ANNUAL REPORT 1980 INLAND WATERS DIRECTORATE ONTARIO REGION

DEPARTMENT OF THE ENVIRONMENT

Inland Waters Directorate
Ontario Region

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1.0 INTRODUCTION

Inland Waters Directorate (IWD), Ontario Region, is a component of the federal Department of the Environment. 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 the Directorate is related to the gathering and dissemination of water-related information and to explaining and predicting the behaviour of the quantity and quality of the waters in Ontario with particular emphasis on the Great Lakes and their interconnecting channels. It plays a major role in water use planning and management investigations including Great Lakes shoreland management and flood damage reduction programs in cooperation with the province, and in addressing international water management problems along the Canada-United States boundary. In addition, the Directorate has a research role in relating water management policies and programs to social needs and issues.

The Directorate consists of three Branches and one Division: Water Planning and Management Branch; Water Resources Branch; Water Quality Branch; and Policy Research and Social Analysis Division.

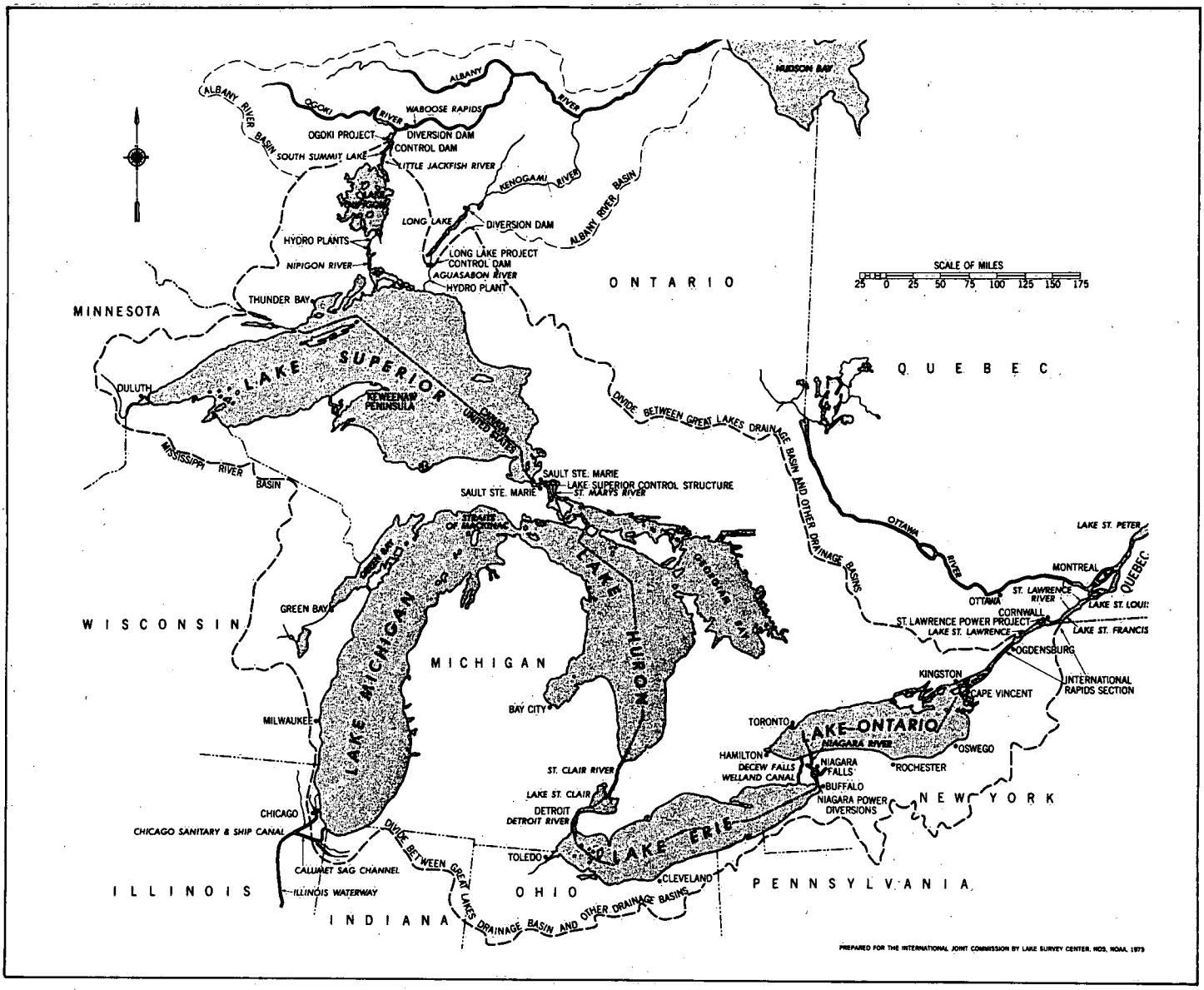
The Water Planning and Management Branch (WP&MB) administers and implements federal, federal-provincial, and international water management projects. The Branch provides technical support to all the International Joint Commission (IJC) Great Lakes Boards of Control; carries out special studies for IJC Study Boards such as the current Lake Erie Regulation and Great Lakes Diversions and Consumptive Uses Studies; implements federal-provincial water management projects under the Canada Water Act relating to flood damage reduction, flood control, and shoreland management; and reviews federally initiated and federally funded water-related projects for environmental impact under the Environmental Assessment and Review Process.

The Water Resources Branch (WRB) operates and maintains a network of stream-flow, water level, and sediment stations throughout Ontario and the Great Lakes system jointly funded with the Province; 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 Water Quality Branch (WQB) carries out monitoring and surveillance activities in Ontario with particular emphasis on the Great Lakes and interconnecting channels and maintains an analytical chemistry laboratory supporting programs of the Directorate and of components of the Department of Environment and the Department of Fisheries and Oceans in the region.

The Policy and Research and Social Analysis Division (PR&SA) provides advice to the Director and branches of Inland Waters Directorate, Ontario Region on program planning and evaluation; gathers and evaluates social and institutional information; and researches the socio-economic implications of resource policies and programs. Much of the Division's activities are related to IJC Boards, References and Studies.

The activities of the Directorate are divided among comprehensive regional programs, each of which is directed by a lead agency which may utilize resources and expertise from any of the branches of Inland Waters Directorate or other components of the Department of the Environment. The following is a description of the activities carried out within this program structure during 1980.



Great Lakes-St. Lawrence River Drainage System —
from Regulation of Great Lakes Water Levels Appendix B, Volume I, Lake Regulation

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

Activities of man 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 issue, affecting shore erosion, hydro-electric power generation, navigation, water supply for domestic and industrial purposes and recreation. 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 basin.

The Inland Waters Directorate, Ontario Region, provides assistance and advice to the following 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 of the Directorate continued to support the IJC's International Lake Superior Board of Control in regulating the outflows of Lake Superior. The water level of Lake Superior was above normal during the first half of the year. However, below-average water supplies to the lake resulted in levels near the long-term average for the remainder of the year. Throughout 1980, the Superior Board reviewed the various hydrologic factors and used Regulation Plan 1977 in determining the Lake Superior outflows. This regulation plan first adopted in 1978 considers both the levels of Lake Superior and Lakes Michigan-Huron in determining the outflows of Lake Superior. Toward year-end, an operational guide was prepared for the Plan.

The Water Planning and Management Branch also supported the Superior Board with regard to the Great Lakes Power Company's redevelopment of its power facilities at Sault Ste. Marie, Ontario. WP&MB staff participated with other agencies in the development of water quality tolerance limits to be adhered to during the redevelopment. Branch staff also determined the required regulated Lake Superior predischarges to facilitate scheduled construction activities during which period normal discharges will be hampered. Other WP&MB activities included the initiation of a testing program for determining structural stability and a long-term maintenance program for the Lake Superior Compensating Works on the Canadian side of the boundary and the review of a proposed method of providing a water supply to Whitefish Channel in the St. Mary's River to meet the fisheries requirements.

On the unregulated lakes (Lakes Michigan, Huron, and Erie), above-average water levels continued through 1980 as a result of above-average water supplies. This condition, extending back to 1969, has become the longest sustained period of above-average water levels on the lakes since 1900.

Technical support was provided by WP&MB to the IJC's International Niagara Board of Control regarding water flow control activities in the Lake Erie-Niagara River area. The Branch also monitored the operation of the Lake Erie-Niagara River ice boom and carried out related studies. The ice boom is deployed every winter by the hydro-electric power entities to reduce the frequency and severity of ice runs in the Niagara River. While it has proven its merit, the ice boom has become a controversial issue in the Buffalo, New York-Fort Erie, Ontario area and has been alleged to extend the length of the ice season in the area. WP&MB staff assisted the Niagara Board in conducting its annual public meeting on the operation of the boom. In July, the IJC held a series of public hearings concerning the application by the power entities to continue to install the boom. The Branch assisted the Board in its presentation at the hearings and provided additional information to the IJC to assist in the deliberations which resulted in a five-year extension of the Order of Approval for the ice boom.

Another study conducted for the Niagara Board by WP&MB, in cooperation with the WRB, was a review of the stage-discharge relationship for the Ashland Avenue gauge site. Water level records from this gauge are used to monitor the flows over Niagara Falls. A new stage-discharge relationship, based on current meter measurements taken in recent years, has been recommended to the Niagara Board.

The Water Planning and Management Branch 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.

Water Planning and Management Branch supported the IJC's International St. Lawrence River Board of Control in regulating the outflows of Lake Ontario by reviewing hydrologic factors and applying Regulation Plan 1958-D. The water level of Lake Ontario was slightly above the long-term average during most of the year and was near average by year-end. During the year, the Board completed its study on Lake Ontario regulation and submitted its report to the IJC, recommending no change to the present method of Lake Ontario regulation.

Throughout 1980, WP&MB coordinated basic hydraulic and hydrologic Great Lakes data with U.S. officials. Support was also provided to the Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data which recommended guidelines and procedures for current meter measurements and for computation of river flows in the Great Lakes-St. Lawrence system. The Committee is currently considering a program to update the International Great Lakes Datum. This datum was last established in 1955 to measure the water levels of the Great Lakes but requires updating due to continuous and uneven vertical movement of the earth's crust in the basin.

Other water management activities were related to the operation of the ice booms in the St. Mary's and St. Lawrence Rivers and monitoring such issues as the State of Illinois' application to the U.S. Supreme Court to modify the Chicago diversion accounting

procedures and the conditions of Terrapin Point at Niagara Falls, where remedial works are being contemplated by the State of New York.

2.2 Great Lakes Study Boards

In May, 1977, the IJC, at the request of the Governments of Canada and the United States, established: (a) the International Lake Erie Regulation Study Board (LERSB) to determine the practicability of limited regulation of Lake Erie; and (b) the International Great Lakes Diversions and Consumptive Uses Study Board (D&CU) to examine the effects of existing and proposed diversions and consumptive uses on Great Lakes water levels and flows. In early 1980, the IJC also established the International Great Lakes Technical Information Network Board to examine, provide advice and make recommendations on unmet hydraulic, hydrologic and meteorological data needs in order to improve the data collection network in the Great Lakes region. The Directorate, Ontario Region and its Headquarters in Ottawa, provide extensive support to these three studies.

Inland Waters Directorate, Ontario Region, provided the Canadian Chairmen and Secretaries to LESRB and its Working Committee. The Directorate also provided Chairmanships to six of the eight subcommittees, namely: Regulation, Regulatory Works, Coastal Zone, Environmental Effects, Economics, and Public Information. Staff from WP&MB also chaired the Technical Information Network Board as well as the Diversions Subcommittee of the D&CU Board.

The Lake Erie Regulation Study activities peaked in 1980. A major conclusion reached by the Study Board was that limited regulation of Lake Erie would incur economic losses far outweighing any benefits derived. It was also concluded that reduction in shoreline flood and erosion damages can best be achieved by proper coastal zone management and a better understanding by the public of the various factors causing lake level fluctuation. By year-end, the Board had prepared drafts of its final report and the accompanying appendices. The Board also provided extensive support to the D&CU Board and the St. Lawrence River Board in their respective studies.

One of the major accomplishments in conducting the Lake Erie Regulation Study was the development and implementation of new methodologies to evaluate the effects of Lake Erie regulation plans on the coastal zone (flood and erosion) and on the environment (water quality, fish, and wildlife). Methodologies were also developed and used to evaluate the effects of lake level fluctuation on recreational beaches and boating.

The Technical Information Network Board initiated its study in 1980. A survey letter was mailed to all government agencies and organizations in the Great Lakes basin, requesting outlines of their present and future data needs.

2.3 Great Lakes and Interconnecting Channels Water Levels Monitoring

The Water Resources Branch operates and maintains 39 water level stations on the Great Lakes for the Canadian Hydrographic Service (CHS), beginning at Thunder Bay, and downstream on the St. Lawrence River as far as Summerstown. Discussions continued between the WRB and the CHS on the division of responsibility for these and other tides and water level gauges operated by WRB for the CHS.

A new water level station was constructed on the St. Lawrence River at Brockville and became operational in April. Modifications to the Burlington Water Purification Plant necessitated the movement of the Burlington water level station to the entrance to Hamilton Harbour. Construction of the new shelter and well was completed in October and instrumentation was installed in December.

Personnel from WRB continued to participate with personnel from the National Oceanic and Atmospheric Administration's Great Lakes Environmental Research Laboratory in the placement of Marsh McBirney Model 585 recording electromagnetic current meters in the St. Clair River just below the Bluewater Bridge at Port Huron, Michigan. The data obtained from these meters will be used to compute the flow of the St. Clair River under ice conditions. Should this method prove successful at this site, another set of meters will be deployed to calculate the winter flows in the Detroit River. To date, due to meter breakdown problems, no useful data have been extracted. It is anticipated that these problems will be overcome in 1981.

On behalf of the Working Committee of the International Niagara Board of Control, work was carried out on the development of a stage-discharge relationship for the Ashland Avenue gauging station on the Niagara River at Niagara Falls, New York. The work consisted of statistical analyses of several proposals for a revised rating and the preparation of a report.

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 37 million North Americans. One out of every three Canadians live in the basin and one-half of all manufactured goods of the country are generated there. The major urban centres of the basin are situated adjacent to the Great Lakes and rely on them 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 — their freedom from pollution — is a basic concern to Canada and the Ontario region.

On April 15, 1972, the Canadian and U.S. governments signed the Great Lakes Water Quality Agreement which formalized the intent on behalf of both countries to prevent further deterioration of the Great Lakes and provided the basis for improving existing water quality. This intent was reaffirmed by the signing of a new agreement on November 2, 1978. The new Great Lakes Water Quality Agreement emphasizes control of pollution from toxic substances and the control and prevention of pollution from industrial 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. Inland Waters Directorate activities related to the Agreement include:

(a) the defining and continual refining of water quality objectives;

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

(c) 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; and

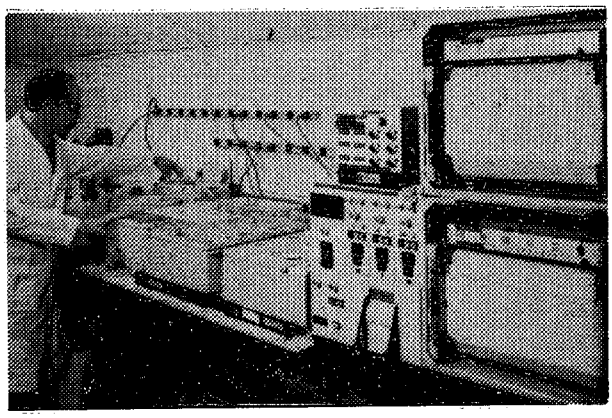
(d) identifying new and developing pollution problems.

Within Canada, the Federal and Provincial governments signed the Canada-Ontario Agreement on Great Lakes Water Quality (COA) in 1971 which was extended in 1976 for a further five years. This Agreement provides 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. The Canada-Ontario Agreement also provides for the cost-sharing of provincial surveillance activities on a 50-50 basis. In the 1979-80 fiscal year, Canada's share of surveillance costs under the Canada-Ontario Agreement amounted to $972,138. The Director of IWD, Ontario Region, is a member of the Review Board which is responsible for overseeing the implementation of the COA.

In recognition of the added responsibilities for Canada under the 1978 Canada-U.S. Agreement, Canada and Ontario initiated the renegotiation of the Canada-Ontario Agreement in 1979. The revised Canada-Ontario Agreement, which will reflect the new requirements of the 1978 Canada-U.S. Agreement, should be completed and signed in 1981.

3.1 IJC Water Quality Board

Inland Waters Directorate continued to provide extensive support to the IJC Water Quality Board and its committees. Staff of IWD, Ontario Region, serve on the Board, the Board's Water Quality Programs Committee and Surveillance Work Group. The WQB provided the chairman for the Lake Huron Work Group which was responsible for preparing the Lake Huron Surveillance Plan section of the Great Lakes International Surveillance Plan. The latter plan, which is the basic framework for surveillance activities in the Great Lakes basin as required in the 1978 Canada-U.S. Water Quality Agreement, was formally presented to the IJC by the Water Quality Board in 1980. IWD, Ontario Region, personnel were also extensively involved in the preparation of the Water Quality Board's Annual Report for 1980 which was presented to the IJC at its November, 1980, meeting with the Board.



Shipboard laboratory of the Water Quality Branch

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

During 1980 the WQB participated in the intensive surveillance project on Lake Huron in cooperation with other Canadian and U.S. agencies. The intensive surveillance effort on Lake Huron was designed to provide a comprehensive, integrated, state-of-the-lake assessment and is scheduled every nine years for Lake Huron. Six water quality surveillance cruises were carried out on Lake Huron-Georgian Bay in the period April to November, 1980, three of these by the Canadian vessel CSS Limnos and three by the U.S. Environmental Protection Agency (USEPA) vessel R. V. Simons. The WQB provided the ship-board analytical support for all six cruises and carried out the shore labs analysis for samples collected on the CSS Limnos cruises. The data from this intensive surveillance of Lake Huron will be analyzed and assessed during 1981-82 and will be reported to the IJC's Water Quality Board in 1982.

As part of the intensive surveillance effort on Lake Huron, 11 water quality surveillance cruises on Saginaw Bay in Lake Huron were carried out by the USEPA using the U.S. launch Bluewater. The WQB provided the ship-board analytical support for all of these cruises. A total of 5,467 tests were completed by the ship-board laboratory during the Saginaw Bay cruises.

In 1980 the annual surveillance of Lake Ontario was reduced in scale because of the need to divert time and effort to the intensive Lake Huron surveillance activities. Three cruises, each of which involved the sampling of 94 stations, were conducted in Lake Ontario by the CSS Limnos in March, April and October respectively. A total of 1,128 samples were analyzed on board ship by the WQB with an additional 1,439 samples being shipped back to the Branch's main laboratory in Burlington for further analyses involving some 14,399 tests.

3.3 *Interconnecting Channels Water Quality*

Water quality monitoring continued in two interconnecting channels, the Niagara and St. Lawrence Rivers. Automatic water samplers at Niagara-on-the-Lake and Wolfe Island collected daily samples for estimating loadings into and out of Lake Ontario. Loading data for phosphorus are submitted annually to the IJC for inclusion in its Great Lakes Water Quality reports. The weekly sampling of suspended sediments for toxic contaminants at the Niagara-on-the-Lake site was continued. Analysis for chlorobenzenes in suspended sediments was initiated.

A study of the short term variation in the toxic chemical concentrations in suspended sediments in the Niagara River was carried out in 1980. During the period November 16-28 inclusive, suspended sediments were collected on a 24-hour basis at the Niagara-on-the-Lake site. The samples collected will be analyzed for PCBs, organochlorine pesticides, chlorobenzenes, phthalates, polynuclear aromatic hydrocarbons (PAH) and dioxins.

A draft report on the analysis of water quality data collected during the WQB's 1975 and 1979 water quality surveys on the Upper Niagara was completed. The report discusses the spatial variation in the water quality of the river and examines the changes in water quality between 1975 and 1979.

3.4 *Niagara River Toxic Contaminants*

Increased emphasis has been placed on the problem of toxic contaminants in the Niagara River. The Directorate provided considerable input, both data and data analysis, to the preparation of a report entitled "Environmental Baseline Report of the Niagara River." The report, prepared for the COA Review Board, details past and present water quality conditions in the Niagara as they relate to toxic contaminants. The departmental position on SCA, an American industrial waste disposal firm proposing to dump its treated wastes into the river, was to a large extent based on the information from this report.

In response to both Canadian and U.S. concerns over the toxic problem in the Niagara River, an ad hoc bilateral committee was formed in the latter part of 1980 to coordinate Canadian and U.S. surveillance and monitoring activities in the Niagara River area. IWD, Ontario Region, provides the Canadian Co-chairman for the Committee, which includes representatives from Canadian federal, provincial, U.S. federal and state environmental agencies.

3.5 *Atmospheric Loadings*

Inland Waters Directorate continued to fulfill its commitment to measure atmospheric loadings to the Great Lakes as part of the IJC Great Lakes Surveillance Program, by maintaining its network of 15 precipitation chemistry stations on the Canadian side of the basin. The stations in the network are located near the shorelines of the Great Lakes and are equipped with precipitation samplers to collect

atmospheric deposition. During the year some minor changes in sampling locations and collection procedures were made to update the network operation, coordinate with other networks operated by other Canadian and American agencies and permit valid data intercomparisons. Future development in the network operations will focus on separating the wet and dry components and their relative contributions to atmospheric deposition and extending the chemical analysis to organic contaminants.

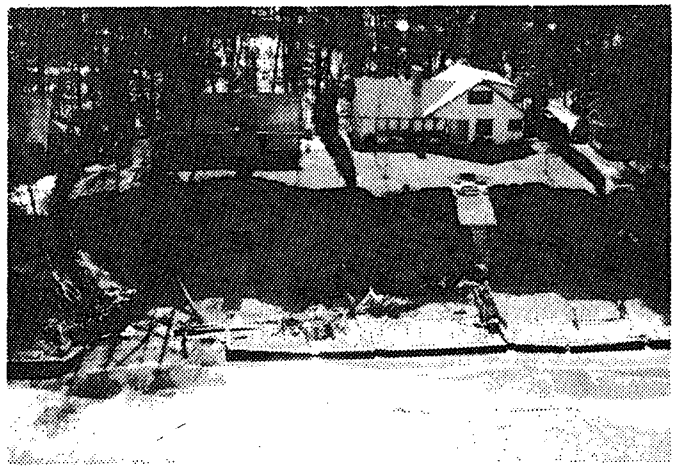
3.6 Analytical Laboratory Support

Analytical support service was provided by WQB to over 72 studies and projects related to programs of the federal government, the IJC, and other agencies. A total of some 26,500 samples consisting of water, wastewater, precipitation, sediments, fish, and other aquatic biota were analyzed for 290,000 test results.

4.0 Great Lakes Shoreland Management and Damage Reduction Program

High water levels and storms such as that which occurred in 1972-73 can cause considerable flood and erosion damage along much of the lower Great Lakes shoreland. Canada and Ontario carried out a major survey of the shoreland in 1972-73 to assess the nature and extent of this damage and to recommend remedial measures. The resulting Technical Report of the Canada-Ontario Great Lakes Shore Damage Survey, released in 1976, contained a number of recommendations for follow-up programs including: establishment of a public awareness program to better inform the public of the risks of building near the shore; establishment of a program to identify hazardous areas; and the development of shoreline management strategies to reduce future damages through land-use controls, land acquisitions, and, where warranted, effective shore protection.

Following the release of that report, Canada and Ontario established a Task Force to implement these recommendations. WP&MB, along with Ocean Science and Surveys of the Department of Fisheries and Oceans and the Ontario Ministry of Natural Resources, provide the membership of this Task Force which has been carrying out these follow-up programs.



Shore damage on Lake Huron — photo courtesy of Shore Properties Studies, Ocean Science and Surveys

4.1 Public Awareness of Great Lakes Shoreland Problems

Inland Waters Directorate provided funds and technical support through the WP&MB to a public awareness program designed to increase awareness of the problems and hazards of living in the shore zone. In previous years, a number of brochures have been prepared on the many aspects of this subject. In an effort to further promote distribution of these brochures, advertisements of their availability were placed in 82 newspapers in the Great Lakes basin and over 1,000 requests for brochures were received.

A slide-tape show was prepared to inform the viewers of the hazards of flooding and erosion when purchasing property in the shore zone. Copies of this show and a previously prepared show, which depicts the hazards of flooding and erosion on Great Lakes shoreland, will be distributed to Conservation Authorities for their use.

A display on the federal-provincial shoreland management program on the Great Lakes was shown at the Biennial Conference of the Conservation Authorities of Ontario held in Trenton from September 15 to 17, 1980. In addition, the two slide-tape shows were shown as part of a presentation on the program.

4.2 Great Lakes Shoreland Erosion Monitoring

Inland Waters Directorate continued to provide

funding to the Department of Fisheries and Oceans (DFO) in support of the Canadian-Ontario shoreland monitoring program. The objectives of this program is to provide the basic data needed to increase the understanding of shore processes on the Great Lakes, with shore profiles obtained from offshore and onshore surveys. A draft interim report on the results of the program was prepared by DFO.

4.3 Great Lakes Shore Management Study

Work continued on the Canada-Ontario Great Lakes Shore Management Study. The objective of the study is to develop methodologies for the preparation of shoreland management strategies by regional authorities located along the Great Lakes. The methodologies have been written to form the draft report entitled "Basic Guidelines for Great Lakes Shoreland Management." This draft has been reviewed and is now undergoing final revisions prior to publication. A draft report was also completed on the application of these methodologies to a reach of Lake Erie shoreland in Essex County.

5.0 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, discouraging new investments in such designated flood-risk areas, and participating in traditional flood-control projects 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, calling for the mapping of flood-risk areas and other flood damage reduction measures. The total cost of the Agreement is $9.2 million ($8.0 million for flood-risk mapping and $1.2 million for other measures) to be shared equally. The term of the Agreement is 11 years, which includes six years for mapping. The Agreement is retroactive to April 1, 1977. The total expenditure under the program as of December 31, 1980, was $1,721,845; the federal share being $860,923.

In accordance with the Agreement, a Steering Committee, with representatives from IWD, Ontario Region and Headquarters, has been established and a Technical Subcommittee, supported by WP&MB, was formed to carry out the technical aspects of the program.

Flood damage — Ganaraska River at Port Hope

5.1 Flood Risk Mapping

The mapping of flood-risk areas is a prerequisite to the Flood Damage Reduction Program. Once such areas are identified and mapped, the Ministers of Environment and Ontario Natural Resources sign the maps for designation. The policies of the Agreement come into effect upon designation. The information arising from this activity will enable government departments and agencies, local authorities, and the public to discourage investment in and to refrain from further development of flood-vulnerable structures in high-risk areas.

Four projects which were completed in the Province prior to the signing of the Agreement were reviewed by WP&MB for quality standards set out in the Agreement. Studies on the Kaministikwia River near Thunder Bay and Humber River in Metro Toronto were found to be acceptable, whereas floodline mapping studies for the Little River in Essex County and Twenty Mile Creek in the Niagara Peninsula were deficient in hydrotechnical details. As the Humber River study was considered representative of all studies within the Metropolitan Toronto and Region Conservation Authority area, a recommendation was made for the designation of the Humber, Don, and Rouge Rivers and Etobicoke, Mimico, Highland, Duffin, Petticoat and Carruther's Creeks, along with the Kaministikwia River in Thunder Bay. The Steering Committee concurred with this recommendation, and documents related to the designation procedure are being

prepared. The documents include letters to the Ministers for their approval and public information maps at a scale of 1:25,000. Descriptions of local flooding history and the Flood Damage Reduction Program will be provided on the back side of the maps. Full designation is expected to occur in the fall of 1981. Interim designation was recommended for the Little River and Twenty Mile Creek. During the year, hydrotechnical reviews were also carried out for the floodline mapping studies in the Oshawa area and the lower reaches of the Grand River.

Due to significant changes in the Provincial floodplain management policies, a request was made by the Province and approval received from the Steering Committee to amend the Agreement. The amendments were drafted in consultation with WP&MB Headquarters and Legal Services for Environment Canada. Documents to obtain the Order-in-Council are being prepared. Other important changes in the Agreement include the replacement of Schedule 'C' by the Provincial specifications, an extension of the mapping term and the life of the Agreement by two years, and addition of a two-zone, floodway/flood-fringe concept.

In light of reviews of the floodline mapping studies in Ontario and the identification of some technical inadequacies, guidelines were developed for the approval of the studies. These were incorporated into a similar package prepared by Ontario for distribution to and use by the Conservation Authorities. Projects are currently under way in 12 Conservation Authority areas and four areas that are outside of Conservation Authority jurisdiction.

An important aspect of the Agreement is to inform the public of the nature and philosophy of the Flood Damage Reduction Program, the extent of the flood-risk areas, and government policies for designated areas. During the year, the Steering Committee approved funding for the wide circulation of the brochure "Cutting Our Flood Losses" prepared by IWD Headquarters. Four sets of a public information display were produced as part of a student project through the School of Visual Arts, Sheridan College. The display panel is available on a loan basis from WP&MB. Twenty copies of a slide-tape show, originally developed by IWD Headquarters and modified by WP&MB to reflect local concerns, were distributed to various agencies at no cost.

An audio-visual presentation on the program was made by WP&MB staff at the 17th Biennial Conference of the Conservation Authorities of Ontario at Trenton in September, 1980. The display panel on the federal/provincial program was also set up during this Conference, as well as in North Bay as part of Conservation Week hosted by the North Bay-Mattawa Conservation Authority.

Members of the WP&MB staff participated in a National Meeting in Ottawa for representatives of Technical Committees under the program. Discussion papers were presented on the public information program and hydraulic data requirements.

5.2 Other Flood Damage Reduction Measures

Following extensive flooding in the Sturgeon River/Lake Nipissing/French River basin during the spring of 1979, the Steering Committee initiated a major study under the Flood Damage Reduction Program to seek solutions that could reduce the threat of future flooding in this watershed. This comprehensive study is jointly administered by WP&MB and the Ontario Ministry of Natural Resources and will cost approximately $400,000, of which $270,000 is for hydrotechnical studies and $130,000 for mapping activities.

The work program calls for a comprehensive water management study and the development of management alternatives for the basin. Competing water uses have been evaluated, including recreation, fishing, industrial uses, hydro-power generation, and tourist operations. Public involvement in the study was achieved through an Advisory Group representing local interest groups, concerned citizens, and representatives of organizations that may be affected by the study recommendations.

There were three phases to the study. Phase I consisted of documenting existing information and was completed in May, 1980. During this phase, the Steering Committee and the Advisory Group conducted public meetings in Noelville, Sturgeon Falls, and North Bay in January of 1980. Phase II of the study was concerned with the optimal operation of existing reservoirs. During this phase, a number of workshops were conducted by the consultants and a number of recommendations were made. The recommendations included installation of telemark water level gauges at North Bay and Dry Pine Bay. Through the offices of the WRB, these gauges were installed and made operational in April, 1980. The Phase II report, completed in September, 1980, was followed by a second set of public meetings in October, 1980.

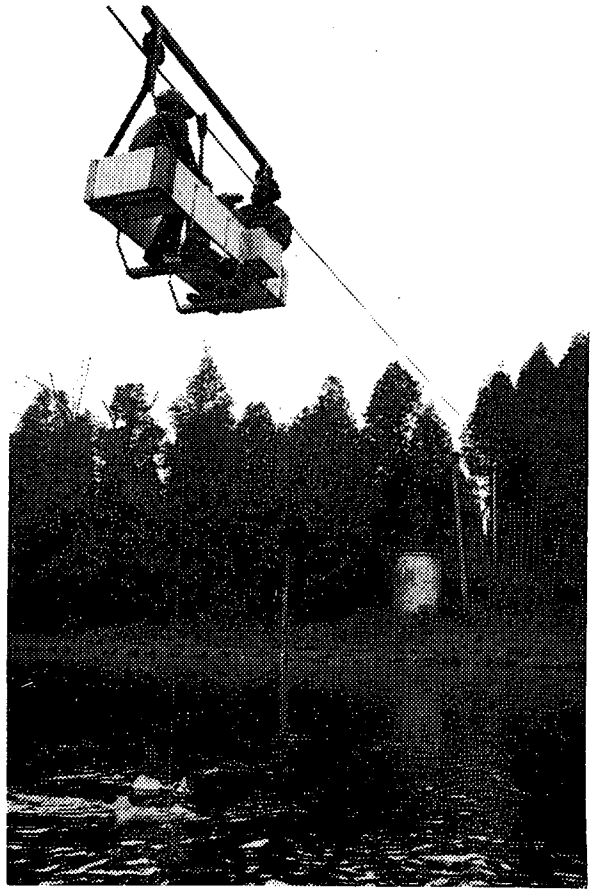
In Phase III, the study addresses various alternatives for optimizing water and land use under the constraints identified by the public while reducing the potential for further flood damages. The draft final report was made available on December 31,

1980, and will be discussed by the Steering Committee, Advisory Group and the public during January/February, 1981, before final recommendations are made to the Ministers.

6.0 Water Management Program

One of the primary aims of the Water Management Program is to provide the basic water quantity and sediment data necessary for making valid assessments with respect to the influence of man's activities on the environment. Under the Federal-Provincial Cost Share Agreement on Water Quantity Surveys, IWD through its Water Resources Branch cooperates with the Ontario Ministry of the Environment, the Ontario Ministry of Natural Resources, and Ontario Hydro in collecting and publishing streamflow, water level, and sediment data. The purpose of the Agreement is to secure coordinated and standardized basic data to facilitate resource planning and management in general and the design and implementation of specific projects related to navigation, hydro-electric development, irrigation, drainage, flood control, recreation, as well as domestic and industrial water supply. As required by the Agreement, a Coordinating Committee, with the federal member as chairman, implements the terms of the Agreement, which include maintaining national standards for field and office procedures, and for equipment and instrumentation. The Committee also designates the classification of all hydrometric stations based on nationally developed guidelines. The sharing of costs under the Agreement is based on this classification of stations.

The Great Lakes system is a vital part of the economy of Ontario, and variations in its levels affect many of its users. An important activity in the Water Management Program is the preparation by WP&MB of a six-month forecast of Great Lakes water levels on a monthly basis for the Great Lakes Boards of Control and users of the system. Forecasts of ice formation in the St. Lawrence River are also made during the early winter of each year.



Measuring streamflow from a cableway

6.1 Hydrometric and Sediment Surveys and Analysis

The Water Resources Branch operated a hydrometric network of 349 stations in Ontario as of April 1, 1980, and continued its processing and publishing responsibilities for an additional 57 stations which are operated by other agencies. April 1 also marked the beginning of the sixth year of the Canada-Ontario Cost Share Agreement on Water Quantity Surveys. Of the 349 stations involved, 141 stations were designated as Federal, 31 stations as Federal-Provincial and 177 stations as Provincial.

Extremely high spring runoff occurred in several areas of Ontario during 1980. Streamflows in southern Ontario increased during the week of March 16 as a result of melting snow. A major storm which began in southwestern Ontario on Thursday, March 20, passed through southern Ontario and ended on March 21. Approximately 35 to 50 mm of rain fell, causing high water and some flooding in many areas, including the Thames, Grand, Don, Ganaraska and Rideau River basins. WRB personnel were kept extremely active over this weekend monitoring flow conditions and taking many valuable high-water discharge measurements. The most severe flooding occurred in the Ganaraska River basin where the heavy rain and melting snow sent torrents of water through the centre of Port Hope, causing extensive damage to streets, bridges and downtown businesses.

Rainfall starting on April 8 resulted in high flows

in the Muskoka-Peterborough area and a number of cottages were inundated. Highest discharge measurements for the period of record were obtained on a number of rivers in the area, including the Muskoka, East and Trent Rivers.

In northern Ontario heavy rainfall on April 17 (35 mm) and April 20 (29 mm) caused extreme flow conditions in the Sault Ste. Marie-Sudbury-North Bay area. Historic high discharge measurements were collected at most gauging stations. Flooding occurred in low-lying areas and was particularly severe in the Searchmont-Highway 17 area as ice jams in the river caused considerable backwater.

Two hydrometric gauging stations were constructed on behalf of Transport Canada and became operational in February at the Mount Hope Airport at Hamilton. These stations are an integral part of a composite water monitoring program which will provide information for an Environmental Impact Statement on the possible expansion of the airport. It is envisaged that the monitoring program will be operative for four to five years and will consider water quality and water quantity of airport runoff to the receiving streams.

The Water Resources Branch responded to an urgent request from the Steering Committee of the Canada/Ontario Flood Damage Reduction Program at the beginning of March for the modification of facilities at two hydrometric stations in the Lake Nipissing/French River area. The Lake Nipissing at North Bay water level station was converted to an automatic water level recording station, complete with a telemark, which became operational April 1. This installation received extensive local press coverage and the local cable television station interviewed the WRB North Bay Sub-office staff who explained the operation of the telemark and how to interpret the data. Another telemark was installed at the French River at the Dry Pine Bay site and became operational on April 29.

The Ontario Ministry of Natural Resources is expanding its Flood Warning and Flow Forecasting System in northern Ontario and requested the WRB to install Labarge satellite data collection platforms (DCPs) at nine sites.

Installation has been completed on the Goulais River, Aubinadong River, Little White River, Sturgeon River and Whitefish River and data are being received from all five sites. The data include water level, water and air temperature, wind speed and direction, precipitation and battery voltage. These data are available from the sites on a real-time basis via satellite retransmission.

In August the WRB took over the operation of four hydrometric stations in the Sudbury area at the request of the Ontario Ministry of the Environment (OME). The stations, originally operated by OME staff, have been added to the Cost Share Agreement and will be operated by the North Bay Sub-office staff of the WRB.

A sediment laboratory was fully operational in Guelph during 1980. Approximately 1,310 suspended sediment and 70 bed material samples were analyzed. Types of analysis included total sediment concentration, bottom withdrawal and bed material. Extensive laboratory experiments were carried out to assess a number of possible replacements for the asbestos filter previously employed in the laboratory. A report was finalized and all 1980 filtering was done using the new filter media combination recommended in the report. At the request of the Ontario Ministry of the Environment, WRB staff collected bed material samples on the South Nation River (two sites), Ausable, Big Creek, Credit, Saugeen and Canagagigue River basins for a chemical analysis survey.

During 1980, the WRB took approximately 2,342 discharge measurements in Ontario. Nine water quality samples were collected and sent to the WQB analytical laboratory in Burlington. A network of 16 sediment stations were operated during the year and an additional six northern stations continued to be sampled at random intervals.

6.2 Construction

The construction program for 1980 consisted of the installation of 12 hydrometric and four water level gauging stations (12 with walk-in shelters, three with "Guelph" shelters and one manual gauge), one gauging station shelter replacement (former one destroyed by fire by vandals), the construction of one cableway and the installation of three control weirs. In addition, 34 field and site investigations were made for new hydrometric stations, relocation of hydrometric stations and four major repairs and renovations. Minor repairs and maintenance such as updating and repairing electrical services, installing thermostats to regulate the gauge house heating systems, repairing weirs and controls damaged during spring freshet, and repairing damaged gauge house doors and rotted roofs were also carried out.

6.3 Training

A Regional Workshop for all WRB, Ontario Region,

staff was held in Guelph on November 4-6. The workshop opened with a one-day satellite data collection platform technical workshop, followed by a one-day "Time Management" course. The final day consisted of a Supervisors' meeting, a Safety Committee meeting and a general open discussion session with all Regional staff.

6.4 Data Control, Publication and Distribution

During the period January-December, 1980, over 460 requests involving in excess of 3,150 station years of record were answered. This included 99 years of certified copies of record, which were provided for filing as evidence in the court case involving a $1.5-million flood damage claim by Newlands Textiles of Cambridge against the Grand River Conservation Authority, the City of Cambridge, the Ontario Government and the Waterloo Regional Police, in connection with the May, 1974, Grand River flood.

The annual publication "Surface Water Data, Ontario — 1979" is in the process of being published and will be distributed by IWD to approximately 400 addresses on the mailing list.

6.5 Network Planning and Evaluation

As part of the network planning and evaluation process, the National Weather Service River Forecasting System, Modified Stanford Watershed Model was adapted to the computer facilities at the University of Guelph (as reported in 1979). The model is still being calibrated and tested for the Kenogami River basin in northern Ontario. With the use of this model and others, the Ontario Region network will be evaluated for the addition or deletion of hydrometric stations.

7.0 Toxic Substances 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 socio-economic welfare and health of society. The presence of these substances in the environment may seriously affect plant and animal life, including man. 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 importance and seriousness of the toxic substances problem and its national scope through the enactment of the Environmental Contaminants Act in December, 1975. The Act is one basis for federal involvement with the toxic substances issue. Federal involvement is also called for because recent studies by the Pollution from Land Use Activities Reference Group (PLUARG) of the IJC have strongly suggested that long-range atmospheric transport is an important means for the entry of toxic substances to the environment. This often involves pollution crossing provincial and international borders.

Automatic precipitation collector

7.1 Long Range Transport of Atmospheric Pollutants

The Water Quality Branch provided field assistance and laboratory analytical support to two national networks, the Canadian Network for Sampling Precipitation (CANSAP) and the Canadian Network for Sampling Organic Compounds (CANSOC). The 49 CANSAP stations were designed to provide information on the spatial and seasonal variations in the concentration levels and deposition rates of inorganic chemical species in precipitation across

Canada. The 12 CANSOC stations were aimed at identifying the levels of persistent organic contaminants in precipitation. About 700 precipitation samples from these networks were analyzed during the year for a variety of inorganic and organic chemicals. The WQB's computerized national water quality data bank (NAQUADAT) is being used to store the data from both networks.

The Water Resources Branch constructed and is operating five water quality monitoring stations in the Turkey Lake basin north of Sault Ste. Marie. One station was constructed in 1979 and four in 1980, with discharge measurements taken at all sites since November, 1979. These stations were established in support of the Turkey Lake Forested Watershed Program, which is studying the aquatic and terrestrial effects of long-range transport of atmospheric pollutants. The program involves the participation of a number of federal and provincial agencies, including the Ontario Ministry of Natural Resources, Fisheries and Oceans Canada, the Canadian Forestry Service, Lands Directorate and Inland Waters Directorate.

7.2 Laboratory Support

The Water Quality Branch laboratory provides analytical support to a number of studies related to the Toxic Substances Program. During 1980 over 1,400 fish, plankton and sediment samples were analyzed for toxic metals and/or trace organic contaminants.

8.0 Environmental Assessment and Baseline Information

Under this program, IWD, Ontario Region, provides direct support to the Federal Environmental Assessment and Review Process (EARP) in ensuring that environmental effects, and particularly effects on water resources, are taken into account early in the planning of projects involving federal interests and that appropriate precautions are taken to minimize adverse environmental impacts of the projects. The program further endeavours to provide the information or knowledge base required for evaluating the effects of various activities on the environmental resources of specific geographic areas to various government agencies and the public.

Inland Waters Directorate, Ontario Region, continued in its involvement with the Eldorado Nuclear Limited (ENL) uranium refinery proposal by participating in POST-EARP PANEL follow-up work of designing environmental monitoring and baseline studies programs for the selected Hope Township site. Around mid-year, ENL altered its original proposal of a single-sited uranium trioxide (UO_3) and uranium hexafloride (UF_6) plant to that of a UO_3 processing plant at Blind River and a UF_6 plant expansion in Port Hope. This necessitated a new round of environmental reviews for the two proposed sites before the granting of site approvals by the Atomic Energy Control Board (AECB). In this latest phase, AECB has assumed responsibility for organizing public hearings regarding the proposals.

A Canada-Ontario Eastern Ontario Subsidiary Agreement was signed in December of 1979. A number of federal-provincial subcommittees were established to oversee its implementation and IWD, Ontario Region, was invited to hold membership on the South Nation River Basin Development Subcommittee. Activities of this subcommittee have included the screening and approval of interim flood relief work projects and the general conduct of river basin plan studies. Concerned over potential impacts of major outlet drainage projects being currently funded through the Agreement, IWD has also requested membership on the Drainage Petition Review Committee in order to ensure a more adequate and timely addressing of related concerns.

Inland Waters Directorate, Ontario Region, has been assigned lead agency responsibility in the review of Gananoque Light and Power Company's proposal to divert up to 200 cubic feet per second from the Rideau River into the Cataraqui River system at Newboro. With Parks Canada being regarded as the initiator of this proposal due to the involvement of federal lands, the project does not fall under the Provincial Environmental Assessment Act but is a candidate for the Federal Environmental Assessment and Review Process. Many potentially significant concerns have been identified by various agencies. Gananoque Light and Power is currently addressing these concerns before proceeding further.

In addition to the foregoing, IWD, Ontario Region, has been actively involved in many other areas relating to environmental assessment. The evaluation of environmental effects was carried out for projects such as the Chenal Ecarte/Sydenham River dredging and disposal, Shoal Lake Indian Band cottage development, Six Nations Indian Reserve Grand River Bridge, and Trans Canada North Bay-Ottawa-Montreal Pipeline proposal. Public Works Canada Area Screening reports for Hamilton, Thunder Bay, and Oakville were reviewed for potential environmental concerns. Also, advice

and assistance were provided in development/planning studies for the provincial Lakeshore Capacity Study (interdisciplinary modelling, study integration), Walpole Island/Sarnia Indian Reserves environmental inventory, and the Thousand Islands Heritage Area Plans. As well, an inquiry was conducted regarding the continuing complaints of water quality degradation due to a causeway on Clear Lake, Ontario. Under the Summer Youth Employment Program, a project was conducted to identify environmental effects of shore developments and protection works on selected sites on Lake Ontario and Lake Erie.

The major baseline study component of the program during the year involved the Oshawa Second Marsh Study, which is a DOE regional undertaking with interservice participation. IWD's responsibility for water quality and quantity studies included activities on the part of all IWD Branches (Water Resources Branch, streamflow gauging and suspended sediments; Water Quality Branch, water quality sampling and analysis; Water Planning and Management Branch/Policy Research and Social Analysis Division, data integration, groundwater, marsh/lake level interaction, coordination). The baseline study is designed to provide the information required to allow management of the marsh as a viable wildlife habitat and natural area, as well as to help evaluate potential adverse effects on the marsh from developmental pressures.

Preparations were made for a study related to a possible environmental impact assessment on the dredging of material from the Keating Channel at the mouth of the Don River and the dumping of the material into Lake Ontario. The study will centre on the nature and significance of the relationship between siltation at the mouth of the Don River and the potential for flooding. To date preliminary flood frequency analysis has been completed and the assembly of necessary data to run the HEC2 backwater model is under way.

With the Senior Management Committee approving the establishment of a national Baseline Environmental Information Retrieval System (BEIRS), which is designed to become a new additional data base for WATDOC, DOE, Ontario Region, proceeded to implement BEIRS with the help of all Services. IWD compiled a listing of candidate documents related to regionally designated priority areas of Energy (nuclear fuel cycle), Wetlands, Long Range Transport of Air Pollutants, and Coastal Zone (Great Lakes). These lists are currently being cross-checked for duplication and prepared for abstracting before input into BEIRS.

At the request of Environmental Conservation Service Headquarters, IWD contributed a report on the local and regional environmental effects of the coal fuel cycle in Canada to the DOE Coal Study.

Public information brochures

9.0 Information Services

An important function of IWD, Ontario Region, is the dissemination of the information generated by its various programs. There is usually a primary client or user of this information, such as the International Joint Commission or its Boards and Committees, provincial ministries and agencies, water utilities, and other federal government departments. In addition to these specific users, however, there is a need to inform the general public about the state of the water environment and factors which affect this state, and about the contribution of IWD, Ontario Region, to the sound management of the water resources in Ontario. A variety of informational materials and approaches are used to inform the public, such as brochures and pamphlets on particular programs or issues, technical demonstrations or seminars and displays at public events, as opportunities arise. In typical day-to-day operations, there is also the provision of information by scientists, engineers, and managers in IWD, as they respond to queries from the media or general public, participate in public forums, and issue technical reports.

Policy Research and Social Analysis Division has produced and published a new "Great Lakes Water Use Map" and accompanying "Guide." Designed primarily as an educational aid to secondary school teachers, but also of value and interest to the general

public, this colourful 30-page brochure and large-size map characterizes the socio-economic uses, and abuses, of the Great Lakes. The map and brochure are currently available from the Canada Map Office, EMR, 615 Booth Street, Ottawa, Ontario.

The Water Planning and Management Branch produced the Lake Erie Study Board's second and third newsletters, which were distributed by the Board throughout the Great Lakes basin in Canada and the United States. The Branch also assisted the Lake Erie Study Board in conducting its public meetings in Windsor and Toronto, Ontario; Montreal, Quebec; Detroit, Michigan; Toledo and Euclid, Ohio; and Buffalo, New York. A 14-minute slide-tape show, describing the various natural and man-made factors affecting water level fluctuations, was prepared for use at these meetings.

Members of the WRB staff gave a number of demonstrations to students at various post-secondary institutes across the province. Classroom and/or on-site demonstrations regarding water level instrumentation and stream gauging techniques were given to students of Lakehead University at Thunder Bay, University of Waterloo at Waterloo, University of Toronto's Scarborough College, Sir Sanford Fleming Community College at Lindsay, Loyalist College at Belleville and St. Lawrence College at Brockville.

10.0 Management and Administration

In 1980, the Directorate administered and managed resources amounting to $5.8 million and 110 person years. The resources included operational funding under international and federal-provincial agreement, as well as grants and contributions under similar agreements. Significant federal-provincial cost-shared funding administered in 1980 included the Canada-Ontario Great Lakes Water Quality Agreement funding ($1,200,000) and the Canada-Ontario Flood Damage Reduction Agreement funding ($388,000 allocated for 1980-81).

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12.0 Organization Chart