

Focus on International Joint Commission Activities

Volume 12
Issue 2 *Focus on International Joint
Commission Activities (ISSN 0832-6673): vol.12
iss.2*

Article 1

1987

Focus on International Joint Commission Activities (ISSN 0832-6673): vol.12 iss.2

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Recommended Citation

Administrator, UWindsor (1987) "Focus on International Joint Commission Activities (ISSN 0832-6673): vol.12 iss.2," *Focus on International Joint Commission Activities*: Vol. 12 : Iss. 2 , Article 1.
Available at: <https://scholar.uwindsor.ca/ijcfocus/vol12/iss2/1>

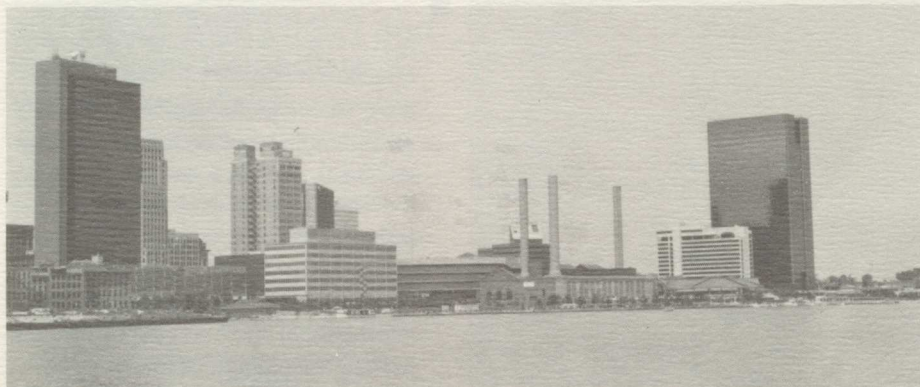
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Volume 12, Issue 2, ISSN 0832-6673
July/August 1987

FOCUS

On International Joint
Commission Activities

Join Us in Toledo for the International Joint Commission's Biennial Meeting on Great Lakes Water Quality



Toledo's recent revitalization has provided many opportunities for residents and visitors to enjoy the city and the Maumee River.



Inside ...

Directive Established for G.L. Levels Reference	2
Shultz Acknowledges Friendship between Canada & U.S.	7
Fisheries & Toxics Focus of IAGLR Conference	8
1987 Biennial Meeting	9-12
Rouge River Education Project	14
Conclusions on Effectiveness of G.L. Research	16
International Cooperation Needed for St. Lawrence River	17
Eutrophication and Toxics Major Problems for Saginaw River and Bay	18
Public Participation Emphasized in Saginaw R./Bay RAP	19
Columns	
Briefs	4
Bookshelf	13
Events	15
People	20

Directive Established for Great Lakes Water Levels Reference

On August 1, 1986, the Governments of the United States and Canada gave a reference to the International Joint Commission (IJC) to examine and report on methods to alleviate the adverse consequences of fluctuating water levels in the Great Lakes-St. Lawrence River basin. As a part of this, the IJC must address the immediate high water level crisis and identify and evaluate intermediate and long-term potential measures.

As the IJC considers these various options and measures, each must be examined for its effects on such vital matters as domestic water supply and sanitation, navigation, agriculture, shore property, flood control, wildlife and others. In order to test whether new or altered works or other regulatory measures are economically and environmentally practicable, the IJC must determine the full costs and benefits of such works or measures and indicate how the various interests on

by David LaRoche

either side of the boundary would be affected. The need for and costs of remedial or compensatory works or measures to offset costs to the interests which may be adversely affected by any proposed regulatory measures also must then be determined.

To date, the IJC has proceeded with its reference responsibilities on three tracks. First, based on currently available information, it submitted an initial report to the federal governments November 14, 1986, listing immediate actions that could be taken to lessen damages from current high water levels (see Focus, Volume 12, Issue 1, page 2).

Second, the Commission formed a task force to undertake a technical evaluation of measures which could be implemented within approximately one year to reduce high water levels. Based upon results of the technical evaluations, the Commission may make specific further recommendations.

Third, the IJC has sought broad expert advice for developing the longer-term implications of fluctuating water levels. The Commission has discussed the reference with experts in climatology, hydrology, hydraulics, land use, modelling, fisheries, limnology, economics and other disciplines. The Commission has maintained contact with riparians and other affected interests as it actively engages the questions posed by the long-term study.

Approach

Recognizing the complexity and unprecedented scope of the reference, the IJC regards the following elements as essential for successful study implementation:

- The study requires broad participation and a multidisciplinary approach. Measures necessary to deal with the adverse consequences of fluctuating water levels are unlikely to be purely technical. Further, it is improbable that a single solution will emerge; rather, a mix of measures over time will be the most likely course.
- The study will require substantial international and interagency participation, recruitment of the finest expertise available from governmental and nongovernmental sectors of both nations, and a commitment to provide the resources necessary to produce a useful and enduring product. Because the effort needs to be an ongoing, evolving process, the IJC believes flexibility, creativity and innovation are critical.
- An integrated systems approach to the reference is essential. This will be accomplished by carefully coordinating the various aspects of the study, providing for a cross-system impact evaluation capability, and including a stronger integrating role for the Commission.

Scope

The study will develop, for review by the federal governments, a range of potential measures with their impacts and implications. It should involve the following steps:

- Review and analyze the physical, economic and environmental situation;
- Based on the above, identify and review critical issues related to fluctuating water levels;
- Develop a full range of potential measures and evaluate their impacts and implications; and

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- Highlight major issues for future consideration, including advice on subsequent actions. (Cont. on p. 4)

1987 Great Lakes Levels and Flows: Mild Winter and Spring Ease Immediate Water Levels Crisis

An eight-month pattern of below average precipitation over the Great Lakes has been reflected in lower lake levels throughout the basin – low enough, in fact, that new record high levels have not been set on any of the Great Lakes since February 1987.

While higher levels are usually expected in March with spring rains, below average precipitation and low runoff due to a light snow cover kept lake levels down. As a result, Lakes Huron and St. Clair did not change significantly and Lakes Erie and Ontario rose only about 2.5 cm (one inch) compared with usual increases of 15 cm (six inches) in March.

April precipitation ranged from less than half the average amount on Lake Superior to near average on Lake Ontario.

Lake Superior outflow according to Plan 1977 is continuing, and increased from the winter outflow of 70,000 cubic feet per second (cfs) to the open water period discharge of 89,000 cfs for May. The Plan 1977 June outflow was 76,000 cfs. Lake Ontario outflows also continue according to previous IJC orders using Criterion (k) emergency action. Discharge was increased at every opportunity allowed by downstream conditions in the Montreal area, according to spring runoff from the Ottawa River. This allowed Lake Ontario levels to fall to approximately 71 cm (2.33 feet) below the level that would have occurred without regulation.

Monthly summaries are presented of recorded water levels for February – June 10, 1987 and the maximum levels recorded for each of the Great Lakes and Lake St. Clair. Recorded levels are measured according to height (in feet) the water reaches above sea level.

FEBRUARY

Lake	Recorded Level	Maximum Level	Year
Superior	600.81	601.38	1986
Michigan-Huron . . .	580.33	580.36	1986
St. Clair	575.53	576.17	1986
Erie	572.82	572.85	1986
Ontario	245.67	246.46	1952

MARCH

Lake	Recorded Level	Maximum Level	Year
Superior	600.62	601.31	1986
Michigan-Huron . . .	580.21	580.40	1986
St. Clair	575.36	576.17	1986
Erie	572.67	573.11	1986
Ontario	245.52	246.77	1952

APRIL

Lake	Recorded Level	Maximum Level	Year
Superior	600.52	601.49	1986
Michigan-Huron . . .	580.25	580.75	1986
St. Clair	575.84	576.21	1986
Erie	573.00	573.46	1985
Ontario	246.21	247.69	1973

MAY

Lake	Recorded Level	Maximum Level	Year
Superior	600.53	601.72	1986
Michigan-Huron . . .	580.22	580.89	1986
St. Clair	575.68	576.25	1986
Erie	572.88	573.43	1986
Ontario	245.98	247.95	1952

JUNE 1-10, 1987

Lake	Recorded Level	Maximum Level	Year
Superior	600.69	601.77	1986
Michigan-Huron . . .	580.27	581.07	1986
St. Clair	575.68	576.51	1986
Erie	572.81	573.70	1986
Ontario	245.72	248.06	1952

Study Groups

Because of the complexity and interrelatedness of the issues the reference addresses, the activities and findings of each functional study group will be integrated closely with those of each of the other study groups.

Groups have been identified thus far to address the potential measures for alleviating the adverse effects of water level fluctuations. These groups will identify and provide advice on crisis intervention, intermediate measures and long-term considerations, and will build on the work of the existing Commission task force.

A sample of some themes for each of these groups follows:

■ Group 1: Hydraulics, Hydrology and Climate

This group has the lead responsibility for developing the water level component of the study. Its work will include examining previous lake regulation studies and providing an assessment of past, present and potential future changes in Great Lakes levels and the factors affecting these levels. This group will develop options for regulatory measures and determine the cost of design, construction and operation of such measures, as well as the costs to offset adverse effects on various interests.

■ Group 2: Coastal Zone Ecology, Resources, Uses and Management

This group will assess the impacts of fluctuating water levels on the coastal zone, including aquatic and terrestrial aspects. As a part of this, it will also review previous studies and determine the effects of fluctuating water levels on the coastal zone, as well as develop schemes for alleviating potentially adverse

effects of any regulatory measures that would affect the ecology, resources, uses and management of the coastal zone.

■ Group 3: Socioeconomic and Environmental Assessment

As its name suggests, this work group will analyze and assess socioeconomic and environmental impacts, including significant impacts on interests outside the coastal zone and outside the region. Its responsibilities include reviewing previous studies and undertaking analyses of the socioeconomic and environmental impacts of fluctuating water levels in the basin; assessing impacts in the areas of proposed regulatory measures and developing schemes to alleviate any adverse impacts; and identifying any possible compensatory actions, along with their potential costs.

■ Group 4: Public Participation and Communications

This group is assigned the lead responsibility for developing the public participation and communications program for the reference. Membership will be integrated with the existing Public Information Committee of the IJC. This group will initiate development of an information program to be carried out by responsible government agencies and will propose strategies for involving the public in the various studies.

At its spring Semi-Annual meeting, the Commission appointed Elizabeth Dowdeswell of Environment Canada and Brigadier General Joseph Pratt of the U.S. Army Corps of Engineers to serve as members of the steering committee and as co-chairpersons of the Project Management Team, which is responsible for ongoing project management and coordination.

For further information on the reference, please contact Alan Clarke, Information Officer, Canadian Section,

100 Metcalfe, 18th floor, Ottawa, ON K1P 5M1; (613) 995-2984, or Sally Spiers, Director of Public Affairs, United States Section, 2001 S Street NW, Washington, DC 20440. (202) 673-6222.

BRIEFS

IJC Canadian Chairman P.-André Bissonnette provided the keynote address at the annual "Forum for Progress" May 4, 1987 in Milwaukee, Wisconsin. Sponsored by the *Milwaukee Sentinel*, the day-long session was attended by



Zane Goodwin of the U.S. Army Corps of Engineers, Frank Quinn from the Great Lakes Environmental Research Laboratory of NOAA, and Commissioner P.-André Bissonnette serve on a panel on the Great Lakes water levels.

more than 500 citizens to discuss and learn more about Great Lakes water levels. Commissioner Bissonnette's address, entitled "Resolving a Common Problem Together," reviewed the IJC's experience in working on issues of concern to both countries, such as lake levels, in order to develop solutions. Three panels provided additional information on the current and long-term impacts of fluctuating water levels in the Great Lakes.

IJC U.S. Chairman Robert McEwen, meanwhile, provided the luncheon address at the annual conference of the National Association of Environmental Professionals (NAEP), which was held in Chicago, Illinois from April 27 to 29, 1987. The conference addressed regional approaches to national issues, using the Great Lakes as focal point for discussions. Plenary sessions discussed such topics as regional initiatives in water quality management, human health and risk assessment, transboundary environmental issues, and current national issues in coastal management. Commissioner McEwen emphasized the historical role the IJC has played along the boundary region between the U.S. and Canada in developing cooperative



Commissioner Robert McEwen addressed participants at the NAEP Conference.

efforts on issues such as those discussed at the conference, and encouraged further coordination between all environmental professionals to develop solutions to the countries' most pressing environmental problems.

The conference was co-sponsored by NAEP, the Illinois Association of Environmental Professionals, and The Center for the Great Lakes.

Sea lampreys, an eel-like fish that migrated from the Atlantic Ocean into the Great Lakes, all but wiped out game fish in the lakes in the 1940s and 1950s by attaching themselves to the fish and sucking out blood and other fluids. The lampreys migrate in the spring from open water to small tributary streams where they spawn and die. When the eggs are hatched, they drift downstream and burrow into the soft mud on the stream bottom for three to 14 years before they develop into adults and move into the lake.

Scientists were able to bring the lamprey population under control in the early 1960s by treating the breeding streams with a chemical compound that is harmless to other species but kills lamprey eggs. Now, some lampreys are avoiding the small, easily treated streams and breeding in broad, deep channels like the St. Marys and St. Clair Rivers, which are too large to be treated chemically. The Great Lakes Fishery Commission and Minnesota Sea Grant researchers have estimated that one sea lamprey can kill between 30 to 40 pounds of fish in the year and a half it is an active parasite.

Carefully rebuilt stocks of salmon and trout thus are considered at risk because of this latest adaption in the lamprey's spawning habits, and scientists are trying to devise new ways of stopping the regrowth of lampreys throughout the Great Lakes. One possible option is chemically sterilizing male lamprey and releasing them to compete with fertile ones in order to reduce the percentage of successful breedings. This method has been successful in rivers in

Michigan's upper peninsula, but extensive testing is still needed before a broader study can begin on the St. Marys or St. Clair Rivers.

For more information, including an eight-page booklet explaining the lamprey invasion of the Great Lakes, contact Minnesota Sea Grant, Extension Office, 208 Washburn Hall, University of Minnesota, Duluth, MN 55812. (218) 726-8106.

Members of Great Lakes United (GLU), an international organization of over 200 environmental, sportsperson, union, local government and small business groups concerned with protection of the Great Lakes and St. Lawrence River, met for three days in early May to discuss major issues facing the region and pass resolutions that form the organization's agenda for the next year. The group's annual meeting was held in Niagara Falls, Ontario and included addresses from Ontario Ministry of the Environment Minister James Bradley and New York Department of Environmental Conservation Commissioner Henry Williams. While Minister Bradley focused on Ontario's recent initiatives to abate pollution from provincial sources and called for the excavation of the Hyde Park landfill in New York, Commissioner Williams outlined his state's Great Lakes agenda. The 25-year plan was recently developed to address issues of toxic and conventional pollutants, protection of drinking water supplies, lake level policies, navigation, recreational uses and protection of resources.



New York DEC Commissioner Henry Williams met with GLU's President Fred Brown and spoke at the organization's annual meeting.

GLU members discussed 11 proposed resolutions in workshop sessions, then voted on each proposal in a plenary session. Topics included air toxics; water quality; overflow dredging; levels, flows and diversions; land use; hazardous and nuclear waste; and funding. For further information on GLU's Annual Meeting, contact David Miller, Executive Director, 24 Agassiz Circle, Buffalo, NY 14214. (716) 886-0142.

After a decade of study, University of Michigan scientists can now predict how fast a stretch of shoreline will erode on the Great Lakes. A computer model was developed that will predict the intensity and duration of waves that strike the beach during a given storm, based on data gathered by eight weather stations scattered across the Great Lakes and other sources. For example, a 100-foot-deep waterfront lot on the Great Lakes will wash away in an average of 30 years, given normal fluctuations in high and low lake levels. If the water levels rise and winds are heavy, the erosion will occur much faster.

The study team has also concluded that there are no engineering solutions. According to Engineering Professor Guy A. Meadows, "You can't build breakwaters or pile rocks on the beach and expect that to stop erosion. In the long run, those structures cause more erosion than they prevent."

He recommended that the Great Lakes states follow the lead of other coastal states like North Carolina, Texas and Florida, which have prohibited the construction of shoreline structures designed to prevent erosion, and instead restore eroded beaches with natural sand. The study has been carried out in cooperation with the National Park Service, the National Oceanic and Atmospheric Administration, Michigan Department of Natural Resources, the U.S. Army Corps of Engineers and the U.S. Coast Guard.

Sustainable human progress can be achieved only through a system of international cooperation that treats environmental protection and economic growth as inseparable, according to a report from the World Commission on Environment and Development. The United Nations Commission's report, entitled "Our Common Future" and released in late April, finds that the world is facing interlocking crises of the environment and the economy which threaten the future of humanity. The Commission stresses that the report does not predict an inevitable future of increasing environmental decay, poverty and hardship as long as decisive political action is taken so that economic growth is based on policies that sustain and expand the environmental resource base.

Major environmental issues cited include the alteration of the earth's atmosphere by the burning of fossil fuels; the destruction of the protective ozone layer by manufactured chemicals; destruction of tropical forests; accelerating extinction of plant and animal species; desert spreading; acid poisoning of lakes and forests; and the toxification of soil, air and water.

According to the report, these issues can only be resolved by dealing with interrelated economic issues, such as poverty, hunger, rapid population growth, excessive outlays of arms, and the inequitable distribution of wealth. The report is published by Oxford University Press, and is available through your book seller or for \$13.50 Canadian funds plus postage (specify first class if desired) from the United Nations Association in Canada, Room 808, 63 Sparks Street, Ottawa, ON K1P 5A8. (613) 232-6268.

The Ontario government has filed suit in the Michigan Circuit Court to force the installation of more efficient pollution control devices on the garbage incinerator proposed to be built in Detroit. The lawsuit is similar to one filed the same day by an alliance of U.S. environmental groups, including Sierra Club, the Detroit Audubon Society, the North Cass Community Union and the Environmental Defense Fund, which asks the courts to order the city to install filters and scrubbers on the incinerator.

Both complaints argue that the permit for the resource recovery facility was given without consideration for best available control technology (BACT) which was available during design development. As a result, the facility will not meet Clean Air Act requirements for particulates, carbon dioxide or sulphur dioxide. The suits also state that, without the addition of state-of-the-art controls such as a dry acid gas scrubber and a baghouse for particulate controls, the facility as permitted does not have controls for gaseous pollutants, including hydrochloric acid, hydrogen fluoride, mercury, dioxins and furan in gaseous forms. Such controls have been used in other trash incinerators and in most cases are required to meet state regulations.

The Detroit Resource Recovery Facility is owned by the Greater Detroit Resource Recovery Authority, a public agency controlled by the cities of Detroit and Highland Park. A permit was granted for construction in November 1984 by the U.S. Environmental Protection Agency (EPA) and Michigan Department of Natural Resources (DNR), and is predicted to have a capacity of 4,000 tons per day. At this level, it would be the largest trash incinerator in the world.

The EPA has concluded that the control system proposed for the facility did not meet federal permit requirements at the time it was issued and the DNR states that errors were made in assessing the proposal when it was first reviewed. The Greater Detroit Resource Recovery Authority has rejected demands to install BACT because of the increased cost –

\$17 million to install and \$8 million per year to operate. After reviewing the case, the state's Air Pollution Control Commission approved construction in April 1986 with the control system as originally proposed. The EPA continues to review the case.

Violators of the U.S. Clean Water Act are entitled to a trial by jury, according to a Supreme Court ruling made April 28, 1987. The decision reversed one made by the 4th US Circuit Court of Appeals in which a Virginia real estate developer was denied a jury trial on charges he illegally placed fill in wetlands in Chincoteague, Virginia.

The verdict was rendered in accordance with the seventh amendment, which provides the right of a jury trial in all common law suits where the value in controversy exceeds \$20. The court also found that the trial judge should determine liability once the jury has rendered a decision.

Several foundation sources have provided funding for a joint project on the Great Lakes between The Conservation Foundation and the Institute for Research on Public Policy. The project will culminate in a book-length report to include two principal elements: quantitative data on trends in environmental contamination and progress governmental institutions have made in implementing programs to protect the environment. Such a review is meant to serve as a basis for examining new opportunities to protect public health and natural resources in the Great Lakes region.

The report will be modeled after The Conservation Foundation's highly acclaimed series of national *State of the Environment* reports, and is expected for release in 1989. For additional information on the project, contact Richard A. Liroff, Project Director, The Conservation Foundation, 1255 Twenty-Third Street NW, Washington, DC 20037. (202) 293-4800.

The Ontario Ministry of the Environment has released a report which provides guidelines for assessing the economic implications of Ontario's waterways cleanup program, the Municipal-Industrial Strategy for Abatement or MISA. *Economic Information Needs and Assessments for Developing MISA Monitoring and Abatement Requirements* identifies specific information needed to determine costs in monitoring and abatement requirements, various means of estimating beneficial consequences of MISA regulations, and further studies that will help to identify the least-cost combinations of control techniques to attain

cleanup objectives. For further information, contact Jack Donnan, Policy and Planning Branch, Ontario Ministry of the Environment, 135 St. Clair Avenue West, 12th floor, Toronto, ON M4V 1P5. (416) 323-4579.

Even though Michigan recently was ranked fifth in the nation for its quality of environmental programs by the Fund for Renewable Energy and Environment, a recent report which assesses the state's enforcement record has concluded that environmental and public health regulators do not have adequate staff to protect citizens from the risk of exposure to harmful substances from the environment. Further, it finds that state regulators "do not have a handle on what is stored, what is discharged, and what environmental threats may exist."

Researchers interviewed state and local agencies to determine their ability to inspect facilities that discharge substances into the air, water and ground. Reported findings include:

- The state's surface water monitoring system relies primarily on self-monitoring and self-policing.
- State regulators do not know the extent to which toxic pollutants are discharged into the air.
- Public drinking water supply systems are not monitored at a level that ensures adequate human health protection.
- Too many polluters have found that they can violate environmental and human health laws without paying a penalty. Others knowingly violate requirements.
- The study emphasizes that poor enforcement harms the regulated community as well as the environment, in that it means delay in cleanup and escalation of costs, especially when compared to the costs of prevention. The report recommends a comprehensive monitoring and inspection program be put in place and funded adequately to enable state agencies to enforce state environmental laws and regulations, as well as revisions in Michigan's penalties and permitting systems to allow for direct enforcement.

"Michigan's Environmental Protection System: Assessment and Recommendations for Change" was prepared by the Southeast Michigan Area-wide Water Quality Board and the East Michigan Environmental Action Council, under the auspices of the Southeast Michigan Council of Governments (SEMCOG). To obtain a copy, contact Janis A. Bobrin, Manager, SEMCOG, Areawide Water Quality Board, 800 Book Building, Detroit, MI 48226. (313) 961-4266.

Secretary of State Shultz Acknowledges Strong Friendship between U.S. and Canada at IJC's Spring Semi-Annual Meeting

On April 8, 1987, U.S. Secretary of State George P. Shultz spoke with members of the International Joint Commission (IJC) and its advisory and control boards at a reception hosted by the Commission. Secretary Shultz acknowledged the strong friendship between the United States and Canada and noted the success of the IJC in addressing mutual environmental concerns among the two nations.

The Commissioners recognized three of its advisors at the reception who were retiring from the civil service. C.J.R. Lawrie, of Transport Canada, Waterway Development Aids and Waterways Branch, Ottawa; William Erdle, Buffalo District Office of the U.S. Army Corps of Engineers; and Lovell Richie, Minnesota Pollution Control Agency, each received a gift in appreciation for their service to the U.S. and Canada.

The reception was held on the occasion of the IJC's Spring Semi-Annual meeting in Washington, D.C. when the Commission meets with its advisory and control boards to discuss their ongoing activities to carry out the IJC's

by Sally Spiers

responsibilities from coast to coast. For example, both Great Lakes Water Quality Agreement boards addressed the Commission on April 8, 1987. The Great Lakes Water Quality Board and the Great Lakes Science Advisory Board are the advisors to the Commission under the 1978 Great Lakes Water Quality Agreement, and the board co-chairpersons meet regularly with the Commission to discuss progress in their activities under the Agreement and to plan future direction. The Commissioners gave special recognition and thanks to Jim Kingham, who served as the Canadian co-chairperson for the Water Quality Board for the past three years.

The International Air Quality Advisory Board reports on existing and potential air quality problems along the U.S.-Canada boundary. In its report to the Commission, it presented a summary of events that have occurred in the design, permitting and production of the Detroit Resource Recovery Facility (see Briefs,

p.4), which the Commission passed on to both federal governments for review.

The Lake Superior Board of Control, the International Niagara Board of Control and the International St. Lawrence River Board of Control monitor the regulation of control works at the outlets of Lake Superior, Lake Ontario and at Niagara Falls. These boards assist the IJC in carrying out its functions to partially regulate Great Lakes water levels.

The International Advisory Board on Control of Water Pollution - St. Croix River, the International Rainy River Pollution Board, and the International Red River Pollution Board monitor the water quality of these transboundary rivers and report to the Commission on progress to attain specific water quality objectives.

The Flathead River International Study Board was created in April 1985 to examine and report on the water quality and quantity implications of a proposed coal mine development on Cabin Creek in British Columbia. The board presented an update on production of their final report, which is expected later this year.



The Commission welcomed Secretary of State George Shultz to its reception. From left are Commissioners E. Davie Fulton, Donald Totten, Robert McEwen, Secretary of State Shultz, and Commissioners L. Keith Bulen, Robert Welch and P.-André Bissonnette.



The cherry blossoms were in full bloom during the IJC's Semi-Annual Meeting.



C.J.R. Lawrie watched as Brig. Gen. Joseph Pratt presents a plaque to William Erdle.

Fisheries and Toxics are Focus of 30th Annual IAGLR Conference

The International Association for Great Lakes Research (IAGLR) held its 30th annual conference

in Ann Arbor, Michigan from May 11 to May 14, 1987, which was cosponsored by the Great Lakes Research Division, The University of Michigan, and the Great Lakes Environmental Research Laboratory of the National Oceanographic and Atmospheric Administration. More than 500 attended the four-day meeting, during which some 250 papers were presented. Two strong themes were emphasized throughout the conference: fisheries and toxic substances.

The Great Lakes are primarily managed as a sport fishery, with large numbers of salmon and lake trout stocked into the lakes each year, and researchers are concerned about the success of such programs. Conference presentors addressed these concerns, particularly the failure of stocked lake trout to reproduce in the Great Lakes. Experimental programs are being developed to determine whether or not natural and artificial spawning reefs can be "spiked" with olfactory cues, which may allow adult lake trout to home in on such habitats, rather than spawning in less suitable areas. Concern was also raised regarding the forage base for Great Lakes salmonids, especially in Lake Michigan where alewife populations have declined dramatically in recent years. The most recent evidence suggests that lake trout are not switching to other, more abundant prey, and thus their growth has slowed in past years. Studies such as these have implications for stocking programs.

Several special symposia were devoted to toxic substances issues, and a number

by Brian Eadie
and Marlene Evans

of versatile approaches for understanding toxic contaminants problems in the Great Lakes were discussed. One particular study, for example, showed that laboratory rats fed a 30% Lake Ontario salmonid diet had impaired behavioral responses relative to rats fed a similar diet of Pacific salmon. Another session reviewed chemically-induced diseases in the Great Lakes, such as deformities, cancers, and other abnormalities in fish, birds and mammals. This session also reported the presence of mirex (a toxic contaminant in Lake Ontario) in beluga whales downstream in the St. Lawrence estuary.

Three sessions dealt with geographic sites in which toxic substances are of special concern and the complex issue of remedial actions for the IJC-designated Areas of Concern. Many of these areas have high levels of contaminants in the sediment. While it may be desirable to remove such contaminants, a number of questions need to be answered: Are the adverse effects of removing these contaminants (releasing some into the water) less than the effects of allowing such contaminants to remain in place and relatively undisturbed? Where should such removed contaminants be placed? Session participants concluded that better long-term disposal techniques are required to more effectively manage toxic wastes and cleanup.

A number of new research areas were also addressed at the conference. A special session discussed research results

from dives to the deepest portions of the lakes using a special submarine, such as the recent studies conducted in Lake Superior. Another session was devoted to paleolimnology, the study of the past history of lakes through chemical, biological and physical examination of the sedimentary record. For example, strong evidence suggests that the character of Lake Erie began to change as early as the 1800s, as the land was settled by Europeans.

Another session dealt with a relatively new area of research concerned with very small (millionths of an inch) plant and bacterial cells found in all waters, called microbial food webs. Preliminary studies suggest that much of the plant production in Lakes Huron, Michigan and Superior is associated with such very small cells. Other special sessions discussed particle flux research or the processes by which matter is transported from the lake surface to the lake floor; Great Lakes geology, an issue of importance for economic development and landfill siting; and improved information exchange between scientists and the public.

For more specific information on the conference, contact Marlene Evans, Great Lakes Research Division, The University of Michigan, Ann Arbor, MI 48109 or Brian Eadie, Great Lakes Environmental Research Laboratory, 2205 Commonwealth Boulevard, Ann Arbor, MI 48105. The 31st conference on Great Lakes research will be held at McMaster University in Hamilton, Ontario in May 1988 and will be organized by Klaus Kaiser, Canada Centre for Inland Waters, Burlington, Ontario.



International Joint Commission
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August 1, 1987

On behalf of the INTERNATIONAL JOINT COMMISSION, it is our pleasure to invite you to attend the BIENNIAL MEETING ON GREAT LAKES WATER QUALITY in Toledo, Ohio from November 16 to 18, 1987.

The meeting begins on Monday afternoon, November 16 and concludes late Wednesday afternoon, November 18. Members of the IJC family and citizens of Toledo and Ohio have been involved for many weeks in planning the program and other events. This is an important opportunity to add to your knowledge and understanding of developments concerning the Great Lakes.

Your participation will help to ensure a successful BIENNIAL MEETING. Please complete the enclosed registration at your earliest convenience.

We look forward to seeing you in Toledo.

L. Keith Bullock

Robert Welch

Co-Chairpersons, IJC Public Information Committee



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PRELIMINARY PROGRAM

MONDAY, November 16

- 9:00 a.m. – 9:00 p.m. *Registration*
- 4:00 p.m. – 5:00 p.m. *Official Opening of Biennial Meeting and Exhibits; Recognition of Invention Convention Participants*
A community awareness program co-sponsored by Toledo Public Schools and the IJC
- 5:00 p.m. – 7:00 p.m. *Opening Reception*

TUESDAY, November 17

- 9:00 a.m. – 12:00 p.m. *Plenary Session*
■ Presentation and discussion of the 1987 Report of the Great Lakes Water Quality Board
- 12:00 p.m. – 2:00 p.m. *Lunch, on your own*
- 2:00 p.m. – 5:00 p.m. *Two Concurrent Workshop Sessions*
■ The Great Lakes Water Quality Agreement
Rationale and proposed changes to the Agreement, reactions from various perspectives and from session participants
■ Lake Levels Workshop
A review of fluctuating water levels and an outline of the study process developed for the Reference to the IJC of August 1, 1986
- 7:00 p.m. – 7:30 p.m. *Cocktails*
- 7:30 p.m. – 9:00 p.m. *Biennial Meeting Dinner* (Speaker to be announced)

WEDNESDAY, November 18

- 8:30 a.m. – 11:30 a.m. *Plenary Session*
■ Presentation and discussion of the 1987 Report of the Great Lakes Science Advisory Board
- 11:30 a.m. – 1:30 p.m. *Biennial Meeting Luncheon* (Speaker to be announced)
- 1:30 p.m. – 4:30 p.m. *Two Concurrent Workshop Sessions*
■ The Remedial Action Plan Process
An introduction to the RAP process, using the Maumee River as a case study
■ Towards Integrated Monitoring – a Great Lakes Perspective
Includes a definition of the problem, what we know and where we need to go to develop integrated monitoring for the basin
- 4:30 p.m. – 5:30 p.m. *Plenary Session*
■ Concluding remarks, including reports from the four workshop sessions

Following the Biennial Meeting, the Forum for Remedial Action Plan Coordinators will be held in Toledo on Thursday, November 19 and Friday, November 20. All Biennial Meeting participants are invited to attend the forum.

For further information about the Biennial Meeting, please contact Sally Cole-Misch, Public Affairs Officer, IJC Great Lakes Regional Office, 100 Ouellette Avenue, Eighth floor, Windsor, ON N9A 6T3 or P.O. Box 32869, Detroit, MI 48232. Call (519) 256-7821 in Canada or (313) 226-2170 in the U.S.



International Joint Commission
Commission mixte internationale

Biennial Meeting on Great Lakes Water Quality
November 16, 17 and 18, 1987
Radisson Hotel and SeaGate Centre, Toledo, Ohio

REGISTRATION, DINNER AND LUNCHEON REQUEST

Please complete the following and return as soon as possible. Copies of the 1987 Great Lakes Water Quality Board and Science Advisory Board reports will be mailed to everyone who has registered prior to OCTOBER 1, 1987.

Return registration and hotel form to: Ms. Rita Kerner
International Joint Commission, U.S. Section
2001 S Street, N.W.
Washington, D.C. 20440

NAME: _____ ADDRESS: _____

CITY, STATE/PROVINCE: _____ ZIP/POSTAL CODE: _____

AGENCY/ORGANIZATION (if applicable): _____

TELEPHONE NUMBER(S): _____

☐ I will be attending the 1987 Biennial Meeting: ☐ November 16 ☐ November 17 ☐ November 18

☐ I am most interested at this time in attending the following workshops:

Tuesday: ☐ The Great Lakes Water Quality Agreement

or ☐ Lake Levels Workshop

Wednesday: ☐ The Remedial Action Plan Process

or ☐ Toward Integrated Monitoring – A Great Lakes Perspective

☐ I will be accompanied by _____ and wish

☐ shared or ☐ separate accommodations.

☐ I/we will arrive by ☐ car ☐ train, bus or ☐ air at _____ a.m./p.m., on _____
and will depart on _____

☐ I/we would like to stay at the new Radisson Hotel (the Conference Hotel), and have enclosed the hotel registration form.

☐ I/we would like information about other hotels.

A registration fee is not charged for the Biennial Meeting, but there are two ticketed events: dinner Tuesday and lunch on Wednesday. A limited number of additional tickets are available and must be purchased in advance.

☐ I would like _____ ticket(s) for Dinner, Tuesday evening at \$12.00 U.S.

☐ I would like _____ ticket(s) for Lunch on Wednesday at \$10.00 U.S.

☐ Enclosed is my cheque, money order/bank draft for the meals, made payable to 1987 BIENNIAL MEETING in the amount of \$ _____. – Please indicate any diet or other requirements that may need planning in advance.

☐ I am interested in attending the Forum for Remedial Action Plan Coordinators on November 19-20, 1987. Please send additional information.

☐ I would like further information about having an exhibit at the Biennial Meeting. Please send an exhibit registration form.

☐ I would like to receive the 1987 board reports in ☐ French ☐ English.



TOLEDO, at the western end of Lake Erie and at the mouth of the Maumee River, is celebrating its Sesquicentennial in 1987. It is Ohio's fourth largest city with a population of 342,600. Toledo is the third largest grain shipping port on the Great Lakes and the most diversified cargo port in the country.

It is also conveniently located in the heart of the Great Lakes basin. Toledo has its own airport, and regularly scheduled bus service is available to Toledo from Detroit Metropolitan Airport. Windsor's Airport is only one hour away, and bus service can be scheduled if there is enough interest from Biennial Meeting participants.

☐ I would be interested in using the bus shuttle service from Detroit Metropolitan Airport.

☐ I would be interested in using the bus shuttle service from the Windsor Airport.

Some of Toledo's many attractions include:

- The Toledo Zoological Gardens, open year-round with more than 2,000 animals, reptiles and birds within its 30-acre park and gardens.
- The Toledo Museum of Art, founded in 1901 by the glass magnate, Edward Drummond Libbey. Rated as one of the top ten museums in the United States, the Glass Gallery has a 5,000-piece exhibit that chronicles the history of glass from the dawn of civilization to the present.
- Portside is on the waterfront in downtown Toledo. The revitalization of Toledo began nine years ago when the SeaGate project was launched, and the dramatic process is still underway. An important part of the new development is Portside, with 70 shops and restaurants of extraordinary variety.

A book of vouchers for Portside, along with other information on Toledo, will be available at a specially staffed reception desk in the Biennial Meeting registration area.

ON THURSDAY, NOVEMBER 19, a three-hour tour is planned in conjunction with the Forum for Remedial Action Plan Coordinators, followed by dinner at Tony Packo's, a famous Toledo restaurant. The tour will include visits to several sites along the Maumee River, including combined sewer overflow areas, examples of no-till farming, landfills and general overviews.

☐ I would be interested in attending the three-hour tour.

The City of Toledo is looking forward to hosting the IJC's Biennial Meeting on Great Lakes Water Quality and to show you all the city has to offer, so register soon for an interesting and fun time in Toledo in November!

BOOKSHELF

Two new publications are available from the International Joint Commission. A *Directory of Great Lakes Education Material* was produced as a result of surveys completed by a sub-committee of the Science Advisory Board in 1984 and 1986. As a result of input from these surveys, the directory provides a listing of books, kits, audio-visual materials, newsletters and other materials for use by educators and others interested in providing information on the Great Lakes Basin Ecosystem. Limited copies are available, so they will be sent on a first-come, first-serve basis.

The Great Lakes: A Vital Resource Worth Protecting is an eight-page brochure that updates actions and directions taken as a part of the 1978 Great Lakes Water Quality Agreement. The IJC's role in managing and preserving the Great Lakes ecosystem is also explained.

Both publications are available through Information Services, IJC Great Lakes Regional Office, 100 Ouellette, Eighth floor, Windsor, ON N9A 6T3 or P.O. Box 32869, Detroit, MI 48232. Call (519) 256-7821 in Canada or (313) 226-2170 in the U.S.

The Sierra Club coordinated with several other organizations, including Great Lakes United, Citizens for a Better Environment, Pollution Probe, West Michigan Environmental Action Council and the Lake Michigan Federation, to produce a report on toxic air pollution in the Great Lakes. The report, which was released in March, outlines several deficiencies in U.S. and Canadian organizational and legal arrangements to control toxic air emissions into the lakes.

It cites, for example, that at least 20 percent of the total toxics entering the Great Lakes come from atmospheric sources, yet little coordination exists between air and land-based pollution controls in either country. Sources and control strategies are reviewed, regulatory recommendations are provided for both countries, and research needs are outlined. A copy of the report, *Toxic Pollution in the Great Lakes Basin: A Call for Action*, is available from the Sierra Club's Midwest Office, 214 N. Henry, Suite 203, Madison, WI 53703. (608) 257-4994.

Great Lakes United has also published a report on the status of Great Lakes water quality, as a result of citizens' comments from 19 public hearings the organization held throughout the basin in 1986. *Unfulfilled Promises: A Citizen's*

Review of the International Great Lakes Water Quality Agreement summarizes the views expressed at the hearings and provides "recommendations for actions to protect and clean up the Great Lakes Basin Ecosystem."

Copies of the 90-page report are available from Great Lakes United, 24 Agassiz Circle, Buffalo, NY 14214. (716) 886-0142.

Every school district in the Great Lakes watershed will receive a joint publication between the U.S. Environmental Protection Agency (EPA), Environment Canada, Brock University and Northwestern University entitled, *The Great Lakes, An Environmental Atlas and Resource Book*. This booklet provides extensive written and graphical information on almost every aspect concerned with the Great Lakes: physical characteristics and history; natural processes; human use; effects and concerns of pollutants; joint management of the lakes; and the future of the Great Lakes. A large poster of the Great Lakes basin is also included.

Limited copies of the atlas are available from U.S. EPA, Great Lakes National Program Office, 230 South Dearborn Street, Chicago, IL 60604, (312) 645-0901 or Great Lakes Environment Program, Conservation and Protection, Ontario Region, Environment Canada, 25 St. Clair Avenue East, Toronto, ON M4T 1M2.

The Great Lakes Commission has recently published two informational booklets on Great Lakes water levels. *Water Level Changes* introduces the reader to factors which influence lake levels and outlines potential modifications to the system. *Great Lakes Shore Erosion and Flooding Assistance Programs* reviews U.S. programs on the state and federal level, including permit and fee requirements for shoreline erosion control. Copies of both reports are available from the Great Lakes Commission, 2200 Bonisteel Boulevard, Ann Arbor, MI 48109. (313) 665-9135.

Carswell Legal Publications has released *Cross-Border Litigation, Environmental Rights in the Great Lakes Ecosystem*, written by Paul R. Muldoon, from the Canadian Environmental Law Research Foundation. The book is intended to be the "first in a series of examinations of the problem of ecosystem environmental protection in the face of political and administrative jurisdictional adversity." As such, it provides a comprehensive review of barriers to actions for transboundary environmental

injury and to cross-border litigation under environmental legislation. It also focuses on the need for an ecosystem perspective and how an ecosystem law for litigious rights can be created in the Great Lakes basin.

For ordering information, contact Carswell Legal Publications, 2330 Midland Avenue, Agincourt, ON M1S 1P7. (416) 291-8421.

The Pollution Probe Foundation has updated its *Great Lakes Toxics Hotspots Poster* for the Great Lakes basin. The statistics on the poster are based on 1985 levels of compliance, and show 343 sites where discharges are exceeding permit levels (for industries and municipalities) or where hazardous waste sites pose a danger of contamination to the system. Eighteen of the Areas of Concern, which are considered most severe in their level of environmental degradation, are also highlighted.

Copies of the brightly colored poster are available from Pollution Probe, 12 Madison Avenue, Toronto, ON M5R 2S1. (416) 926-1907.

Great Lakes Travel & Living is a new monthly magazine that focuses on activities and places in the region for recreational use or general interest. Subscriptions for the publication have grown significantly since its inception in mid-1986, and each publication includes an extensive calendar of events for the entire basin. Produced by the Great Lakes Publishing Company, subscriptions are available for \$23.90 U.S. funds from their office at P.O. Box 423, Mt. Morris, IL 61054.

The Center for Environmental Interns Programs (CEIP) Fund, a national, nonprofit organization that develops and coordinates environmental positions for college students and graduates, has published a synopsis of information from an environmental careers conference it cosponsored with the University of Michigan School of Natural Resources in November 1986. The conference featured over 30 environmental professionals from government agencies, corporations and nonprofit organizations and provides insight into education, work experience and job search techniques. The publication is designed for students, faculty, advisors and others interested in environmental protection and management. Copies can be ordered for \$10.95 U.S. funds to the CEIP Fund, 332 The Arcade, Cleveland, OH 44114. (216) 861-4424.

"Commitment is the Key," According to Students Involved in Rouge River Watershed Education Project

by Sally Cole-Misch

Nose plugs, goggles and plastic gloves were optional equipment – but recommended – for many of the metropolitan Detroit area high school biology students who spent two weeks in mid-May learning about the Rouge River and the parameters of water quality. Classes from 16 high schools in three counties travelled to local sites to collect river water and analyze it according to nine parameters (for a complete outline of the program, see *Focus*, Volume 12, Issue 1, page 12).

The continuing program is sponsored by the Friends of the Rouge, a nonprofit organization formed in 1986 as a part of efforts to restore the river. The Rouge River is considered one of the most severely degraded waterways on the International Joint Commission's (IJC's) list of 42 Areas of Concern.

The educational monitoring project is considered the first of its kind in the United States, and organizers say a key goal is to involve students in environmental cleanup projects throughout their educational careers so that a commitment is developed – as teenagers and as adults – to protect the area's natural resources.

That kind of commitment was clearly evident when students and teachers from all 16 schools gathered for a one-day workshop May 16, 1987 to compare results of their investigations and discuss possible solutions to the pollution in the Rouge River. Sources of pollution along the river were identified as increased urban runoff, which contributes salt and motor oils; combined sewer overflows (CSOs), some of which were found to be illegally contributing pollution into the river even in dry weather periods;



Students collected water samples, tested them, and analyzed results during the two-week project.

increased fertilizer use by homeowners and farmers; industrial dumping and discharges; construction and resulting erosion problems; and dumping of solid wastes. A general lack of interest, awareness and commitment by the area's citizens and governmental agencies to these pollution problems was also cited as a major issue that must be resolved.

By dividing into working groups, the students brainstormed ideas to generate solutions to particular issues of concern. All workshop participants agreed that the most important step in cleaning up the Rouge River is to increase citizen involvement in the problem. The students felt that as more people become involved and realize the extent of the problem and the potential for remediating the river, more support will be generated and funds will be found to clean up the waterway. They also stressed that with this increased involvement, more citizens will

realize how their own lifestyles affect their surroundings and will be more willing to change their actions to protect the Rouge River.

Some of the ideas the students developed over the afternoon included structural and enforcement revisions, such as developing separate storm and sewer systems for the region; providing greater control of source inputs from CSOs and industrial and municipal discharges; and developing county planning centers to regulate uses of the river according to restrictions for the entire watershed.

Possible activities discussed to increase citizen involvement included:

- increasing media exposure to explain why the Rouge River must be restored; sponsoring walks or "workathons" in which participants obtain donations for number of hours spent cleaning up the river;

- starting neighborhood watches to report and stop dumping of oils, garbage and other pollutants;
- holding community meetings to generate awareness and educate citizens as to where the water goes after it has gone down the drain;
- informing younger students about the Rouge River project, and generating their enthusiasm to participate in the cleanup;
- pushing for enforcement of laws by writing legislators, policymakers and local agencies;
- setting examples by "cleaning up our own acts";
- providing positive examples, through the media and in personal conversations, of what benefits will be accrued from restoring the Rouge River.

The second phase of the Interactive Environmental Education Project for the Rouge River Watershed will begin this fall, when social studies classes in all 16 schools will discuss the socioeconomic considerations for the Rouge River basin. Students and teachers will participate in decision-making scenarios, moral dilemma role playing and activities about public and private institutional responsibilities for the watershed. The Confer computer system will be used throughout the program to allow opportunities for exchange between the schools. An expanded water monitoring program is scheduled for the schools next spring, and all materials will be coordinated between the social studies and science classes.

Phase three will expand the program into a state, national and international computer-based exchange program of water quality information within various watersheds, as well as independent or planning investigations. While phases one and two will continue for the Rouge River, similar projects will be coordinated in other watersheds throughout the Great Lakes basin in order to develop an international network of students comparing

research results and ideas on how to restore and protect their particular water systems. Annual student congresses also are planned that will bring participants together to share data and develop recommendations to improve water quality throughout the ecosystem.

To find out how to become involved in the Interactive Water Monitoring Project, contact Mark Mitchell, 506 West Williams, Ann Arbor, MI 48103. (313) 761-7034.

EVENTS

INTERNATIONAL JOINT COMMISSION

Schedule of Meetings

The following includes upcoming meetings scheduled by the Commission and its various boards. Please contact an IJC office for further information.

July	8-9	Human Health Effects Committee Windsor, ON
	9-10	Water Quality Programs Committee Windsor, ON
	10	SAB Executive Committee Windsor, ON
	13	Atmospheric Deposition Workshop Planning Committee Windsor, ON
	13-14	Remedial Options Work Group Burlington, ON
August	15	Atmospheric Deposition Monitoring Task Force Toronto, ON
	6	Sediment Subcommittee and Aquatic Ecosystems Objectives Committee, Joint Chairperson Session Windsor, ON
	17	Remedial Options Work Group Green Bay, WI
	18	Sediment Subcommittee Green Bay, WI
	19	Assessment Work Group Green Bay, WI
	20	Surveillance Work Group Windsor, ON
	25-26	Council of Great Lakes Research Managers Windsor, ON

September	9-10	IJC Executive Meeting Washington, DC
	9-11	Science Advisory Board Toronto, ON
	21-22	Aquatic Ecosystems Objective Committee Montreal, PQ
October	29-30	St. Croix Water Quality Workshop St. Andrews, NB
	6-8	IJC Semi-Annual Meeting Ottawa, ON
	23	Science Advisory Board Executive Committee Windsor, ON
November	16-18	IJC 1987 Biennial Meeting Toledo, OH
	16-19	Science Advisory Board Toledo, OH
	19-20	Second Forum for Remedial Action Plan Coordinators Toledo, OH
December	8-10	IJC Executive Meeting Washington, DC

General Conferences

The Soil Conservation Society of America will hold its 42nd annual meeting August 2-5, 1987 in Billings, Montana. This year's theme, "Forces Shaping Resource Management," will focus on eight areas, including changing values in public land management, growing concern over international transboundary issues, increasing public attention to water quality and quantity issues, and the economic and ethical motivations for conservation.

For information on attending the conference or receiving abstracts of presented papers, contact Dave Unger, Soil Conservation Society of America, 7515 Northeast Ankeny Road, Ankeny, IA 50021. (515) 289-2331.

The 117th Annual Meeting of the American Fisheries Society is scheduled for September 11-17, 1987 at the Benton Convention Center, Winston-Salem, North Carolina. For information, contact Carl Sullivan, Executive Director, AFS, 5410 Grosvenor Lane, Bethesda, MD 20814. (301) 897-8616.

The Wisconsin section of the American Water Works Association will hold its annual meeting September 16-18, 1987 in Wausau, Wisconsin. Issues of interest will include how the quality of the water source affects the production of high quality drinking water, the effect of groundwater on water quality of the Great Lakes, and the effect of nonpoint source pollution on groundwater and surface water supplies.

For information about the meeting, contact Thomas J. Konrad, Superintendent of Utilities, City of Oshkosh, P.O. Box 1130, Oshkosh, WI 54902. (414) 236-5172.

The U.S. Environmental Protection Agency, the American Academy of Environmental Engineers, the National Science Foundation and the NUS Corporation will cosponsor the "Second Annual Conference on New Frontiers for Hazardous Waste Management" September 27-30, 1987 in Pittsburgh, Pennsylvania. More than 60 papers from all over the world will be presented to discuss the latest research, developments and demonstrated experiences for alternative technologies. Session themes include thermal destruction, physical/chemical treatment, biological treatment, land disposal and recycle/reuse/minimization.

Advance registration fees will be discounted through September 11, 1987. For additional information, contact Lynne Casper or Debra Wroblewski, NUS Corporation, Park West Two, Cliff Mine Road, Pittsburgh, PA 15275. (412) 788-1080.

The Center for the Great Lakes will present the "Lake and River Levels/Shoreline Management Conference" from September 30 to October 2, 1987 at the Amway Grand Plaza Hotel in Grand Rapids, Michigan. Municipal and provincial officials and attorneys are encouraged to attend the three-day seminar, where innovative shoreline management projects and other topics will be discussed. For more information, contact Madelyn Webb at the Center's Toronto office at 3 Church Street, Suite 500, Toronto, ON M5E 1M2, (416) 860-1730; or The Center for the Great Lakes, 435 North Michigan Avenue, Suite 1408, Chicago, IL 60611. (312) 645-0901.

Plans are well underway for a "Children's Environmental Festival" at the Harbourfront in Toronto, Ontario from September 30 through October 4, 1987. More than 6,000 children in grades four through six are expected to attend the festival, which will include displays, working models, exhibits, theatrical productions, games, music and hands-on learning activities. While school groups will be scheduled to attend for the first three days, the general public is welcome to attend October 3-4.

For further information about the festival, contact Don Houston, Program Coordinator, Children's Environmental Festival, 208 Bloor Street West, Suite 603, Toronto, ON M5S 1T8. (416) 963-8219.

"DIOXIN '87" is the title of the seventh international symposium on chlorinated dioxins and related compounds, sponsored by the U.S. Environmental Protection Agency, Toxicological and Environmental Chemists, University of Nevada - Las Vegas, another sponsor, will host the event on October 4-9, 1987, which is to focus on risk assessment and risk management themes. Registration and other materials are available from DIOXIN '87 Program Committee, c/o Environmental Research Center, University of Nevada - Las Vegas, Las Vegas, NV 89154.

Environment Canada's Technology Development and Technical Services Branch has organized several workshops and conferences to address a diverse range of environmental protection and pollution control issues. Some upcoming conferences include:

- | | |
|------------------|--|
| Oct. 1-2, 1987 | Information Exchange Workshop on Municipal Wastes Incineration
Montreal, Quebec |
| Oct. 9-11, 1987 | Ninth Canadian Conference on Waste Management
Edmonton, Alberta |
| Nov. 10-11, 1987 | 10th International Symposium on Wastewater Treatment
Montreal, Quebec |
| Nov. 11-13, 1987 | 14th Aquatic Toxicity Workshop
Toronto, Ontario |

To obtain more information about these or other scheduled conferences, contact Lise Gendron or Valerie Johnston, Environment Canada, Technology Development and Technical Services, Conservation and Protection, 12th floor, Place Vincent Massey, Hull, PQ K1A 0H3. (819) 997-3405 or (819) 953-1190.

"Showcase for Environmental Education Excellence: Gaining Momentum for the Challenge Ahead" is the theme of the 16th annual conference of the North American Association for Environmental Education (NAEE). This year's meeting will be held at Le Chateau Frontenac in Quebec City, Quebec, from October 16 to 21, 1987. More than 100 concurrent sessions will allow for presentation of several environmental education topics; seminars, displays and software presentations are also planned.

More information and registration packets are available from NAEE Headquarters, P.O. Box 400, Troy, OH 45373. (513) 698-6493.

Conclusions Reached at a Workshop on Effectiveness of Great Lakes Research Programs

by Fahmy K. Fahmy

The Council of Great Lakes Research Managers of the International Joint Commission (IJC) held a workshop in November 1985 to review the effectiveness of Great Lakes research programs, using polychlorinated biphenyls (PCBs) as a case history. Papers presented by invited speakers and discussions held at the workshop helped participants develop conclusions in 11 key areas. Highlights of some of these conclusions are included below. Complete proceedings from the workshop will be available this fall, and another review of the workshop can be found in FOCUS, Volume 11, Issue 1, page 13.

Human Exposure

Five major non-occupational routes of human exposure to contaminants contribute to the total amount of contaminants in each person's body: air, drinking water, soil, food and consumer products. Relative contributions from these various sources are still unclear. Most recommended maximum exposure limits or acceptable daily intake of chemicals for humans are based on only two of these routes: drinking contaminated water or eating contaminated food, or fish specifically. Limited reference is given to other routes of human exposure.

Growing evidence is pointing to significant amounts of exposure to persistent toxic chemicals in different kinds of food and in a variety of

consumer products. Thus workshop participants concluded that more research effort should focus on determining relative contributions of the various routes of human exposure to contaminants, and that other sources of exposure should be considered when maximum exposure limits or acceptable intake doses are established.

Sources

Toxic chemicals enter the Great Lakes from many sources: tributaries, industrial and municipal point sources, urban and agricultural runoff, groundwater, sediments and atmospheric deposition. Research efforts have had considerable success in monitoring and controlling inputs from point sources, but little progress has occurred in controlling inputs from diffuse sources. Scientists need to seek more innovative approaches and techniques to track and monitor contaminant inputs from diffuse sources into the Great Lakes, particularly from atmospheric deposition, groundwater and tributaries.

Ecological Effects

PCB studies have shown that Great Lakes biota can be altered structurally and/or functionally when exposed to persistent toxic chemicals. For example, increased mortality of chinook salmon and reduced rates of survival of lake trout fry have been tied to exposure to PCBs and DDT; nine of 13 fish-eating bird species have shown decreases in eggshell thickness (which affect reproduction rates) due to exposure to PCBs and DDE in the Great Lakes.

Toxicological effects of individual chemicals have been studied extensively in the laboratory, but little data are available to define effects from chemical mixtures, particularly from field studies, which can provide a more realistic assessment of the health of the ecosystem. Based on discussions on this topic, workshop participants determined

that laboratory and field studies are needed to assess the effects of mixtures of persistent toxic chemicals on aquatic organisms.

Human Health Effects

PCB levels in human tissue vary widely among individuals depending on the extent of exposure. A recent study conducted in Michigan indicated that PCB levels in humans correlate with the quantity and type of Great Lakes fish consumed. The study also indicated a direct correlation between PCB concentrations in the body and the period of exposure. For example, the longer the individuals had been consuming fish, the greater were the PCB levels in their blood serum.

The research also indicated that each individual has a baseline level of PCBs circulating in his or her body. This baseline will surge shortly after each new exposure to an additional dose of PCBs, e.g. after eating a meal of contaminated

fish, and the elevated concentration can reach critical levels.

Although PCBs are not primary carcinogens, they are believed to promote the growth of tumors. Since they also bioaccumulate and are persistent, there is concern about their potential long-term effects on human health. The conclusion thus was reached that collaborative research is needed to develop a reliable data base on levels of contaminants in human bodies and to correlate these levels with observed physiological impairments, genetic aberrations and any other medical problems.

For further information about the workshop or the Council of Great Lakes Research Managers, contact Fahmy K. Fahmy, Toxicologist, IJC Great Lakes Regional Office, 100 Ouellette Avenue, Eighth floor, Windsor, ON N9A 6T3 or P.O. Box 32869, Detroit, MI 48232. (519) 256-7821 in Canada or (313) 226-2170 in the U.S.

International Cooperation is Needed to Restore the St. Lawrence River

by John Hartig

Imagine you are an astronaut orbiting earth. From that vantage point, you have an unobstructed view of the Great Lakes and St. Lawrence basin, from the western tip of Lake Superior to the mouth of the St. Lawrence River as it flows past the peninsula of Gaspé. It is from this perspective you realize that all the water of these five inland seas flows into the Atlantic Ocean via the St. Lawrence River.

The 860 kilometer (534 mile) long St. Lawrence River was the subject of an international conference in Montreal, Quebec on May 29-31, 1987. Organized by La Société Pour Vaincre La Pollution, the conference was organized to discuss



INTERNATIONAL MEETING ON THE ST. LAWRENCE RIVER

protection of the St. Lawrence River as an international resource, uniting both Canadians and Americans in the effort. Approximately 200 people, including environmentalists, sport and commercial fishers, navigators, government representatives, consultants and scientists, attended to exchange

information and views. The conference included an opening address focused on Canadian and U.S. views to protect the St. Lawrence River; five workshops (citizen involvement, role of government, industrial discharges, effects of toxic substances, international agreements); a plenary session summarizing conclusions from the five workshops; and a keynote address from Quebec Environment Minister Clifford Lincoln on the value of protecting the St. Lawrence River as part of the historical and ecological heritage of the provinces of Ontario and Quebec and the state of New York.

Highlights of conclusions from the conference include:

- a) concerned citizenry has an important and vital role to play in the restoration of the St. Lawrence River;
- b) there must be international cooperation;
- c) contaminants from Lake Ontario (i.e. mirex) are bioaccumulating in St. Lawrence River fishes;
- d) contaminants from Cornwall, Ontario (mercury) and Massena, New York (PCBs) are contributing to problems in Quebec waters of the St. Lawrence River (i.e. Lac St. Francois);
- e) New York and Ontario are developing a remedial action plan to restore beneficial uses in the international section of the St. Lawrence River downstream of Cornwall/Massena;
- f) more work is needed on wildlife pathology;
- g) there is a need for dissemination of environmental data in an understandable fashion;
- h) concern was raised that Quebec does not have a permit system for wastewater discharges;
- i) uniform health advisories are needed on consumption of fish from the St. Lawrence River; and
- j) concern was raised for the 90% reduction in the Beluga whale population below Quebec City.

All conference participants agreed that they benefitted from this unique international opportunity to exchange information, views and plans for the restoration of the St. Lawrence River. However, they

felt that greater emphasis must be placed on international cooperation, and a challenge for such was passed on to each of the Canadian, United States, Quebec, Ontario and New York governments present at the conference.

For further information on the conference or on the St. Lawrence River, contact Daniel Green, La Société Pour Vaincre La Pollution, P.O. Box or C.P. 65, Place D'Armes, Montreal, PQ H2Y 3E9. (514) 844-5477.

Eutrophication and Toxic Substances Contamination Identified as Major Problems for Saginaw River and Bay

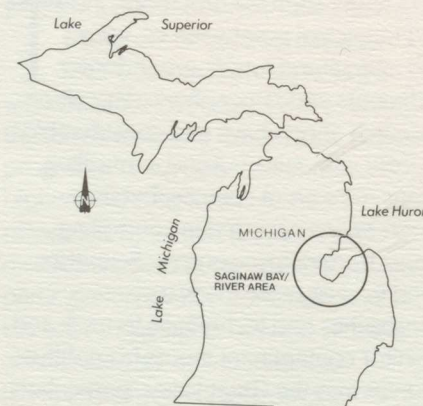
by John Hartig

This is the sixth in a series of articles highlighting the development of remedial action plans for restoring beneficial uses in Areas of Concern in the Great Lakes basin.

Saginaw Bay is the 2,947 square km (1,138 square mile) western extension of Lake Huron in the east central portion of Michigan's lower peninsula. As with most other Areas of Concern, major problems identified in Saginaw River/Bay include cultural eutrophication and toxic substances contamination.

Elevated phosphorus inputs to Saginaw Bay have created eutrophic conditions which favor nuisance species of algae. Phosphorus target loads were established by the International Joint Commission (IJC) in 1978 to control cultural eutrophication problems in Saginaw Bay. Significant reductions were achieved in municipal phosphorus loadings to Saginaw Bay, and the bay has responded with improvements in water quality.

Despite progress in controlling municipal phosphorus inputs, additional efforts are required to control nonpoint sources of phosphorus to meet the target load of 440 tonnes (485 tons) per year for Saginaw Bay. The State of Michigan is currently developing a phosphorus management strategy, including an implementation schedule, to achieve the



necessary reductions.

The other major problem in Saginaw River/Bay is toxic substances contamination. Toxic substances have contaminated the sediments in Saginaw River/Bay, have negatively impacted biota, and also resulted in the issuance of health advisories on certain fish. For example, sediments downstream of Saginaw and Bay City, Michigan are heavily contaminated with PCBs and heavy metals. A potential source of PCBs to the Saginaw River is the General Motors plant in Bay City, where between 27 and 54 tonnes (30 and 60 tons) of PCBs have been released from the plant and now reside in and on the land adjacent to the Saginaw River.

In addition, the incidence of cross-beak syndrome in common tern colonies in Saginaw Bay is higher than background levels and second only to Green Bay in the entire Great Lakes ecosystem. Toxic substances contamination may be causing this elevated incidence of

cross-beak syndrome in common terns. Recreational use of the Saginaw River/Bay has been restricted as a result of contaminant levels. Current fish health advisories issued include:

- do not eat any carp or catfish from either Saginaw River or Bay;
- restrict consumption of lake trout, rainbow trout and brown trout from Saginaw Bay;
- nursing mothers, pregnant women, women who anticipate bearing children, female children of any age and male children age 15 or under should not eat any lake trout, rainbow trout or brown trout from Saginaw Bay.

It should also be noted that a severe flood occurred throughout the central portion of the lower peninsula of Michigan in 1986, which undoubtedly caused considerable movement of contaminated sediment throughout the watershed. Investigations are needed to determine how this major flood affected contaminant distribution within Saginaw River/Bay and the impacts on biota.

The development of the Saginaw River/Bay Remedial Action Plan (RAP) represents a challenging departure from most historical pollution control efforts, where separate programs for regulation of municipal and industrial discharge, urban runoff and agricultural runoff were implemented without considering overlapping responsibilities. This new process will thus call upon the talents available in a wide array of programs far beyond those traditionally associated with water pollution control. The RAP must include consideration of municipal and industrial wastewater discharges, combined sewer overflows, hazardous waste sites, nonpoint sources of pollution, groundwater, fisheries and wildlife habitat, contaminated sediments, and land and recreational uses. Including and involving the local citizenry in the development of the Saginaw River/Bay Remedial Action Plan is key to ensuring a credible product is produced and indeed will be implemented.

Public Participation is Emphasized in Saginaw River/Bay RAP

by Richard Moore

The Saginaw River/Bay Area of Concern, due to the enormous geographical area involved, may prove to be among the most complex problems addressed by a remedial action plan (RAP) in the Great Lakes region. Although the Area of Concern is limited to the 35 km (22 mile) length of the Saginaw River and the 2,947 square km (1,138 square mile) expanse of Saginaw Bay, these bodies are jointly fed by a watershed covering over 20,720 square km (8,000 square miles) in Michigan's lower peninsula.

Potential sources of pollutants, particularly phosphorus, may be scattered throughout this watershed. To achieve the goals of the RAP process despite the magnitude of the potential source area, planners involved in preparing the Saginaw River/Bay RAP are emphasizing two important aspects of their activities: the drafting of a sound technical document and the active solicitation of public opinion and support for the plan.

Work on the technical document began in October 1986 by the East Central Michigan Planning and Development Region (ECMPDR), a regional planning commission serving 14 counties surrounding the bay. ECMPDR serves as coordinator for the Saginaw River/Bay RAP, according to a contract and direction from the Michigan Department of Natural Resources (MI DNR). To assimilate the large volume of data available on water quality in the Saginaw River/Bay and the many tributaries, ECMPDR is working with seven graduate students from the University of Michigan's School of Natural Resources (UM SNR), under the direction of Dr. Jeffrey Foran of the National Wildlife Federation's Great Lakes Natural Resources Center (NWF) in Ann Arbor,

Michigan. The student team has produced the bulk of the initial draft of the RAP technical document, which will be released to the public in September 1987.

The public participation program began in January 1987 when ECMPDR, UM SNR and NWF held a series of five public meetings in communities around the bay area. Meeting participants were asked to share their concerns about the bay's water quality with members of the planning team, and this input was supplemented with five "key informant" meetings, when representatives from agriculture, industry, local commerce, local government and conservation groups voiced their opinions on issues addressed in the RAP. Public comments from all meetings held will be incorporated into the final draft plan.

As a result of public participation in the RAP process, the Saginaw Basin Natural Resources Steering Committee will be created as a public body to review the technical document and provide oversight on the implementation process. This 45-member steering committee will include representatives from the 22 counties which form the Saginaw Bay drainage basin, and will provide a joint forum for all interest groups with a stake in the management of the bay's many resources.

Although the primary function of the steering committee is to deal with the RAP, it is anticipated that the committee will choose to deal with the much broader range of issues, such as those raised at the recent conference entitled, "A New Way for the Bay: A Workshop for the Future of Saginaw Bay," held March 5, 1987 at Delta College in Delta, Michigan. More than 250 people from throughout the Great Lakes region attended this conference to discuss economic

development, environmental quality and resource management issues.

For more information about the Saginaw River/Bay RAP, contact Richard Moore, Regional Planner and RAP Coordinator, ECMPDR, P.O. Box 930, 500 Federal Avenue, Saginaw, MI 48606. (517) 752-0100 or 800-322-0207.

Saginaw Bay and Drainage Basin Characteristics

Drainage basin size: 20,720 square km (8,000 square miles) over 22 counties

Topography: generally flat lake plain with moraines providing up to 91 m (300 feet) of local relief along the northern, western and southern margins of the basin. Small sand dunes, old beach ridges and river banks provide minor relief elsewhere.

Soils: predominantly clay, with low infiltration.

Land use: roughly 60 percent agricultural, with significant amounts of woodland and urban industrial growth.

Saginaw Bay size: 2,947 square km (1,138 square miles)

Shoreline length: 386 km (240 miles)

Average depth: 4.6 meters or 15 feet (inner bay); 14.6 meters or 45 feet (outer bay)

Volume: approximately 30 billion cubic meters or 6.9 cubic miles

Circulation: generally counterclockwise, although it is easily disturbed by wind and changing seasonal circulation within Lake Huron.

Flushing time: 52 days

Uses:

Water Supply: 45 separate water supply or distribution systems use Saginaw Bay water for more than 300,000 residents.

Waste Assimilation: at least 67 municipal wastewater treatment facilities and hundreds of industrial plants discharge wastewater into tributaries of Saginaw Bay.

Recreation: severely limited, due to pollutant inputs and contaminated sediments (80 percent of pollutant load to bay received from Saginaw River valley). Fish advisories for consumption of salmon, trout, muskie, carp and catfish.

PEOPLE

Several new faces have become a part of the IJC's family of members on the Great Lakes advisory boards. **Elizabeth Dowdeswell** has been appointed Canadian co-chairperson for the Great Lakes Water Quality Board (WQB). Dowdeswell is Environment Canada's Regional Director General for Ontario, and also serves as co-chairperson of the project management team for the Commission's Great Lakes levels study. **Dr. Robert M. McMullen**, Regional Director of the Central and Arctic Region of the Freshwater Institute, Department of Fisheries and Oceans, has also been appointed as a Canadian member to the WQB. **Del Rector**, Deputy Director of Environmental Protection for Michigan's Department of Natural Resources, becomes the new WQB member for that state.

Six new members have joined the Great Lakes Science Advisory Board (SAB). U.S. representatives include: **Dr. Anders Andren**, Professor, Water Chemistry Program, University of Wisconsin; **Dr. John Edinger**, J.E. Edinger Associates, Inc., Pennsylvania; and **Dr. Richard Liroff**, Senior Associate for The Conservation Foundation. New Canadian members include: **Dr. Donald Chant**, Chairperson and President, Ontario Waste Management Corporation; **Dr. Henry Regier**, Institute for Environmental Studies, University of Toronto; and **Sharon Williams**, Osgoode Hall Law School, York University. The Commission welcomes their efforts and input to the activities of both boards.

Great Lakes Science Advisory Board Co-Chairperson **Dr. Al Beeton** is the new director of the National Oceanic and Atmospheric Administration's Great Lakes Environmental Research Laboratory (GLERL) in Ann Arbor, Michigan. Beeton has served as director for the past 10 years of the Great Lakes and Marine Waters Center, an umbrella unit which houses the Michigan Sea Grant College Program and the Great Lakes Research Division. He also held a joint appointment as professor of Natural Resources and Atmospheric and Oceanic Science at the University of Michigan, which he will continue to hold under his new position.

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