High Water Levels Continue to Plague the Great Lakes

by Sally Cole-Misch

The Great Lakes and their connecting channels make up the largest freshwater system of surface water in the world. Their total water surface area is almost 95,000 square miles (approximately 246,000 square km) and the entire watershed (the land area drained by a body of water) is more than twice as large. It is expected that levels in the Great Lakes will fluctuate in the short and long term; because of their vast surface area and restrictive connecting channels, usually it’s possible for the system to cope with large water supply variations in any given year and maintain a typical annual fluctuation of one to two feet (.3 m to .6 m).

Nature plays the prominent role in these fluctuations through precipitation, evaporation, runoff, groundwater, ice retardation, aquatic growth, storms, tides and crustal movement. Human impact from limited control structures, dredging, shipping, power generation and diversions affects water levels by only a few inches. While consumptive uses (municipal, power, irrigation, etc.) of Great Lakes water have a measurable, cumulative effect on lake levels and flows, these uses are relatively constant and therefore do not contribute to fluctuating lake levels.

Fluctuations in lake levels may occur short term, seasonally or long term. Short period lake fluctuations from storms can last a few hours to a few days. Wind and barometric pressure may cause the lake surface to tilt, and while no actual change in water volume will have occurred, lake surface elevation at a particular location could change more than eight feet (2.5 m). A storm December 2, 1985, for example, tipped Lake Erie towards Buffalo, New York causing a short term difference of 16 feet (4.9 m) in the lake level.

The annual hydrologic cycle imposes seasonal fluctuations in lake levels, when spring melt of winter snow ordinarily causes higher supplies in the spring and early summer. Seasonal fluctuations normally average 1.1 feet.

... with just normal storm activity over the lakes, extensive shoreland flooding and erosion can be expected this spring.”

— U.S. Army Corps of Engineers

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(.3 m) on Lake Superior and Lakes Michigan and Huron, 1.5 feet (.5 m) on Lake Erie, and 1.9 feet (.6 m) on Lake Ontario.

Long term changes in lake levels result from increased or decreased supplies of precipitation and runoff, minus evaporation, over an extended period of time. Right now, the Great Lakes are recording their highest levels this century, and they are expected to continue to rise during the spring months. Increases in 1985 ranged from 11 inches (27.9 cm) on Lake Superior to 16 inches (40.6 cm) on Lake St. Clair. Only Lake Ontario has not surpassed its previous record level, but it is close.

Precipitation has the greatest effect on the relative level of the lakes and their basins. Overall they received 26.2 percent more than normal precipitation in 1985 than in an average year, or a total of 40.2 inches (102.1 cm) of rain (nine inches or 22.9 cm more than the average). All five of the lakes and the basin, in general, have had above average rainfall in 15 of the last 18 years.

Lake Superior’s precipitation was average or slightly above average from January 1984 through June 1985. A 23 percent increase occurred from April to July 1985, and in each of the last four months precipitation was about 60 percent above average. This last increase created new record monthly high water levels for Lake Superior.

In the Lakes Michigan and Huron basins, precipitation was well above average during late 1984 and the early months of 1985; by April, historical water supplies had been exceeded. After a return to normal levels of precipitation in May and June, both lake basins received above average rain and snow during the last four months of 1985.

The Lake Erie basin has experienced above average precipitation since November 1984, and received a

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163 percent increase in November and December of 1985. While Lake Ontario's precipitation levels remained close to average up to November 1985, record water supplies in excess of double the norm were recorded during the last two months of that year.

The increase in precipitation experienced in the Great Lakes is, of course, repeated in surrounding land areas. Once basin land has absorbed its maximum amount of precipitation, runoff into surface lakes will increase. Runoff from basin lands into the lakes can sometimes cause an almost immediate effect in water levels.

While precipitation and runoff increase water supplies, evaporation is nature's way of decreasing levels. Air temperature affects evaporation since lower temperatures mean slower evaporation rates and vice versa. Temperatures have declined over the last 10 years in the Great Lakes, and since 1956 the mean annual temperature has been 1.4 degrees F (0.6 degrees C) lower than the previous 25 years.

The continued high water emergency has been a primary concern for the International Joint Commission since March 1985. Since that time, the IJC has presented briefings, news releases and other public statements to apprise citizens and officials of both Governments of existing Great Lakes emergency conditions, and has taken action within its own jurisdiction to regulate water levels to the limited extent possible. The Boundary Waters Treaty of 1909, which established the Commission, gives the IJC responsibilities in two areas. One duty involves the investigation and formulation of recommendations concerning specific problems along the common frontier which are referred to it by the Governments. The other responsibility includes ruling on all applications for the use, obstruction, or diversion of boundary waters on either side of the international boundary which would affect the natural level or flow of waters on the other side.

Two past IJC rulings affect, within limits, the levels and outflows in the Great Lakes. First, the IJC approved two diversions in 1914 for power generation at Sault Ste. Marie, Michigan and Ontario, on the head of the St. Marys River. Control works were built in the river to compensate for the diversions, and the water is returned to the St. Marys River downstream of the powerhouses. Both diversions increased river channel capacity and allowed limited regulation of Lake Superior outflows, since the St. Marys River is the only outlet from the lake.

The IJC's Orders of Approval for the diversions for power generation established the basic objectives for, and limits to, regulation of Lake Superior outflows, and appointed the International Lake Superior Board of Control to maintain lake water levels within a certain range.
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Originally, the objective of the Orders of Approval was to maintain Lake Superior levels within a narrower range, but this proved to be impossible. Put simply, the Commission then, as now, could not accurately predict supplies over the long term. During the early 1950’s, for example, the maximum mean monthly level called for in the Order (602 feet or 183.5 m) was nearly reached on some occasions. Then from the mid-1950’s through the late 1960’s water levels were for the most part below the minimum level called for in the Order. The 602 feet (183.5 m) level represents the lake’s high water mark for the period of record (1860-1913) prior to regulation.

In the mid-1960’s, low water levels were even more severe on Lakes Michigan and Huron. To help alleviate the Michigan/Huron situation, outflows in excess of those called for by the plan of regulation were discharged from Lake Superior. Due to extremely low water supplies, however, only minimal assistance could be provided.

In the early 1970’s high water supplies and resulting high levels again occurred. Because of critically high water levels on Lakes Michigan, Huron, St. Clair and Erie the Commission ordered reduced outflows from Lake Superior. This emergency action provided nominal relief to the lower lakes while the level of Lake Superior remained below its maximum level of 602 feet (183.5 m).

Based upon this experience and the results of studies undertaken during the late 1960’s and early 1970’s, the Commission in 1979 amended its Orders of Approval in an effort to provide greater protection to riparian use upstream and downstream of the St. Marys River control works. The Orders of Approval, as amended, call for Lake Superior outflows to be regulated in such a manner to maintain the levels of Lake Superior and Lakes Michigan and Huron at the same relative position within their recorded ranges of stage and with respect to their mean monthly levels without increasing the probability of Lake Superior exceeding elevation 602 feet (183.5 m). Under normal conditions, the International Lake Superior Board of Control calculates outflows using the procedure set out in the Commission approved regulation plan which is designed to meet the objectives set forth in the Orders of Approval.

This procedure, known as “Plan 1977,” works very well as long as water supplies to the lakes are within normal historic ranges.

However, in late August and continuing through September and October, abnormally heavy rainfall in the Lake Superior basin caused the lake to rise considerably faster than anticipated. Consequently, on August 8, 1985, the Commission directed the Board to begin to exceed the regulation plan outflows from Lake Superior in order not to go above level 602 feet (183.5 m). By October 11, the Commission had increased outflows to 133,000 cubic feet per second (3766 m³/s), the largest outflows on record. Nevertheless, continued unusually heavy rains over the Lake Superior basin made it impossible to prevent Lake Superior from slightly exceeding level 602 feet (183.5 m) for the months of October and November.

The maximum effect of the April 25, 1985 Commission emergency action was realized in late August, when the levels of Lakes Michigan/Huron had been reduced three inches (7.6 cm) and Lake Superior had increased 4.4 inches (11.2 cm). Lakes St. Clair and Erie realized the maximum benefit at the end of August and October, respectively. Lake Erie levels were reduced by 1.3 inches (3.2 cm) while Lake St. Clair was reduced by 1.8 inches (4.5 cm). By the end of 1985, the cumulative effect of the Commission’s emergency action had been to raise Lake Superior approximately 1.2 inches (3.1 cm), lower Lakes Michigan and Huron by approximately 0.5 inch (1.3 cm), Lake St. Clair by approximately 0.8 inch (2 cm), and Lake Erie by approximately 1.1 inches (2.8 cm).

The second ruling by the IJC that affects the levels and outflows within the Great Lakes system is the approval in 1952 of the construction and operation of the St. Lawrence Power Project in the St. Lawrence River at Massena, New York and Cornwall, Ontario. The channel excavation required for this project also took into account the need to enlarge
the capacity of the river and make possible deep draft navigation throughout the Great Lakes-St. Lawrence system. Like the Lake Superior project, it also enabled some possible regulation of Lake Ontario and St. Lawrence River outflows.

The Order of Approval for the St. Lawrence Power Project was amended in 1956 to include regulation that would reduce the range of levels experienced on Lake Ontario, facilitate navigation in the St. Lawrence River, and provide protection for riparian and other interests downstream in Quebec. The Order calls for Lake Ontario discharges to be regulated to keep the lake within a range of 242.8 feet (74 m) during the navigation season to elevation 246.8 feet (75.2 m) at any time, “as nearly as may be.” There is, of course, no control over the water supplies to Lake Ontario, and in such cases where excess supplies are experienced, criterion [k] in the Order requires that the works shall be operated to “provide all possible relief to the riparian owners upstream and downstream” (criterion [k]). The Order also contains provision for protection of other interests that may be affected.

Because of physical differences in Lake Superior and Lake Ontario, lake levels can be affected to a greater degree in Lake Ontario via the St. Lawrence River control works. Since regulation began in 1960, water levels have been maintained well within the prescribed range during periods of normal water supplies. Although this objective has not always been attainable during periods of extreme low or extreme high supplies, the situation has been better than it would have been without regulation. During the extreme low water period of the mid-1960’s, Lake Ontario levels were maintained slightly higher than they otherwise would have been. More importantly, in the early and mid-1970’s when water supplies were critically high, water levels were held more than a foot (.3 m) below pre-project levels. Despite this action, and because of unusually heavy supplies, Lake Ontario water levels reached 247.9 feet (75.6 m), well above the range called for in the Commission’s Order.

Despite the high level of water supplies throughout most of the Great Lakes basin, Lake Ontario levels have remained relatively close to normal. High inflows from Lake Erie were partially offset by low local supplies and increased outflows through the St. Lawrence River. However, the IJC’s International St. Lawrence River Board of Control reported December 3, 1985 that, due to abnormally heavy precipitation during November and the continuing increase in water from the upper lakes due to high levels, water supplies available to Lake Ontario would exceed those of the past, and recommended that criterion [k] be invoked at the end of the navigation season. In addition the Board warned that Lake Ontario levels will exceed the maximum specified in the Order of Approval by June 1986 if supplies remain at or above average. The Commission approved this recommendation December 17, 1985.

Lake Ontario outflows could not be increased immediately because of formation of ice on the lake. Interrupting the ice cover creates a serious potential for ice jams, which can cause severe local flooding and restrict river outflow capacity. To facilitate a stable ice cover, ice booms are placed across the St. Lawrence River. The booms temporarily reduce flows to allow the ice to form quickly and with uniformity. Once the ice cover formed, outflows were increased to conform with criterion [k]. The emergency action is expected to continue until this high water supply period ends.

While the IJC continues to monitor the levels, flows and precipitation of the Great Lakes on a daily basis, adjustments that can be made from human controls are minuscule compared to the effect nature plays in increasing or decreasing lake levels. The water supply to each lake cannot be controlled by humans. The amount of water that either lake can hold is limited by shoreline development and other existing uses, and both upstream and downstream conditions must be taken into account.

According to Dr. Frank Quinn, Head of the Lake Hydrology Group at the Great Lakes Environmental Research Laboratory in Ann Arbor, Michigan, “There is nothing that can be done, no plug that can be pulled someplace, to lower the water.” It is difficult to really understand lake levels and human lack of control over them without realizing the tremendous volumes of water: the Great Lakes contain 95 percent of North America’s fresh water, enough to cover the entire land area of Canada to a depth of seven feet (2.1 m). Because of the large volumes of water and the relatively small outflow through the connecting channels between the lakes, it takes literally months for consistent change in water supplies to a lake, or changes in outflow from the lake, to establish a trend in lake levels. Dr. Quinn claims that if the goal is a one-foot (.3 m) drop in flow from Lake Superior to Lake Huron, it would take three years to achieve the first six inches (15.2 cm) and 12 to 15 years to accomplish the full effect even under normal circumstances and average precipitation levels. “You’re really controlled by nature,” Quinn said.

“ar limited ability of man to control nature is sometimes hard to accept.”

For residents of the Great Lakes, then, the question becomes when, not if, flooding will occur in 1986. Severe flood and erosion damage thus can be expected to continue along the Great Lakes shores during 1986, particularly during periods of severe wind storms in the spring and fall months. Perhaps the best assistance that can be provided to Great Lakes residents during this continuing high water emergency is to keep
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them informed of levels fluctuations and of the federal, state, provincial and local agencies to contact for assistance in protecting homes and shorelines. For specific references, contact the LC Regional Office (519) 256-7821 or (313) 226-2170, the Washington Office (202) 673-6222 or the Ottawa Office (613) 995-2984. Beyond that, everyone in the Great Lakes basin, including shoreline residents, federal officials and scientists, must look to nature for relief from the high water levels.

Washington Semi-Annual Meeting

The International Joint Commission is preparing for its 147th Semi-Annual Meeting, April 15-17, 1986, in Washington, DC. The Commission generally meets with its various Control and Advisory Boards to discuss board activities in Washington, DC in April and Ottawa, Ontario in October. However, the Commission recently has begun to hold meetings in other places along the U.S.-Canada boundary region.

A top priority on the Commission’s agenda for the spring meeting will be further discussions on the continuing problem of record high water levels on the Great Lakes (see related article on first page). The Commission will meet with its three Great Lakes Control Boards, the International Lake Superior Board, the International Niagara River Board, and the International St. Lawrence River Board. These boards are responsible for monitoring and setting, within limits, the outflows of Lakes Superior and Ontario.

The International Air Quality Advisory Board (formerly the International Air Pollution Advisory Board) will be among the boards to report to the Commission in April. It was created by the Commission in 1966 to assist with a request from the Governments of Canada and the United States to note air pollution problems occurring in the boundary areas (except the Detroit-Windsor and Port Huron-Sarnia areas, which were the responsibility of a separate Board) and to bring such problems to the Governments’ attention as appropriate.

The main topic of discussion with the Air Quality Advisory Board will be the Board’s recently updated directive which outlines its responsibilities and functions. Also under discussion will be an atmospheric workshop jointly organized by the International Air Quality Board, the Great Lakes Water Quality Board and the Great Lakes Science Advisory Board.

The Commission also will meet with the Co-Chairs of the Great Lakes Water Quality and Science Advisory Boards, the International Advisory Board on Pollution Control – St. Croix River, the International Red River Pollution Board, and the International Rainy River Water Pollution Board. The Flathead River International Study Board presented the Commission with an interim report in February and will not be meeting with the Commission at the April meeting.

The Commission will meet with representatives from the United States Department of State and the Canadian Department of External Affairs and hopefully will meet again at the White House with the President and/or Vice President of the United States. A reception for all semi-annual meeting participants will be held at the State Department. Thomas Jefferson Room, Tuesday evening. A Canadian reception will be hosted the following evening by Ambassador and Mrs. Gotlieb.

During its executive meeting in Ottawa, February 1986, the Commission met with Canadian Minister for External Affairs, Mr. Joe Clark, at a small private reception. The Commissioners also were guests of United States Secretary of State, George Shultz at a luncheon on March 18 in Washington, DC honoring Prime Minister Brian Mulroney during his summit meeting with President Reagan.

BOOKSHELF

"An Alternative Primer on the Great Lakes" is how guest Editor Dr. Thomas Willans describes the Spring 1986 issue of Alternatives magazine entitled "Saving the Great Lakes." Alternatives Magazine, published in co-operation with the Faculty of Environmental Studies at the University of Waterloo has addressed contemporary social, technological and environmental themes, and provided a forum for a critical but impartial analysis, comment and debate since 1971. This special issue is being financially assisted by the Max Bell Foundation through the Great Lakes Ecosystem Rehabilitation Project.

Topics addressed in the issue will include: Resource Use Conflicts, the Great Lakes Water Quality Agreement, Winter Navigation, Water Diversions, Organic and Non-Organic Pollution, as well as public consciousness and activities for problem resolution.

Some of the country’s leading Great Lakes specialists, including John C. Nanne, International Joint Commission; Michael Donahue, Center for the Great Lakes; George Francis, University of Waterloo; and Art Niimi, Canada Centre for Inland Waters will be contributing articles. "Their vast experience and understanding of the Great Lakes will detail the issues for students, teachers, citizens and public interest groups who wish to update and broaden their understanding of these complex and multifaceted problems," says Willans.

To receive a copy of "Saving the Great Lakes" contact: Alternatives, c/o the Faculty of Environmental Studies,
Monitoring in Areas of Concern Workshop

by John Hartig

The Great Lakes Water Quality Agreement goals of restoration and enhancement are based upon protection of the most sensitive uses of the waters of the Great Lakes system. Areas of Concern are identified as those locations where the Agreement objectives or jurisdictional standards, criteria, or guidelines are exceeded and remedial measures are necessary to restore the most sensitive uses.

The Surveillance Work Group of the Great Lakes Water Quality Board held a bidential workshop at the Canada Centre for Inland Waters, Burlington, Ontario, October 3-4, 1985 on Areas of Concern.

Such a workshop was appropriate because the jurisdictions are developing remedial action plans for all Areas of Concern and because of the difficulty in developing surveillance and monitoring programs for river and harbor Areas of Concern. Emphasis was placed on toxic substances since they are the major problem identified in 39 of the 42 Areas of Concern.

Objectives of the workshop were to: 1) reach consensus on what data and information should be reviewed in preparation for development of remedial action plans and surveillance and monitoring programs for Areas of Concern; and 2) make specific recommendations on how to obtain such necessary information on river and harbor Areas of Concern (including sources of pollution, distribution and fate in water and sediments and effects on biota).

Remedial action plans are being developed for each Area of Concern with a goal of restoring all uses. Each Area of Concern is now described in relation to a sequence where categories are used to define the stage of investigation and action taken thus far. Categories range from those Areas of Concern where causative factors are unknown and there is no investigative program underway to identify causes to those where there is confirmation that uses have been restored. Deletion as an Area of Concern will be in the next report of the Great Lakes Water Quality Board.

Areas of Concern in the Great Lakes system include rivers, harbors, connecting channels, and large embayments. The Water Quality Board, through its Surveillance Work Group and its Lake and Connecting Channel Task Forces, which have been given the responsibility of updating the Great Lakes International Surveillance Plan, have already developed surveillance and monitoring plans for the connecting channel and large embayment Areas of Concern. But the Task Forces have had difficulty developing surveillance and monitoring programs for river and harbor Areas of Concern, of which most have toxics problems. Difficulty in developing programs stems from the nature of toxics monitoring in complex river and harbor environments.

The conclusions and recommendations from the workshop were formally presented to representatives of the Water Quality Board, Science Advisory Board, Water Quality Programs Committee, and the jurisdictions on November 6, 1985 at the Hilton Airport Inn, Romulus, Michigan. These conclusions and recommendations are now being compiled in a report which will serve as guidance to the Great Lakes jurisdictions.

For further information contact Dr. John Hartig, IJC Great Lakes Regional Office, 100 Ouellette Avenue, 8th Floor, Windsor, Ontario N9A 6T3, or P.O. Box 32869, Detroit, Michigan 48232, (519) 256-7821 or (313) 226-2170.
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Developing a Remedial Action Plan for the Rouge River

by John Hartig

Since 1973, the International Joint Commission (IJC) has been identifying specific areas, such as harbors, river mouths and connecting channels where there is impairment of beneficial uses and where additional remedial measures are necessary to restore those uses. The Rouge River, which flows through Metropolitan Detroit and empties into the Detroit River, is an Area of Concern that has been consistently identified since this process began. The Rouge River is plagued by natural and man-made factors which limit water quality to the extent that approximately 39.8 miles (64 km) of river do not meet Michigan water quality standards or Agreement water quality objectives. Low dissolved oxygen concentrations and high fecal coliform bacteria levels occur in the river during wet and dry weather conditions. Sediments in the lower river are heavily contaminated with toxic substances and organic sludges, precluding the presence of normal aquatic life. In addition, the Rouge River negatively impacts the Detroit River. Immediately downstream from the Rouge River, pollution tolerant aquatic worms number over one million per square meter of Detroit River bottom, demonstrating long term, severe organic enrichment.

The Michigan Water Resources Commission passed a resolution October 1, 1985, implementing the Rouge River Basin Strategy, an action plan and public participation process to abate water pollution in the Rouge River. The resolution confirms that the Rouge River has been designated an Area of Concern in the Great Lakes basin by the IJC because of its extremely poor level of water quality. It declares that because of its size and location, the Rouge River is a valuable resource that can be restored to provide substantial economic, recreational and aesthetic benefits to residents of the region. Finally, it approves the Rouge River Basin Strategy and calls for implementation of remedial actions to correct water pollution problems in the Rouge River basin.

The strategy represents the systematic and comprehensive approach necessary to address the major problems of 185 combined sewer overflows within the drainage basin and contaminated bottom sediments. The process of public participation acknowledges that local units of government and concerned citizenry must be involved from the beginning of this process to clean up the Rouge River. Specific timetables have been set for implementation of the strategy to develop a remedial action plan and the process of public participation.

The Michigan Department of Natural Resources (MDNR) and Southeast Michigan Council of Governments (SEMCOG) jointly convened the first Rouge River Basin Committee meeting February 14, 1986, to promote local participation in the development of the remedial action plan.

The Rouge River Basin Committee includes over 100 representatives from: counties, cities, villages, townships, the Governor's Office, Michigan Water Resources Commission, Michigan Natural Resources Commission, MDNR, Rouge River Watershed Council, SEMCOG, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, industries, consulting firms, universities, and the IJC.

The development of a remedial action plan to restore beneficial uses in the Rouge River is expected to take approximately two years. The Michigan Water Resources Commission Resolution has set a goal for completely restoring beneficial uses in the Rouge River by the year 2005.

For further information, contact Mr. James Bredin, Surface Water Quality Division, Michigan Department of Natural Resources, P.O. Box 30028, Lansing, Michigan 48909. (517) 373-2867.

Focus is taking on a new look

When you receive your July issue of FOCUS, you may not recognize it. We're updating the newsletter's graphic design and introducing new sections that will provide a more in-depth look into how the IJC works. All of the regular sections on Great Lakes people, activities and issues will continue as before. Sally Cole-Misch has joined Jean Laforge as Public Information Officer at the Windsor office and as co-editor of the publication. We're excited about the upcoming changes in FOCUS and look forward to bringing them to you.
Commission Now Has Complement of Six

On January 10, 1986 The Honorable E. Davie Fulton, P.C., Q.C. and Robert S. K. Welch, O.St.J., Q.C., LL.D. were appointed to serve as Commissioners of the International Joint Commission on behalf of Canada for a three year term. Mr. Fulton and Mr. Welch have distinguished records of public service extending over more than three decades. Mr. Fulton was Member of Parliament for Kamloops from 1945 to 1965, and Minister of Justice and Attorney General of Canada from 1957 to 1962. He was appointed Minister of Public Works in 1962. In 1970 he became the first chairperson of The Law Reform Commission of British Columbia, and held that post until 1973. He was appointed and served as Judge of the Supreme Court of British Columbia from 1973 to 1981, and also chaired the Canadian delegation that negotiated the Columbia River Treaty with the United States from 1959 to 1961. Most recently, he received the Award of the Trial Lawyers Association of British Columbia for 1986.

He received an Honorary LL.D. from Queen’s University, Kingston, and the University of Ottawa. He earned a B.A. in Jurisprudence from St. John’s College, Oxford, where he was appointed a Rhodes Scholar in 1937-1939, and a B.A. from the University of British Columbia in 1936.

Mr. Fulton, born in Kamloops in 1916, is now a private attorney in Vancouver, British Columbia.

Mr. Welch was first elected to the Ontario Legislature in 1963 and served in the Cabinet from 1966 to 1985 in many senior portfolios under three premiers. In September 1977, he was appointed Deputy Premier in the Province of Ontario, a portfolio he held until his retirement in May 1985.

He was appointed Chancellor of Brock University as of November 1, 1985; declared an Honorary member of the National Council of the Boy Scouts of Canada; and appointed Chancellor of the Anglican Diocese of Niagara in 1965, a post he continues to hold. He also has been an Officer Brother in the Order of St. John since 1983.

Included in his Cabinet portfolios were Women’s Issues, Education, Housing, Energy, Social Development, Culture and Recreation, Attorney General, and Government House Leader. He also served as Provincial Secretary and Minister of Citizenship as well as the Minister responsible for the Civil Service.

Mr. Welch was awarded an Honorary LL.D. by Brock University, St. Catharines, in 1971, and by McMaster University, Hamilton, in 1984.

Mr. Welch was born in St. Catharines and resides in Niagara-on-the-Lake where he is presently Senior Counsel to the St. Catharines legal firm of Lancaster, Mix & Welch.

Mr. Fulton and Mr. Welch will serve as Commissioners with Pierre-André Bissonnette, Chairman of the Canadian Section of the IJC. Mr. Bissonnette was appointed February 1985.

Mr. Bissonnette served as Senior Advisor to the Privy Council from 1982-
served as Chairman of the State Courts and Criminal Law Commission, Chairman of the Marion County Delegation and Member of the State Republican Legislative Policy Committee.

Mr. Bulen has been actively engaged in politics and government for over 30 years. He served as Republican County Chairman three terms and also as District Chairman. He served on the Executive Committee of the Indiana Republican State Committee five terms. He was Deputy Chairman of the Reagan for President National Committee in 1979 and 1980. In 1980 he served as the Reagan-Bush Eastern Coordinator, directing activities in 17 states. He served as Associate Director of Presidential Personnel, as head of the political division, during President Reagan’s transition period 1980-81. In 1976, he acted as the National G.O.P. Convention Coordinator of six midwest states for Ronald Reagan. He served as Chairman for Richard G. Lugar’s Senatorial Campaign in 1974 and in both of Lugar’s successful campaigns for Mayor of Indianapolis. Mr. Bulen was the State Nixon for President Coordinator in 1968 and 1972. He has been elected to the Executive Committee of the Republican National Committee twice, elected Republican National Committeeman for Indiana twice, and has been a delegate to the Republican National Convention continuously since 1968 and was Co-Chairman of the Indiana Delegation in 1972.

He is actively engaged in the Harness Horse business having owned world champion pacer and 1978 Harness Horse of the Year, Abercrombie.

In 1952, Mr. Bulen received his J.D. from Indiana University. He received his B.A. from Indiana University in 1949. During World War II, he enlisted in the Army Air Force and served overseas with the Fifth Air Force. Mr. Bulen was born on December 31, 1926 in Pendleton, Indiana.

Donald L. Totten, of Hoffman Estates, Illinois, was appointed to the International Joint Commission by President Ronald Reagan in July, 1981. He is president of a public relations and management consulting firm.

The Commission is able to draw on Mr. Totten’s capability to work in legislative groups and his background as an engineer. Mr. Totten is a former member of the Illinois General Assembly who represented the Third Legislative District just northwest of Chicago from 1972-1982.

Before his legislative career, Mr. Totten was Assistant to the Director of the Department of Transportation for the State of Illinois for two and one-half years. Prior to that, he spent 15 years in the engineering and business fields.

In addition to his business and legislative experience, Mr. Totten was elected Republican Party Chairman of Schaumburg Township in 1966 and re-elected four times. In 1976 he was State Chairman of the Illinois Citizens for Reagan and a member of the steering committee of the Illinois President Ford Committee. He served as regional political director for the Reagan for President Committee and State Chairman for the Reagan for President Committee in Illinois in 1980.

Mr. Totten is a past National Chairman of the American Legislative Exchange Council and former Vice Chairman of the Transportation and Commerce Committee of the National Council of State Legislators.

Mr. Totten was born in Brooklyn, New York on February 19, 1933. He received his engineering degree from the University of Notre Dame in 1955. He is married and has three children.

BRIEFS

The IJC briefed representatives of state and provincial governments at its Regional Office, Windsor, Ontario on March 5, 1986 on the continuing and severe consequences of high Great Lakes levels. Commissioners Bulen and Bissonnette opened the meeting, which included presentations from Dr. Frank Quinn, Head of the Great Lakes Hydrology Group, Great Lakes Environmental Research Laboratory, Tony Wagner, Inland Waters Directorate, Environment Canada, and Zane Goodwin, Chief of the Engineering Division, North Central Division, U.S. Army Corps of Engineers.

Discussions centered around the minimal effect that humans can bring to bear on Great Lakes levels, actions the IJC has taken and their effect on the levels, current and future predictions, and what programs are in place or are planned to provide assistance to shoreline owners. The major thesis of the day was that current high water levels are a result of nature and can only be adjusted to a minor degree by humans. The briefing provided an opportunity for the state and provincial representatives to compare plans to deal with the water levels, and options for future actions.

A similar briefing was held for U.S. Members of Congress in Washington, DC on March 14, 1986.

President Ronald Reagan presented Valdas V. Adamkus, U.S. Environmental Protection Agency (EPA) Region V Administrator, the Distinguished Executive Presidential Rank Award – the highest merit award given to any civil servant. The award recognizes "substantial extraordinary accomplishment."

The President annually selects a limited number of senior executives to receive the award. Selection is based on demonstrated qualities of strength, leadership, integrity, industry, and personal conduct of a level that has established and maintained a high degree of public confidence and trust.

Adamkus is the first EPA Region V recipient of the award.

Adamkus has been Regional Administrator since 1981. Before that, he served for 10 years as Deputy Regional
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Administrator. He frequently serves as a Special Representative on Eastern European (especially JSSR) environmental affairs for the EPA. In 1978 he received EPA's highest award, the Gold Medal for Exceptional Service, for distinguished leadership in managing the Region and for outstanding contributions to international environmental control.

Adamkus is the U.S. Chairman of the IJC's Great Lakes Water Quality Board. (EPA Environmental News Release, No. 85-270.)

In August 1985, Vinton W. Bacon, currently Professor Emeritus of Civil Engineering at the University of Wisconsin, Milwaukee and former U.S. Chairman of the Great Lakes Science Advisory Board made a significant donation of material from his personal library to the Library of the Regional Office of the International Joint Commission. The donation included municipal (Metropolitan Sanitary District of Greater Chicago), state (California State Water Pollution Control Board) and federal government (U.S. Supreme Court decisions on lake diversion) documents, textbooks, films and scientific papers gathered by Professor Bacon during his distinguished career as an engineer and educator. This material, gratefully received and classified in the Regional Office, will be of considerable value to scholars in the Great Lakes region. Arrangements to consult the material may be made by calling (519) 256-7821 ext. 250 in Canada or (313) 226-2170 / FTS 226-2170 in the United States.

As a result of a commitment declared by Canadian Prime Minister Brian Mulroney and U.S. President Ronald Reagan at their March 1985 meeting to work together to solve environmental issues, representatives from each country have produced the Joint Report of the Special Envoys on Acid Rain, completed in January 1986. U.S. representative Drew Lewis, former Secretary of Transportation, and Canadian envoy William Davis, former Premier of Ontario, were charged with the responsibility of assessing the international environmental problems associated with transboundary air pollution, and recommend actions that would help solve them.

The three conclusions reached as a result of the year-long study are that acid rain is a serious environmental problem in both countries, that it is a transboundary problem, and that there are only a limited number of avenues currently available to achieve major reductions in acidic air emissions. The report has received mixed reviews from business, scientific and environmental factions from both countries. The report is available from Environment Canada and the U.S. Environmental Protection Agency.

Water law scholars and policy officials who convened in Cleveland in December 1985 offered a number of legal options for protection of the Great Lakes from harmful diversion and consumptive use. Options discussed ranged from revision of the International Boundary Waters Treaty of 1909 to consistent state and provincial legislation to water permitting and registration systems. While consensus on a single "best" approach did not emerge, participants agreed on several that held strong potential. These include a basinwide water management system; comprehensive water quantity planning to ensure long term availability of supplies; full implementation of the Great Lakes Charter; a continuing dialogue among Great Lakes states and provinces; and additional investigation of the broader range of legislative, policy and planning options identified.

The conference was sponsored by The Center for The Great Lakes with the cooperation of the Canada-U.S. Law Institute of Case Western Reserve University's School of Law. Two documents resulting from the Conference will be available from the Center in late April.

Publication requests should be directed to The Center for The Great Lakes, 435 North Michigan Avenue, Suite 1733, Chicago, Illinois 60611. (312) 645-0901 or The Centre for The Great Lakes Foundation, 3 Church Street, Suite 500, Toronto, Ontario M5E 1M2. (416) 860-1730.

A review of the 1978 Great Lakes Water Quality Agreement was carried out by an interdisciplinary, non-governmental review panel of 15 experts. It worked under the joint auspices of the U.S. National Research Council and the Royal Society of Canada. Funding was provided jointly by the William H. Donner Foundation and the Donner Canadian Foundation. The report was released on December 12, 1985 after a review process that lasted nearly two years.

A copy of the report is available from National Research Council, Water Science and Technology Board, 2101 Constitution Avenue NW, Washington, DC 20418 or Royal Society of Canada, 344 Wellington Street, Ottawa, Ontario K1A 0N4.

Great Lakes United (GLU) is an international organization representing approximately 100 conservation groups throughout the eight Great Lakes states and two Canadian provinces. Matching grants received from the Public Welfare and William Donner Foundations will enable GLU to hold 18 public hearings on the 1978 Great Lakes Water Quality Agreement July through October of 1986. Many of the hearings will be held in Areas of Concern identified by the Water Quality Board.

These hearings will provide an opportunity for the public to voice concerns with the present Agreement and its implementation. Information will be compiled and formally submitted to the two federal governments in early 1987.
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The public record will serve as a citizens’ agenda for consideration by U.S. and Canadian government officials when they review the Agreement after the release of the IJC Third Biennial Report.

For further information on how you can participate and a listing of the hearings scheduled, please contact Tim Eder, Field Coordinator, Great Lakes United, 24 Agassiz Circle, Buffalo, New York 14214. (716) 886-0142.

Resolving the Fishery-Power Conflict at Sault Ste. Marie

by Geoffrey Thornburn

In December 1985, the Commission took the last step in a 14 year-long process of bringing about a resolution to the water-use conflict between fisheries habitat and power production at the St. Marys Rapids, Sault Ste. Marie. Increasing diversion through side canals of the waters that had historically flowed over one of the most important fish feeding and spawning locations in the region, had resulted in inadequate water supplies for fish along the shores of Whitefish Island. This area is downstream from the Compensating Works which help control the outflows of Lake Superior through the St. Marys River. In 1974, a special report by the Commission’s International Lake Superior Board of Control had suggested that remedial works, especially a berm or dike roughly paralleling the southern shore of Whitefish Island, would help restore fisheries habitat. This concept was supported by the Commission and the Federal Governments but not implemented.

When Great Lakes Power Limited at Sault Ste. Marie, Ontario, received approval in 1978 to redevelop its plant, the Commission also provided for certain minimum flows over the rapids. The objective was to give the fish at least the same amount of water at times of low flow (i.e., less than four gates open in the Compensating Works). This provision, Condition I(b), had significant implications for power production in both countries because the reduced water supply was shared equally. When requested to reconsider Condition I(b) by Great Lakes Power Limited and the American firm, Edison Sault Electric Company (ESELCO) in 1982, the Commission formally reopened the entire question of adequate provision for the fisheries.

An independent study was undertaken on behalf of the Commission by Mr. Gordon Koshinsky, Canada Department of Fisheries & Oceans, Freshwater Institute, Winnipeg, and Dr. Clayton Edwards, IJC Great Lakes Regional Office, Windsor. They found that the rapids are indeed important for fisheries and that the construction of remedial works was the best means to provide water to the shore of Whitefish Island and Whitefish Channel. Their report received wide support and formed the basis for moving ahead.

A consultative group, known as the Liaison Group on the St. Marys Rapids, was established under the joint Chairmanship of Commissioners Olson and Totten. It included the four fisheries agencies (Canadian and U.S. Federal, Ontario and Michigan) as well as Parks Canada which controlled the adjacent land. With the help of a working committee which also included U.S. Army Corps of Engineers, an accommodation was reached that was generally acceptable to the various parties. It consisted of a low-level dike roughly paralleling Whitefish Island which would allow maintaining water levels over the critical fish habitat along the shore, and an independent water supply to Whitefish Channel between Whitefish and St.

Remedial Works in St. Marys River
Credit – Ministry of Natural Resources, Sault Ste. Marie, Ont.

Mary's Islands. Habitat improvement in the main rapids was also recommended to the responsible jurisdictions. The two private power companies agreed to pay the capital costs of the dike, and Ontario agreed to pay for the improvements to Whitefish Channel and to undertake the necessary environmental studies.

The works were built during the summer of 1985. The dike was officially opened September 27 and the culvert supplying water to Whitefish Channel was completed in early December. The Commission then indefinitely suspended Condition I(b), and thereby provided for more water to produce hydro-electric power while leaving the fish with a more assured water supply. The Ontario Ministry of Natural Resources stated that its long term fisheries management goals for the area had been met. However, the U.S. Fisheries agencies are still evaluating the potential for additional habitat enhancement in the rapids.

All sides of this long-standing issue have recognized that, through consultation and consideration beyond their own perspectives, a mutually acceptable if not perfect solution could be achieved. The Commission played a catalytic role in bringing together and encouraging the principal interests, thereby contributing to the prevention and settlement of “disputes regarding the use of boundary waters” according to the intentions of the Boundary Waters Treaty.
FOCUS

For further information contact Geoffroy Thornburn, IJC, 100 Metcalfe Street, 18th Floor, Ottawa, Ontario K1P 5M1. (613) 995-2984.

Workshop on Great Lakes Research Coordination

by Fahmy K. Fahmy

The International Joint Commission’s Council of Great Lakes Research Managers held a workshop on Great Lakes Research Coordination in Windsor, Ontario, November 20-22, 1985. This workshop was held in partial fulfillment of the Council’s responsibility to the Commission and the Science Advisory Board.

The Council was established in 1984 to enhance the ability of the Commission and its Science Advisory Board to provide guidance and advice on Great Lakes research. The Council is also responsible for collecting and disseminating information on Great Lakes research programs, and assisting in the coordination of research efforts in the Great Lakes Basin.

Council Co-Chairs Norbert Jaworski (U.S.) and Keith Rodgers (Canadian) opened the workshop, which was attended by 55 Great Lakes research managers and scientists. Three IJC Commissioners – Robert C. McEwen, L. Keith Bulen and Pierre-André Bissonnette – provided opening remarks for various sessions and participated in workshop discussions. The Commissioners expressed interest and concern about Great Lakes research and offered their support to the Great Lakes research community.

The principal objectives of this workshop were to review the effectiveness of Great Lakes research, using polychlorinated biphenyls (PCBs) as a case history, and to recommend appropriate mechanisms for improving research coordination and cooperation among all Great Lakes research institutions.

Invited speakers presented overview papers on various aspects of PCB research on the first day of the workshop, including research accomplishments with regard to sources, effects and management of PCBs, and candidly identified research limitations.

It was evident from these overviews that significant research efforts and resources have been expended on the study of PCBs. As a result, much data and knowledge have been acquired. We know, for example, that PCBs are made up as a group of isomers, or congeners, that share some similarities in structure and behaviour but differ as to the intensity of their toxicological effects. We know that PCBs reach the Great Lakes from various sources and also have some idea of their relative abundance from these sources. Moreover, we understand how PCBs transfer among the various compartments of the environment and have evidence of their potentially harmful effects on human health and other organisms.

Despite this understanding, there are still significant gaps in our knowledge. For example, we do not know how to effectively control the input of PCBs into the lakes from diffuse sources. Nor do we know how to cost effectively manage sediments where PCBs are bioavailable. There is also a lack of information about exposure levels of PCBs and the risks such levels pose to humans. Without this information, it is difficult to reach conclusions regarding human health effects from Great Lakes contamination by PCBs.

On the second day of the workshop the participants were divided into three work groups to discuss problems of toxic substances in the Great Lakes. One Group addressed Exposure and Effects, while another addressed Measurements, Sources and Modelling and a third Group addressed Management and Remedial Measures. Each group developed a list of recommendations, based on information provided by the speakers and personal experience of participants, on the research needed to fill the gaps in knowledge and provide scientific information required for the management of problems caused by toxic substances in the Great Lakes ecosystem.

The participants also exchanged information about their current research programs, resources and facilities, and explored mechanisms for coordinating efforts to conduct needed research to achieve common goals more cost effectively.

The proceedings of this workshop are being prepared by the Council and will include the full scripts of overview papers presented by the speakers as well as the conclusions and recommendations of the three work groups.

For more information contact Dr. Fahmy K. Fahmy, IJC Great Lakes Regional Office, 100 Ouellette Avenue, 8th Floor, Windsor, Ontario N9A 6T3, or P.O. Box 32869, Detroit, Michigan 48232. (519) 256-7821 or (313) 226-2170.

EVENTS

INTERNATIONAL JOINT COMMISSION –
Schedule of Meetings
April 14-15 – Human Health Effects Committee, Washington, DC
15-17 – IJC Semi-Annual meeting, Washington, DC
16 – Coordinating Committee for the Assessment of Chemicals in the Great Lakes Ecosystem, Washington, DC
17 – Toxic Substances Committee, Washington, DC
22 – Atmospheric Workshop Planning Committee, Great Lakes Regional Office, Windsor, Ontario

https://scholar.uwindsor.ca/ijcfocus/vol11/iss1/1
April 25  — SAB Executive Committee, Windsor, Ontario
May 15-16 — Great Lakes Water Quality Board, Mackinac Island, Michigan
29:30  — Science Advisory Board, Toronto, Ontario
June 3-5 — IJC Executive meeting, Ottawa/Windsor

A Joint Conference of the Air Pollution Control Association, Ontario Section and the Pollution Control Association of Ontario will be held at the Hamilton Convention Centre and the Hamilton Sheraton Hotel, April 27-29, 1986. For further information, contact Boris Boyko, Ministry of the Environment, 119 King Street West, Hamilton, Ontario L8N 329. (416) 521-7640.


For further information, contact David Miller, Great Lakes United, 24 Agassiz Circle, Buffalo, New York 14214. (716) 866-0142.

For more information contact William Marks, Conference Chairman, Michigan Department of Natural Resources, P. O. Box 30028, Lansing, Michigan 48909.

The International Association for Great Lakes Research (IAGLR) will hold its 29th Conference at the University of Toronto, Scarborough Campus, Scarborough, Ontario on May 26-29, 1986.

In addition the plenary session from World Large Lakes Conference will be given at the IAGLR Conference which is open to all interested persons.

For further information contact Mrs. N. Sonstenes, IAGLR Conference Office, University of Toronto, Scarborough Campus, 1265 Military Trail, Scarborough, Ontario M1C 1A4. (416) 284-3174.

The Center for the Great Lakes will be sponsoring two major conferences in 1986 of general interest to Great Lakes residents. “Water Works: A Great Lakes Waterfront Workshop” will be held in Toledo, Ohio, on June 18-20. The theme will be public/private sector cooperation in revitalizing Great Lakes waterfronts to promote economic developments and highlight the region’s unique environmental attributes.

The Detroit/Windsor area will be the location of a November 17-19 “Great Lakes Water Quality Summit.” The Conference, which will attract state, provincial & federal policymakers as well as citizen groups and the broader public, will examine progress under the Great Lakes Water Quality Agreement of 1978 and include discussion of program initiatives and innovations to enhance Great Lakes water quality.

Further information on both conferences is available from the Center for The Great Lakes, 435 North Michigan Avenue, Suite 1733, Chicago, Illinois 60611. (312) 645-0901. Or The Centre for The Great Lakes Foundation, 3 Church Street, Suite 500, Toronto, Ontario M5E 1M2. (416) 860-1730.

IJC Appoints Chairmen to Science Advisory Board

Dr. Alfred M. Beeton and John R. (Jack) Vallentyne were appointed January 11, 1986, by the International Joint Commission to serve as Co-Chairmen of the Great Lakes Science Advisory Board (S.A.B.) for a one year term. Both are active members of the Great Lakes Research community.

The Science Advisory Board advises the Commission and the Great Lakes Water Quality Board on questions and research related to the Great Lakes Water Quality Agreement.

Dr. Beeton, who will serve as the U.S. Chairman of the Science Advisory Board, is Director of the Great Lakes and Marine Waters Center at the University of Michigan and also holds a joint appointment there as professor of Natural Resources and professor of Atmospheric and Oceanic Science in the College of Engineering. He is also Director of the Michigan Sea Grant College Program, and served as President of the National Sea Grant Association from 1983-1984.

As a member of the Board of Consultants to the U.S. Army Corps of Engineers, Buffalo District, New York, from 1968-1970, Dr. Beeton advised the effect of Corps’ dredging activities on pollution in the Great Lakes. He has worked as a consultant to the U.S. Environmental Protection Agency, served on the Commission’s work group on Phosphorus Control Strategies for the Great Lakes from 1979-1980, and became a member of the Commission’s Council of...
Great Lakes International Surveillance Plan Updated

by John Gannon

Annex 11 of the 1978 Water Quality Agreement states that a joint monitoring and surveillance program shall be developed and implemented among the Canadian and U.S. federal and state and provincial governments in order to meet the following objectives: to evaluate water quality trends; to identify emerging problems; to assess the degree to which jurisdictional source control requirements are being met; to determine achievement of general and specific water quality objectives.

Annex 11 further stipulates that "the Great Lakes International Surveillance Plan (GLISP) contained in the Water Quality Board Annual Report of 1975 and revised in subsequent years shall serve as a model for the development of the joint surveillance and monitoring program."

The Water Quality Board released a revised GLISP in 1980 which emphasized intensive lake studies on a nine-year rotational cycle. The intensive survey on Lake Superior in 1983-84 represented completion of the first cycle. Subsequent review of accumulated data identified the need to further modify monitoring and surveillance strategies to more effectively address Great Lakes water quality issues and problems. Consequently in May 1983 the Water Quality Board established, under the Surveillance Work Group, seven lake and connecting channel task forces and charged these groups to design scientifically defensible monitoring and surveillance plans which were considered necessary and sufficient to meet the requirements of the Great Lakes Water Quality Agreement.

The collective product of the Surveillance Work Group and its task forces is a three-volume GLISP: I. Overview—Background, rationale and highlights of the plans; II. Plans—Individual plans for each lake and connecting channel, which describe what monitoring and surveillance should be done, when, where, and why; III. Handbook—monitoring and surveillance methods.

Since the Water Quality Board considers GLISP to be dynamic, all three volumes will be in a looseleaf format. Volumes I and II will be updated periodically as necessary and material will be inserted into Volume III as it is developed.

The Water Quality Board has approved the recently completed updates of GLISP, including Volume I and the following sections of Volume II: Lake Michigan, Lake Huron, Lake Erie, Lake Ontario, the Niagara River, and the St. Lawrence River. The plan for Lake Superior has been delayed pending completion of the 1983-84 intensive survey report. Similarly, the plan for the St. Marys, St. Clair and Detroit Rivers and Lake St. Clair will be finalized following completion of the ongoing binational Upper Connecting Channels Study.

The fundamental objective of GLISP is to determine the impact of human
activities on the quality of the Great Lakes basin ecosystem, particularly the effects of these activities on the desired uses of the lakes. Information from the program is primarily directed at assisting managers of remedial programs in defining the need for specific programs as well as in evaluating their effectiveness.

The updated GLISP contains the following highlights which are a departure from or improvements on the 1980 GLISP edition: greater emphasis on persistent toxic substances; shift to an ecosystem approach (e.g., a more integrative and holistic design including a better balance of physical, chemical, and biological components); consideration of the need for more detailed and specific programs for identified Areas of Concern; development of compatible methodologies for common operational components (e.g., atmospheric monitoring) which are applicable to the entire basin; development of specific operational components (e.g., habitat monitoring, biomonitoring, etc.) where required to address specific concerns in certain lakes or connecting channels; annual planning and implementation instead of periodic intensive surveys; and more detailed planning and more emphasis on coordination, quality assurance, compatible data management and timely data interpretation and reporting.

For more information contact: Dr. John E. Gannon, Secretary, Surveillance Work Group, International Joint Commission, Great Lakes Regional Office, 100 Ouellette Avenue, 8th Floor, Windsor, Ontario N9A 6T3 or P. O. Box 32869, Detroit, Michigan 48232. (519) 256-7821 or (313) 226-2170.

**PEOPLE**

IJC has appointed the following new members to the Water Quality and Science Advisory Boards.

Joining the Water Quality Board for three year terms are Nancy A. Maloley, Commissioner, Indiana Department of Environmental Management, Indianapolis, Indiana; Richard Carlson, Director, Illinois Environmental Protection Agency, Springfield, Illinois; Ward Falkner, Canada Department of Fisheries and Oceans, Burlington, Ontario; and Denyse Gouin, Directrice de la Direction des etudes du milieu aquatique, Ministere de l'Environnement du Quebec, Sainte-Foy, Quebec.

Joining the Science Advisory Board is Tudor Davies, Director, Office of Marine and Estuarine Protection, U.S. Environmental Protection Agency, Washington, DC.

Vinton W. Bacon and Gilles LaRoche have retired as chairmen of the Science Advisory Board. Professor Bacon, who served as chair for three years, is a Professor Emeritus at the University of Wisconsin. A civil engineer, he has received several awards in the areas of engineering, construction and wastewater reclamation.

Dr. LaRoche served as research program coordinator at the U.S. Environmental Protection Agency, and played an important role in the development of national policy on water uses. He will remain on the Board as a member. The Commission acknowledges the retiring chairs and thanks them for their dedication and efforts.

Dr. Ron Drynan, a civil engineer who worked at the IJC Regional Office in various capacities since 1974, retired in January 1986. During Ron's tenure at the Regional Office he served as assistant director, Water Quality Board secretary, and Science Advisory Board secretary. He worked with the Pollution from Land Use Activities Reference Group (PLUARG) plus numerous other projects.

Appreciation is extended to Ron for his effort and dedication during his service with IJC.