directorate, through its Water Planning and Management Branch, is involved with the Province of Ontario in a program to reduce flood damages. The Department, on behalf of the federal government, signed an Agreement with the Province of Ontario on March 31, 1978, to provide funding to map flood risk areas and other flood damage reduction measures. The Agreement provided for $8.0 million in mapping over a 5 year period and $1.2 million for other measures over 10 years.

The Ministers for Environment Canada and Ontario Natural Resources signed Amending Agreement No. 1 to the Canada-Ontario Flood Damage Reduction Agreement in 1985, providing an additional $8.4 million ($7.4 million for mapping and $1.0 million for other measures) to the agreement which was also extended to 1995.

During the year a program for the mapping of Indian lands in Ontario was initiated with the Department of Indian and Northern Affairs. Work commenced on the flood risk mapping of the Root River on the Rankin Reserve and the Gordon River on the Gordon River Reserve near Sault Ste Marie. The expenditures under this program during 1985-86 will be about $32,000 which will be shared equally between the Environment Canada and Indian and Northern Affairs Canada.

4.1 Flood Risk Mapping

The mapping of the floor risk area is the primary function of the program. The majority of mapping studies are implemented through the local Conservation Authorities and municipalities. In 1985, projects were in progress in 17 Conservation Authorities, as well as several municipalities where no organized Conservation Authority exists. The policies of the Agreement come into effect upon designation. These policies put limitations on:

1. placing federal and provincial government buildings or structures in the flood risk area;
2. funding from government sources for new buildings or structures placed in the flood risk area and subject to flood damage risk;
3. eligibility for flood disaster assistance of buildings or structures placed in the flood risk area after designation and which are vulnerable to flood damage.

As well, the two governments will encourage local municipalities to adopt Official Plan Policies and zoning restrictions on development in the flood risk area.

Where a two-zone flood risk area has been designated, including the floodway and floodfringe, the above policies will apply to the floodway zone only. Development would be allowed within the floodfringe provided it is adequately protected from flood damage. Any significant addition or enlargements made to the existing buildings in the floodfringe, however, would require flood proofing to be eligible for future disaster assistance.

Existing development would continue to be eligible to government flood disaster assistance and other government-funded programs such as CMHC mortgage insurances. Normal maintenance of existing structures can continue as before.

In late 1984, the province released a revised floodplain management policy which calls for a more flexible approach towards defining a regulatory flood. The Amending Agreement accommodates all of these revisions. With the release of the policy and the signing of the Agreement, the work on a number of projects previously delayed commenced and designations were resumed.

The Steering Committee agreed to recommend the designation of flood risk areas along the Nipigon River through the Town of Nipigon and the Atikokan River at Atikokan. Open Houses were held to inform the public of the impending designation. Six northern designations are before the Steering Committee. These are: Espanola (Spanish River and Darkie Creek), Thessalon (Thessalon), McNab (Ottawa River), Petawawa (Ottawa River), James (Hornepayne River) and Elk Lake (Montreal River). Work on the public information flood risk maps was initiated for Petawawa, McNab and shoreline mapping of Lake Huron for Maitland Valley Conservation Authority. Procedures were initiated for the designation of flood risk areas in the Lower Trent Region Conservation Authority. This Authority-wide designation includes work done by the province and the Conservation Authority outside the Agreement.

To date, sixty-one streams and eighty-five communities have been mapped under the Agreement. Of these twenty-two communities along fifteen streams accounting to almost forty percent of the province's population have been designated.

An important component of the Flood Damage Reduction Agreement is the provision of information to the public and other government departments on the nature of the Program; the extent of flood risk areas and government policies that apply to the designated areas. During the year, the Steering Committee and the Technical Sub-Committee arranged for an information session to all federal departments and provincial ministries. Special presentations were made to the field inspectors of CMHC and the planning and design staff of Ontario Ministry of Transportation and Communications. The program was also explained to a number of Conservation Authorities and municipalities. A display and an information booth were set up at the Ontario Real Estate Association Conference. The display was also set up at the Planning Institute of Canada's Conference in Sudbury. Extensive use was made of information brochures, public information display panels and audio-visual presentations at the CCIW Open House and at other occasions.

Flooding at Chatham, Ontario in the Spring of 1985.

4.2 Other Flood Damage Reduction Measures

All three phases of the Regional Flood Frequency Analysis for Ontario Streams were completed. Phase I of the study consisted of data synthesis and single station analysis; Phase II of the study involved regional analysis by the Index Flood Method; and Phase III required the regional analysis by the Multiple Regression Method. Findings of the first two phases were finalized and printed and will be released at a provincially sponsored conference in February 1986. Two other volumes of the report are being finalized. A summary of the Index Flood Method was developed and forwarded to the Province for inclusion in the Floodplain Management Technical Guidelines. A technical paper was presented at the "Extreme Events Analysis Workshop" sponsored by The Canadian Water Resources Association.

The Steering Committee addressed the recommendations of the Muskoka River Study. These recommendations were discussed with the Public Advisory Group and forwarded to the Ministers. As part of the recommendation acceptance the Steering Committee agreed to initiate three projects in the Muskoka Region. As a first step detailed hydrologic analysis are being carried out for the eight major lakes and twelve reaches of the system, followed by flood risk mapping of Bracebridge and Huntsville.

The Depth of Flooding Damage Curve Development Study was completed. The objective of this comprehensive study is to develop a set of curves that will relate the depth of flooding to the damages sustained by housing. These curves will be useful in the evaluation of benefits that could result from damage mitigation initiatives. A seminar based on the findings is being developed for Spring 1986.

The Steering Committee agreed to initiate studies to evaluate flood damage reduction measures on a number of streams in the Niagara Peninsula Conservation Authority. A similar project was approved at a cost of $34,000 to assess alternatives of flood proofing for existing development in the flood risk areas of the Goulais River. The study is due for completion in early 1986.

The Steering Committee also approved undertaking two more studies in the other measures component. The first study will address the improvement of reservoir operations in Halton region Conservation Authority with the objective of reducing the flood risk in downstream communities. A second project was approved to develop guidelines for delineating floodway and floodfringes considering a number of topographic, social, technical and cultural constraints.

5.0 Water Management Data Program

The ever increasing demand for water and the multiplicity of its uses have produced a growing need for better and more efficient management of this most precious resource. The systematic collection and compilation of water resources data is essential for the wise management of Ontario water resources. It is vital to activities such as the regulation of individual and industrial consumption, irrigation, hydro-electric power generation, recreation, flood risk mapping and flood forecasting, engineering studies, pollution control and environmental assessments. The objective of the Water Management Data Program is to provide the basic water quantity data on a timely, accurate and comprehensive basis to meet Canada's responsiblities under Federal-Provincial Agreements and to serve the national interest. Inland Waters Directorate is extensively involved in meeting this objective and ensuring that the data user's needs are met.

The fluctuation of the water levels of the Great Lakes affect many users. An important activity in Water Management Data Program is the preparation of a six-month forecast of Great Lakes water levels on a monthly basis for distribution to the public. Forecasts of ice formation on the St. Lawrence River are also made during the early winter of each year. Throughout 1985, IWD responded to numerous requests from the public and other government agencies for information related to water levels and flows in the Great Lakes System. The Director and WP&MB staff held numerous interviews with newspapers, radio and television stations in Ontario to discuss the subject of high Great Lakes water levels. Examples included virtually all the major newspapers and television stations in southern Ontario.

In addition to the timely publication and distribution of a new brochure on Great Lakes levels, WP&MB carried out other public information activities throughout the year explaining the causes of the high water levels and the hazards of living on the flood vulnerable area of the Great Lakes shoreline. Other activities included:

a) Inclusion of a high water level advisory in the monthly Great Lakes Water Level Bulletin;

b) Preparation of a set of answers to address some of the most often asked questions concerning lake levels;

c) Briefings, on several occasions, presented to federal members of Parliament;

d) Making presentations at IJC seminars; and

e) Attending public meetings as invited guest speakers at several Great Lakes shoreline communities.

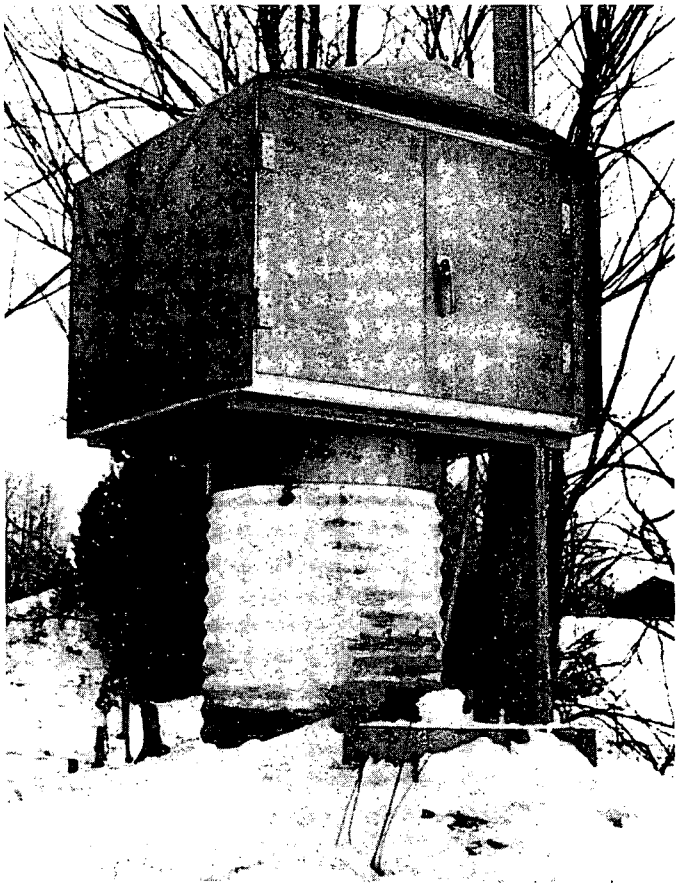
5.1 Hydrometric and Sediment Surveys

The Water Survey of Canada Division of the WRB continued to operate a network of hydrometric and sediment stations under the terms of the Canada-Ontario Cost Share Agreement on Water Quantity Surveys. Provincial participants in the Agreement are the Ontario Ministry of Environment (OMOE), the Ontario Ministry of Natural Resources (OMNR), and Ontario Hydro. The terms of the Agreement ensure a coordinated approach to data collection by the four federal and provincial agencies and that national standards are met for measurement and computation procedures, and for equipment and instrumentation. The Agreement requires that all hydrometric and sediment stations be classified on the basis of national guidelines and that the station costs be shared between parties according to the classifications. The terms of the Agreement are implemented by appointed Administrators and by a Canada-Ontario Coordinating Committee which has representatives from DOE, OMOE, OMNR, and Ontario Hydro.

April 1, 1985 marked the beginning of the eleventh year of the operation of the hydrometric network under the Canada-Ontario Cost Share Agreement. As of April 1, the Water Resources Branch of IWD, Ontario Region operated a total of 377 hydrometric stations in Ontario. In addition, there were 51 hydrometric stations in the extreme northwest part of the province which were operated by the Water Resources Branch of IWD, Western and Northern Region. These stations were operated by the Western and Northern Region because of their close proximity to its Winnipeg District office.

During the year, the WRB took approximately 2310 discharge measurements at hydrometric stations. The Branch processed the data from all stations which it operated and also processed data from 60 stations operated by other agencies.

Of the 377 hydrometric stations operated by the WRB, 148 were classified as Federal stations, 36 as Federal-Provincial stations and 193 as Provincial stations. As per the terms of the Cost Share Agreement, construction and operating costs for Federal stations are funded entirely by Canada, Federal-Provincial stations are cost shared at 50/50, and Provincial stations are funded by the Province. New national guidelines for the classification of hydrometric stations, approved by the Administrators of the Canada-Provincial Agreements, were implemented on April 1, 1985. The classification system includes the Federal, Federal-Provincial, and Provincial groups as well as several sub-groups. For all stations, Canada, as the operating party in Ontario, is responsible for providing and paying the total cost of the primary water level recording equipment while the requesting agency pays for the purchase, installation, and operation of specialized equipment. For the fiscal year ending March 31, 1985, the shareable cost for construction, maintenance and operation of the hydrometric and sediment networks in Ontario was $1,768,000 of which $772,800 was paid by the province.



New "look-in" type aluminum shelters for real-time data telemetry equipment.

The WRB operated a network of 7 continuous and 6 seasonal sediment stations. Seven northern and two southern stations were sampled on a miscellaneous basis. New sediment stations, both seasonal and miscellaneous, were selected for the coming year as well. Three stations which had been sampled on a continuous basis were discontinued. This resulted from the recommendations presented in the Ontario Region Miscellanous Sediment Station Network Proposal and the Ontario Region Sediment Network Review completed in late 1983.

A fully operational sediment laboratory in Guelph supported the sediment data collection activities. A total of 1700 suspended sediment samples, 47 bed material samples, 627 dissolved solids samples and 238 evaporation analyses was completed. In addition, samples were analyzed for the two automatic sediment samplers which were installed for testing in a joint program with Sediment Survey Section, WRB Headquarters.

Phase I of the contract to review sediment issues and data needs in Ontario was completed in March, 1985 which included a 2-day meeting in Ottawa concerning national perspectives on sediment issues. Contractors from various Regions gave presentations.

As part of Phase II of the review of the Sediment Surveys Program in the Ontario Region, a successful workshop was held on October 22, 1985 with potential and existing data users. Twenty-five representatives from provincial agencies, Conservation Authorities, universities and private firms as well as federal agencies participated. The workshop will be used as input to defining sediment issues, data needs and approaches for the program in Ontario. The final report by the contractor on Phase II will be completed by the end of January, 1986. The recommendations from this report will be incorporated into a Regional action plan for Sediment Surveys in the Ontario Region which will be submitted to WRB Headquarters as input to an overall national action plan.

During 1985, the WRB installed six data collection platforms (DCP) at remote hydrometric stations for the retransmission of data via satellite. These DCPs are included in a program to install 35 DCPs at remote sites in Ontario over a five year period which is part of a national federal program. WRB also operated 11 other DCPs on behalf of Ontario Ministry of Natural Resources.

A successful 2-day training program on the installation, operation and maintenance of Bristol DCPs was provided to Guelph hydrometric staff by Bristol Aerospace of Winnipeg and a WRB Headquarters staff representative.

The WRB carried out special discharge measurement programs at the request of various agencies such as OMNR to calibrate their East River Watershed Model, and for the Lakehead Conservation Authority to determine the effectiveness of the new McIntyre-Neebing River flood diversion. The WRB also tested and evaluated specialized data collection equipment such as the Tavis Water Level Pressure Transduscer, and the Montedoro-Whitney electromagnetic velocity meter.

5.2 Runoff Conditions and Events

Several areas of Ontario experienced high water during the 1985 spring freshet period.

Rainfall on February 23 & 24 caused break-up in many areas of Southern Ontario, including the Toronto and South Western Ontario areas of the Province. Extensive flooding occurred in the Lower Thames River basin and Water Survey of Canada field staff took the highest discharge measurements for the period of record at 3 hydrometric stations. Peak flows occurred on the Lower Thames River at Chatham about Feburary 27. Water levels were highest recorded since 1968.

During early April, rainfall combined with snowmelt caused water levels to rise significantly in South Central Ontario over the Easter weekend. Highest discharge measurements for the period of record were obtained on a number of streams and rivers flowing into Lake Huron.

Record high temperatures were recorded in mid-April. These high temperatures, precipitation and a ripe snowpack caused a rapid rise in water levels across Northern Ontario in the latter part of April. Major and minor flooding occurred in a number of communities from as far as Huntsville in the south to Kashechewan at the mouth of the Albany River in the north. A number of people were evacuated in centres such as Searchmont, Onaping Falls, and Kashechewan.

Water levels recorded on the Ottawa River near Westmeath and Britannia were in the high range and the highest discharge measurement for the period of record was obtained on the Petawawa River near Petawawa.

During the spring, summer and fall months, localized storm events caused water levels to increase for short durations with some minor flooding reported in various parts of Ontario.

Below normal temperatures during mid-December resulted in reduced streamflows and ice cover on most rivers by the end of the month.

5.3 Construction and Maintenance

The WRB construction program included 7 new installations, 3 major upgradings and a number of minor maintenance projects.

A number of field and site investigations were conducted for new hydrometric stations, relocation of hydrometric stations, and major repairs and renovations. Minor repairs and maintenance such as upgrading and repairing electrical services, installing thermostats to regulate gauge house heating systems, repairing weirs and controls damaged during spring freshet, and repairing cableways, intakes, and damaged shelters were also carried out.

Two new experimental look-in type aluminum shelters were designed, manufactured and installed at 2 sites in Southern Ontario in an attempt to reduce the cost of converting small look-in shelters for the installation of real-time data telemetry equipment. Significant cost savings were realized and similar conversions are planned for 1986.

5.4 Data Control, Publication and Distribution

During 1985, the WRB answered 494 requests for technical data, advice, and information related to the hydrometric and sediment network. Some 2,968 station years of record were distributed, comprised of 139 requests (2,420 station years) for historical record, 264 requests (548 station years) for current record, and 91 requests for other related information. The streamflow data for two hydrometric stations (Saugeen River near Port Elgin and Missinaibi River at Mattice) continued to be reported on a monthly basis to the United States Geological Survey (USGS). The USGS incor-

porates these data in their regional hydrologic analyses and publishes the results in the "National Water Conditions Bulletin." The WRB completed the processing of 1984 hydrometric data by May 1, 1985 and 1984 sediment data by November 1, 1985.

The annual publications "Surface Water Data – Ontario, 1984", "Sediment Data - Canadian Rivers, 1983," "Historical Streamflow Summary – Ontario to 1984," and "Historical Water Level Summary – Ontario to 1983" were published and distributed. Microfiche were updated to include the 1984 hydrometric and 1983 sediment data, and were distributed to users.

The major data review activity during 1985 was a review of the stage-discharge relationship for the Black Creek near Weston gauge. In this review, a new procedure using the HEC-2 hydraulic model was used to improve the upper end of the relationship.

Some expansion of the Guelph office EDP system was realized with the acquisition of two RA60 disk drives and six RA60 disk packs, one terminal, a PRO-380 microcomputer, and an LVP16 plotter. The new disk drives greatly increased the storage capacity, efficiency, and speed of operations for the PDP 11/44 minicomputer. The installation of the necessary DECNET software, and modifications to the Datapac communications link, provided a more effective and efficient means to communicate, and transfer files, between WRB Regional and Headquarters minicomputers.

5.5 Network Evaluation/Planning and Hydrologic Studies

The Hydrology Division, WRB was involved in a number of network evaluation and planning activities during 1985. The Network Evaluation and Planning Sub-Committee was formed to provide technical support to the Coordinating Committee of the Canada-Ontario Cost Sharing Agreement for Water Quantity Surveys. Each of the following agencies are represented on the Coordinating Committee and Network Sub-Committee: Environment Canada, Ontario Ministry of Natural Resources, Ontario Ministry of Environment and Ontario Hydro. The review of present uses of Ontario hydrometric data and identification of any new/future requirements for data was on-going during 1985. Several hydrometric stations were reviewed in order to determine the need for each particular station. The reviews included stations in the Oshawa area, Niagara Peninsula and Northern Ontario. A review of methodologies applicable to the evaluation and planning of the Ontario hydrometric network continued (eg. methods for assessing data accuracy and usefulness).

Hydrologic studies included the analysis of spring runoff conditions in the Canadian portion of the Great Lakes basin, an estimation of outflows from the Bay of Quinte, an assessment of hydrologic trends in the Big Creek (near Walsingham) watershed, and monthly runoff modelling in order to assess the impact of future climate changes on runoff in Ontario. The Branch worked closely with WRB Headquarters on the comparative study of regional flood frequency analysis methods. The Branch provided advice on various hydrologic matters to a number of individuals, agencies and consultants. The Branch also coordinated and hosted several seminars on hydrologic topics during the year, including an "Introduction to Frequency Analysis" (P. Pilon-HQ's, Video-tape), and "Tank Model" (Dr. Sugawara, Tokyo, Japan).

Stream discharge measurements under ice.

5.6 Tides and Waters Levels Network

In addition to the regular hydrometric stations operated under the Canada-Ontario Cost Share Agreement, WRB continued to operate 34 water level gauges on the Great Lakes and St. Lawrence River System on behalf of the Canadian Hydrographic Services (CHS) of the Department of Fisheries and Oceans (DFO). These gauges are part of the DFO network of tides and water level gauges which provide data for navigation and water management purposes. Under the terms of a memorandum of understanding with DFO, IWD operates and maintains these gauges and publishes the data from them in its surface water data publications. DFO retains ownership of the gauges, operates and maintains specialized equipment for navigational applications, processes the data, and publishes weekly and monthly reports and bulletins on water levels.

The WRB continued to gradually phase out the Ott Punch Tape Recorder with the more reliable Stevens Strip Chart Recorder. Nine Stevens Recorders were installed during 1985, leaving only 5 Ott Recorders to be replaced.

Two major construction projects were completed in the network during 1985 with the replacement of the long 88 meter crushed intake pipe at the Gros Cap station, and the refurbishing of the shelter at Cobourg following a fire at the station caused by an electrical malfunction. The installation of a new station on Lake Huron at Sarnia was started but had to be abandoned because of site construction problems and this project has been deferred to 1986.

6.0 Water Quality Agreement Program

By the late 1970's and early 1980's it had become clear to Environment Canada that more coordination and cooperation was required in the collection of water quality data in Canada. Water quality data collection had evolved over the years at federal, provincial and local levels to meet specific agency data requirements with limited inter-agency and inter-governmental coordination. This had resulted in the development of parallel federal and provincial data collection and processing systems leading in some cases to gaps and overlaps in surveys and networks and duplication of some facilities. In the same way water quality data banks proliferated with means of linking them not always available. With the increasing squeeze on funding of government programs at both the provincial and federal levels the time was ripe for an initiative to eliminate duplication and increase efficiencies in data gathering programs through formal cooperation and coordination links.

In January 1982, the Federal Cabinet gave approval to Environment Canada to negotiate water quality agreements with the provinces for the collection of water quality data and information. These agreements when completed will provide for long term commitment for the acquisition of water quality data; comparable scientifically sound water quality data that are reliable for water resources management purposes; and dissemination of timely information on water quality to the public, government agencies, industry and the scientific community. The output from these agreements will provide an ongoing national inventory of existing water quality conditions in a number of specific river basins across the country, generate the data required to assess the state of those aquatic ecosystems of federal interest in both regional and national scales, and to indicate changes in water quality that might be damaging to those ecosystems. An agreement has already been signed with Quebec (May 4, 1984) and negotiations with British Columbia, Alberta, Manitoba and Newfoundland were nearing completion in 1985.

In Ontario, ministerial letters were exchanged between the Minister of the Environment for Canada and Ontario to instruct officials to commence negotiations of a water quality monitoring agreement between the two levels of government. The first negotiation meeting between federal and provincial officials took place in December 1985. The agreement is expected to cover all aspects of the collection, analysis and dissemination of water quality information in the province, outside of the existing arrangements with regard to the Great Lakes (Canada-Ontario Great Lakes Water Quality Agreement).

7.0 Toxic Chemicals Program

The deleterious effects of toxic materials such as mercury, lead and PCBs on the environment are of major concern considering the ultimate impacts on the welfare and health of society. The presence of these substances in the environment may seriously affect plant and animal life, including humans. Contaminated water is limited in its use unless costly pretreatment is employed. Contaminated fish, birds, and other animals may become unfit for human consumption resulting in unemployment and loss of revenue for some industries. There may also be serious adverse effects on recreational activities and industries, including sport fishing, swimming and hunting.

The federal government has recognized the very serious problem toxic substances pose. As a result it enacted the Environmental Contaminants Act in December, 1975. The Act represented a major step forward in dealing with toxic chemicals nation-wide.

Water Planning and Management Branch completed 3 projects under the Toxic Chemicals Program in 1985. One study examined the social and psychological effects of exposure to hazardous substances through the experiences of citizens in 6 locations (3 in Ontario and 3 in the U.S.). Effects common to all areas investigated were feelings of helplessness and depression, loss of control and trust, fears and trauma in children, and marital problems.

A second project undertook a content analysis of newspaper articles on the Niagara toxics issue. Study findings showed that newspapers on both sides of the Niagara River have been presenting a wide range of messages about the toxics issue, often conflicting messages with significant differences among the 4 newspapers monitored. In general, the Canadian newspapers placed greater emphasis on government inaction with respect to the toxics problem while those in the U.S. emphasized government actions.

The third study undertaken by WP&MB sought to determine the short and long-term socio-economic/environmental costs of 3 alternative ways of handling the 4 largest and most threatening Niagara area dumps: no action, containment, and excavation/thermal destruction. The least cost, most efficient option, from a social, environmental, and long-term perspective, was found to be toxic waste removal and destruction.

The results of all three of the above projects were prepared in report form and the latter study findings constituted a paper presented at the November Conference on Permanent Solutions: Hazardous Waste Excavation and Treatment, held in Niagara Falls, Ontario.

Ottawa River

A water quality monitoring station was set up by the WQB at Lemieux Island in September 1984, to collect water and suspended sediment from the Ottawa River. A triple-line intake system with independent submersible pumps was installed, in the midstream channel, to minimize loss of samples and costly emergency repairs. A continuous flow centrifuge equipped with a vibration sensor and related pump control circuitry (designed by the Water Quality Branch) was installed to collect suspended sediment and provide a supply of clarified water.

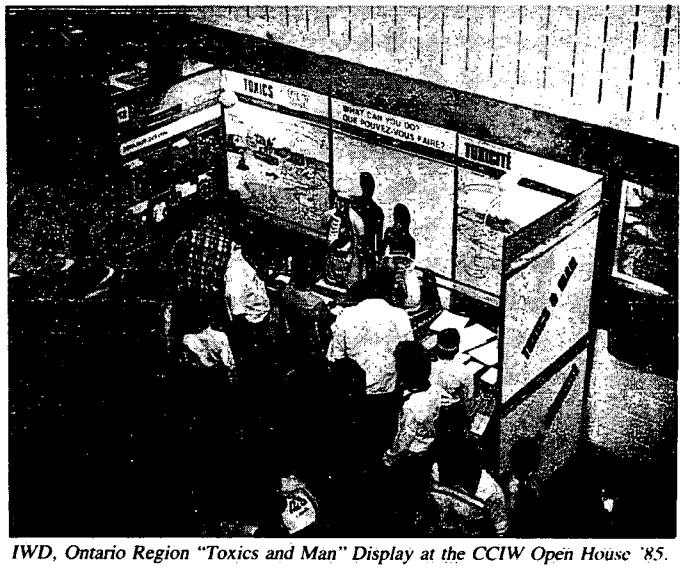
Water samples for nutrient analyses were collected on a daily basis during 1985 at the Lemieux Island station. Organochlorine pesticides, chlorobenzenes, PCB's, major ions and trace metals were analysed in samples collected weekly or biweekly from raw water, clarified water and/or suspended sediment. All sampling was conducted with the assistance of laboratory staff from the Ottawa-Carleton Water Filtration Plant. The multi intake system with related control circuitry installed in 1984 has proven to be reliable as there has been no pump or centrifuge failure, and samples have been collected according to the sampling schedule. The Nalgene 8030 tubing used at this station has however deteriorated and will require replacement in 1986. Monthly sampling for organic contaminants and heavy metals has commenced at three other stations on the Ottawa River at Timiskaming Dam, Pembroke and Hawkesbury.

8.0 Long Range Transport of Airborne Pollutants Program

The problem of long range transport of airborne pollutants (LRTAP) is an issue of major concern to both Canada and the United States. Reports of studies conducted by two IJC reference groups, the Upper Lakes Reference Group and Pollution from Land Use Activities Reference Group (PLUARG); have indicated that the issue of long range transport of airborne pollutants with its transboundary pollution implications was of great concern requiring immediate attention. Recognizing the problems LRTAP could bring to the Great Lakes Basin ecosystem, Article VI of the 1978 Canada-U.S. Great Lakes Water Quality Agreement specified the need to increase monitoring activities.

The long range transport of airborne pollutants such as acid rain is having serious adverse effects on both the aquatic and terrestrial ecosystems in eastern North America. Acid precipitation has its greatest effect on the waters and soils of the Precambrian Shield region which have only limited capacity for neutralizing the acid in the rain. Soil impoverishment through leaching of important nutrient elements by acid precipitation has the potential of reducing the yield from forests in this region. Several lakes in the Haliburton-Muskoka area of south-central Ontario have lost up to 75% of their buffering (neutralizing) capacity in the last 10 years. It has been estimated that there are about 48,000 lakes in Ontario that have been or could be adversely affected if acid loadings remain constant or increase over the next 10 to 20 years. This trend in aquatic environmental degradation poses serious threats to the social and economic well-being of Canadians.

The Water Resources Branch collected hydrometric data from six hydrometric stations in the Turkey Lakes area in support of the National Water Research Institute and the Turkey Lakes Watershed Program. The objective of this latter study is to determine how an acid sensitive lake system responds to acidic precipitation. To improve the accuracy of the water level trace, two nitrogen bubbler manometer gauges were replaced by float activated strip chart recorders and stilling wells during 1985.



IWD, Ontario Region "Toxics and Man" Display at the CCIW Open House '85.

The Water Planning and Management Branch provided advisory and analytical services for this program in cooperation with other government agencies. During 1985, technical advice and ECS membership was provided to the Socio-economic Subgroup, Research Monitoring and Coordinating Committee of LRTAP in the area of review and assessment of benefits and costs associated with the long range transport of airborne pollutants. Extensive information was assembled on: effects/damages/resources at risk, abatement and technological options, financing options, economic impacts, and evaluation methodologies for the LRTAP program. Such information was used as the basis for preparation of a poster/paper presentation entitled, "New Perspective on

the Socio-economic Aspects of LRTAP/Acid Rain," for the Muskoka '85 Conference on Acidic Precipitation, held in September 1985. In addition to providing HQ with advice regarding LRTAP program development, supplementary LRTAP funding was used to support the completion of a consultant's report, "A Review of Socio-economic Impacts of LRTAP/Acid Rain in Eastern Canada."

9.0 Environmental Assessment and Baseline Studies

Under this integrated program, IWD, Ontario Region provides direct support to the Federal Environmental Assessment and Review Process (EARP) in ensuring that environmental effects, particularly effects on water resources, are taken into account early in the planning of projects involving federal interests and funding and that appropriate measures are taken to minimize environmental impacts of the projects. IWD usually assumes lead agency responsiblities for evaluation of predominantly water-related development projects and provides advice on water concerns to other lead services on other projects. IWD has membership on the Regional Screening and Coordinating Committee (RSCC) which provides the focus for EARP-related activities in Ontario Region.

The baseline studies component of the program endeavours to provide the information or knowledge base required for evaluating the effects of various activities on environmental resources of specific geographic areas or the effects of particular development cycles, such as the nuclear fuel cycle. IWD, Ontario Region, participates together with other DOE services in baseline studies identified as priority areas by the Regional Director General/Ontario Region, as these arise.

9.1 Environmental Assessment

During 1985, IWD, Ontario Region Environmental Screening Guidelines were applied to regional activity work plans, consistent with the 1984 EARP Guidelines Order-in-Council. Formal screening was conducted for 12 WRB projects which involved construction and repairs to guage wells, shelters, etc. Screening decisions were reported on a quarterly basis through the ECS Coordinator to the Federal Environmental Assessment and Review Office (FEARO) for public dissemination in their publication of federal screening decisions.

Several projects continued from the previous year with various degrees of required involvement and stages of completion. The Provincial Government completed its review of the Keating Channel (Toronto) Environmental Assessment, for which extensive input was previously provided by DOE Ontario Region. Towards the end of the year, opportunity was provided for open public comment on the report; no decision was reached, however, on the requirement for public hearings on the project. Decommissioning of the low-level radioactive waste dump at Port Granby (Eldorado Resources Ltd.) which was to have commenced in 1986, was delayed indefinitely with no alternative site for waste disposal yet identified. A bluff stability and erosion monitoring program is currently on-going at Port Granby to ensure the containment of wastes presently stored there.

WRB participated in the second bathymetric and bed material survey of the Goderich Harbour Expansion Project using the Hydac system developed by the Sediment Survey Section at HQs. The survey was carried during the final stages of construction of the breakwater in September, 1985 for the Department of Public Works as part of the monitoring program for the project.

Data was provided to Transport Canada and comments given on a summary report of the 1974-1983 surface water monitoring program for the proposed Pickering Airport project.

WP&MB acted as lead agency in the review of the Feasibility Report and Final Environmental Impact Statement for the Great Lakes Connecting Channels and Harbours Study, prepared by the U.S. Army Corps of Engineers. The proposal called for extensive deepening of navigation channels in the Upper St. Marys River and disposal of dredged materials. Among the many other projects evaluated for effects and impacts were: the Toronto Harbourfront Light Rail Transit system (Toronto Transit Commission), Assumption-Centennial Park Seawall construction, draft Belleville Ice Management Environmental Assessment (Moira River Conservation Authority), Indian/McGregor Creek Flood Control (Lower Thames Valley Conservation Authority), Washagamis Bay Indian Band cottage and marina development (Indian and Northern Affairs Canada), Thunder Bay Harbour new channel construction (Lakehead Harbour Commission), Old Welland Canal/Welland River bridges construction (Ministry of Transportation and Communications), expansion of Collingwood Airport (Transport Canada), Windermere Basin (Hamilton Harbour) sediment clean-up (Public Works Canada), and draft Class Environmental Assessment for modifications to hydroelectric facilities (Ontario Hydro).

In related activities, input was provided to: Provincial Ministry of Environment's Remedial Action Plans for Collingwood Harbour, Wheatley Harbour, Niagara River, St. Clair River, St. Marys River, and Spanish River; Toronto Harbour Commission's annual operating plans and preparation of an Initial Environmental Evaluation for a new Toronto Outer Harbour Marina; EPS technical guidelines for environmental screening of marina developments in Ontario; EPS National Action Plan for dredging project assessment; FEARO environmental screening and initial assessment guidelines for federal departments; and EPS study on screening/initial assessment practices in Ontario Region. A slide/paper presentation on the topic of winter navigation

season extension on the Great Lakes was also made for a course on "Decisions for the Great Lakes," Queen's University at Kingston.

9.2 Baseline Studies

A baseline data collection program, involving WP&MB and WRB, was initiated in the fall of 1985 for the St. Marys River, following earlier work to assess dredging impacts on flow distributions around Sugar Island and the identification of data needs. The long-term measurements of water levels, flows, and sedimentation patterns are expected to provide a better basis for ascertaining effects on flow distributions, sedimentation, and water quality. Related hydraulic and sediment modelling work is also being undertaken as a two-year resarch project at NWRI, commencing in 1986.

Hudson Bay Lowlands

Monthly samples for heavy metals, organochlorine pesticides and PCB's were collected from the five major rivers of the Hudson Bay Lowlands by the WQB. Sampling sites were located adjacent to the native settlements near the mouths of the Moose, Albany, Atawapiskat, Winisk and Severn Rivers. Two papers detailing the source and fate of contaminants were submitted for journal publications. These papers described contaminants in water, fish, and bottom sediment in each of the five rivers. Contaminants in headwater wetlands and estuary flats of the Moose River were also examined. A third paper detailing species abundance and diversity of the benthic communities in the major rivers was also submitted for journal publication. A paper, outlining the development of the multi-phase sampling conducted in Ontario's Arctic Watershed with selected results from the six studies, was presented at a Monitoring Workshop held at CCIW, Burlington in May 1985.

Part of environmental display at the Burlington Mall commemorating Environment Week.

10.0 Management and Administration

In 1985, the Directorate administered and managed resources amounting to 6.9 million dollars and 87.8 person years. The resources included operational funding under international and federal-provincial agreements as well as grants and contributions under similar agreements. Significant federal-provincial cost-shared funding administered in 1985 included the Canada-Ontario Great Lakes Water Quality funding ($1,200,000) and the Canada-Ontario Flood Damage Reduction Agreement funding ($700,000 for 1985-86). Approximately $827,000 is expected to be cost recovered from the Province in 1985/86 under the Canada-Ontario Cost Share Agreement on Water Quantity Surveys.

IWD, Ontario Region actively participated in the CCIW Open House '85 which was held April 17-21 and proved to be a resounding success with over 30,000 visitors attending. A total of five displays were set up by IWD, Ontario Region, three by WP&MB and two by WQB. The WP&MB displays were entitled: "Toxics and Man," "Man and the Hydrologic Cycle," and "Water in Motion." The former two were displays that were staffed by Branch members while the latter was a mural used as an introduction to the Physical and Hydraulic Lab theme area. The Toxics and Man display proved to be a popular one which generated a great deal of interest and questions from both students and adults. The display sought to simplify and explain the significance of trace chemical concentration measurements, human exposure pathways for lead and dioxin and target receptors in the body, and examples of toxics in sources from around the household. In addition, a brochure entitled, "Toxic Substances in Your Home – What Can You Do?", was prepared for dissemination. The Man and the Hydrologic Cycle display covered topics of Great Lakes water levels, flooding, shore erosion, Niagara hydroelectric power and water diversions.

The WQB displays dealt with toxic contaminants in Ontario lakes and rivers and the effects of phosphorus controls on the water quality of surface waters in Ontario. In addition, IWD conducted a survey of visitors to the Open House to gauge their response to the event (very positive!).

WP&MB staff participated in organizing and staging several successful events in the Burlington/Hamilton area for Environment Week, June 2-8, 1985. Supported by the CCIW Executive Committee and volunteers, the Environment Week Committee sent "Johnny Biosphere" (Dr. Jack Vallentyne of DFO) to local schools prior to Environment Week and the "Environmental Minstrels" (Ken Lonquist and Doug Brown) to more schools and the Burlington Central Library during the actual week. In addition, a 3-day public information display featuring "Professor Trout Jr." (a talking fish) and several exhibits from the CCIW Open House (including WP&MB's Toxics and Man) was set up in Hamilton's Lime Ridge Mall. The award-winning film, "Baobab – Portrait of a Tree,," was also screened at CCIW on World Environment Day, June 5.

11.0 Publications and Presentations

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8. Madisso, U., "A Synthesis of Social and Psychological Effects of Exposure to Hazardous Substances". Unpublished Report, Burlington, January, 1985.

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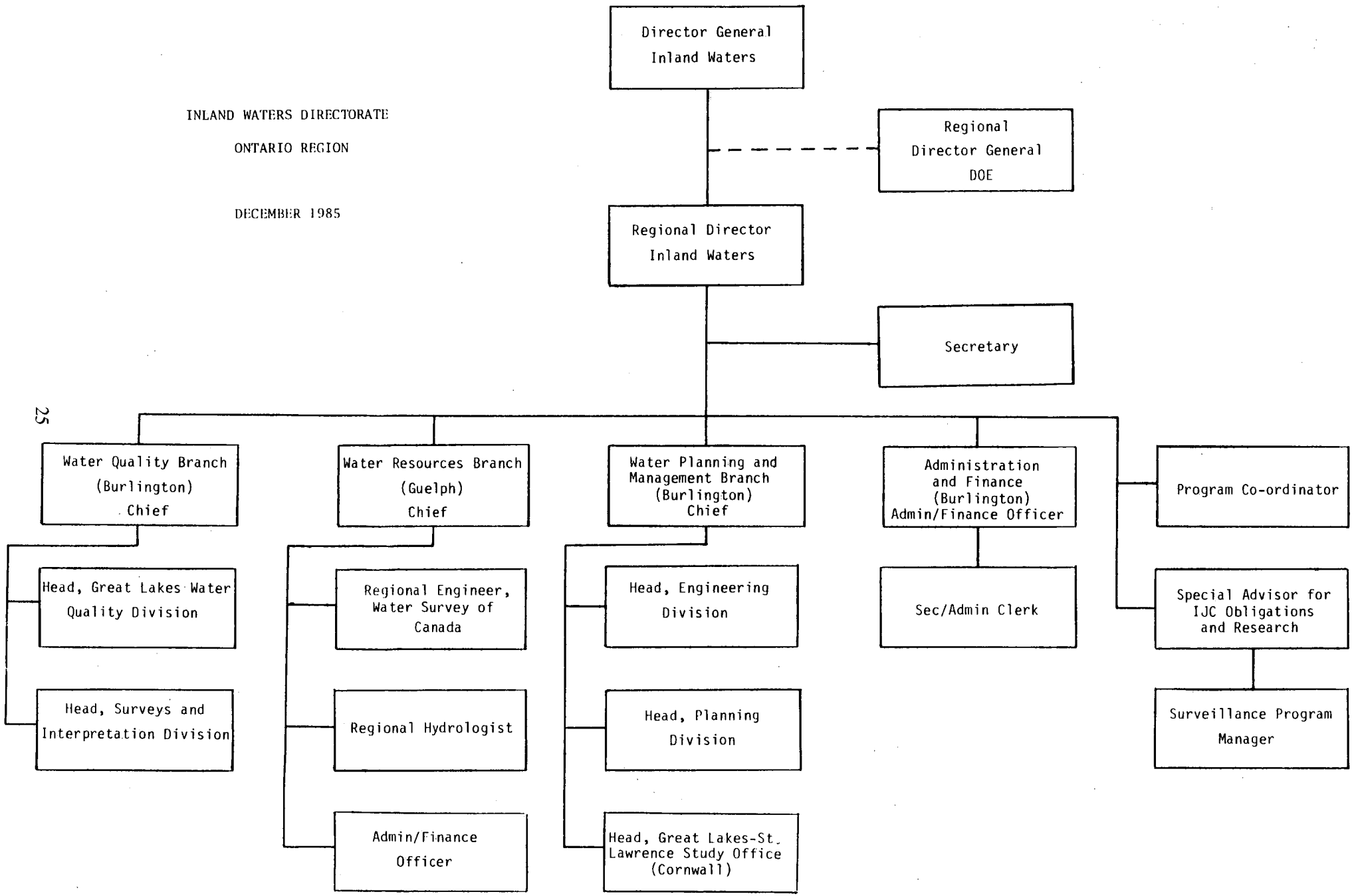
12.0 Organization Chart



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Date Due