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FOCUS

On International Joint
 Commission Activities

COMMISSION APPROVES LIST / DELIST CRITERIA FOR GREAT LAKES AREAS OF CONCERN

At its Executive Session in February, the International Joint Commission approved the following guidelines for listing and delisting Areas of Concern in the Great Lakes Basin Ecosystem. These guidelines are the result of months of work coordinated by the Great Lakes Water Quality Board and input from more than 200 interested citizens and scientists, in response to a request for comments in a previous issue of Focus. The Commission views the agreement on these guidelines as a significant milestone and wishes to thank all those who participated in this valuable process.

The intent of these listing/delisting guidelines is to serve as indicators of use impairment for Great Lakes Areas of Concern and will be used to assist the International Joint Commission (IJC) and its Boards in: 1) making recommendations for new Areas of Concern; and 2) reviewing all stages of remedial action plans (RAPs). These guidelines are intended to establish a consistent "set of yardsticks" that can be uniformly applied throughout the Great Lakes basin. Further, these guidelines are intended to help ensure that the RAP program is properly focused and pragmatic so that it clearly identifies key actions needed to restore uses in order to get maximum benefit out of limited resources.

Annex 2 of the 1987 Protocol to the Great Lakes Water Quality Agreement defines Areas of Concern as geographic areas that fail to meet the



Opening beaches previously restricted for recreational use is one guideline for delisting an Area of Concern.

general or specific objectives of the Agreement where such failure has caused or is likely to cause impairment of beneficial use or of the area's ability to support aquatic life. Impairment of beneficial use is defined as a change in the chemical, physical, or biological integrity of the Great Lakes system sufficient to cause any of the 14 use impairments in Table 1 or other related uses covered by Article IV such as the microbial objective for waters used for body contact recreational activities.

The listing guidelines presented in Table 1 (see pages 4-5) are intended to be used by the IJC and its Boards in making recommendations for new Areas of Concern. Specifically, these listing guidelines should be used in conjunction with the Protocol for Recommending Areas of Concern. It must be recognized that RAPs are intended to address use impairments
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matic approach should be taken in recommending new Areas of Concern.

Again, the intent of these listing/delisting guidelines for Great Lakes Areas of Concern is to assist the IJC and its Boards in fulfilling its responsibilities relative to Areas of Concern/RAPs called for in the Great Lakes Water Quality Agreement. It is recognized that there will undoubtedly be a need to revise these guidelines in the future based on the development of new indicators and standards, and new protocols for application of these guidelines.

Please turn to pages 4-5 to review the Guidelines for Recommending the Listing and Delisting of Great Lakes Areas of Concern (Table 1).

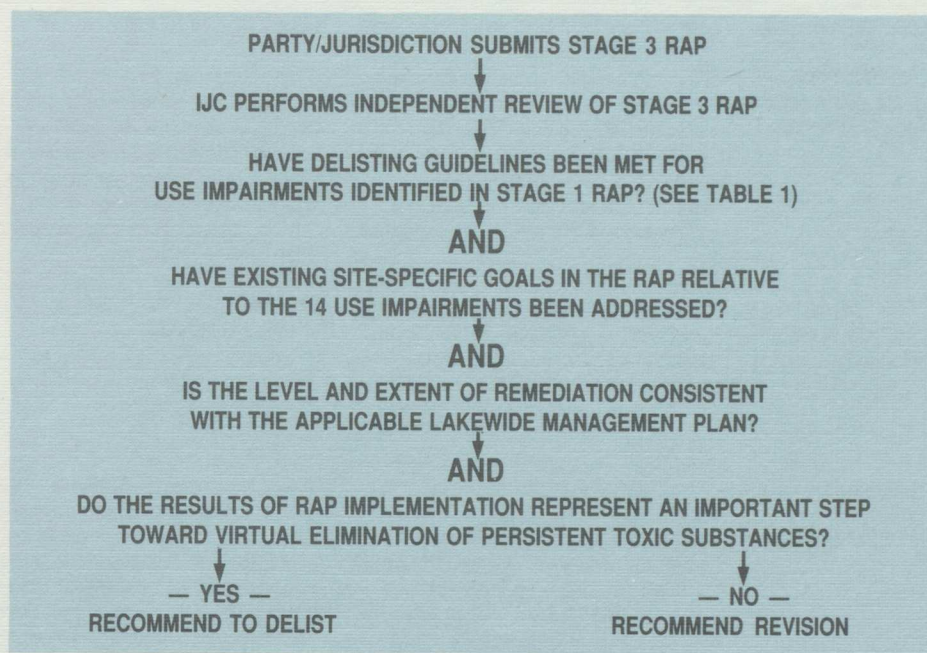


FIGURE 1. A generalized process for IJC review of a Stage 3 RAP and application of guidelines used to make recommendations on delisting Areas of Concern.

AIR BOARD RELEASES REPORT ON DETROIT-WINDSOR REGION'S AIR QUALITY

by E.A. Bailey

In September 1988 the Governments of Canada and the United States asked the International Joint Commission (IJC) to reinstate activities under a 1975 Reference on air pollution in the Detroit-Windsor and Port Huron-Sarnia area. The IJC was specifically asked to examine and report on the actual and potential hazards posed to human health and the environment from airborne emissions in the region.

To assist in developing its pro-

gram under the Reference, the IJC established the International Air Pollution Advisory Board for the Detroit-Windsor and Port Huron-Sarnia region, which presented its report to the IJC last December. Members include Ed Piché (Canadian co-chair), Del Rector (U.S. co-chair), Claire Franklin, Ralph Kummeler, Kim Shikaze and Warren Porter.

The Board focused its attention on human health implications of toxics in the surrounding or ambient air of the region rather than on the environmental impacts of airborne emissions. The Board identified 125 chemicals that required careful review and all known emission data and air monitoring data for these chemicals were compiled. Information on the relevant toxicity of each contaminant was assembled and estimates were made of how widespread the exposure might be to these contaminants. The Board

combined this information, using screening techniques for chemicals that cause cancer, reproductive problems and birth defects, to identify those chemicals from the list of 125 pollutants that it considered to be of the greatest concern in the region.

The Board reported that there is sufficient information to conclude that air toxic chemicals in the region are a significant public health issue requiring additional abatement and preventative measures. The 15 chemicals listed on page 6 were identified as having the highest level of concern with regard to ingestion through breathing the air. They concluded that the highest priority for pollution prevention initiatives should be given to benzene, formaldehyde and 1,3-butadiene.

The region's air concentrations for styrene, chloroform, nickel compounds, xylene, benzene and formal-

Continued on page 6

TABLE 1. GUIDELINES FOR RECOMMENDING THE LISTING AND DELISTING OF

USE IMPAIRMENT	LISTING GUIDELINE	DELISTING GUIDELINE	RATIONALE	REFERENCE
RESTRICTIONS ON FISH AND WILDLIFE CONSUMPTION	When contaminant levels in fish or wildlife populations exceed current standards, objectives or guidelines, or public health advisories are in effect for human consumption of fish or wildlife. Contaminant levels in fish and wildlife must be due to contaminant input from the watershed.	When contaminant levels in fish and wildlife populations do not exceed current standards, objectives or guidelines, and no public health advisories are in effect for human consumption of fish or wildlife. Contaminant levels in fish and wildlife must be due to contaminant input from the watershed.	Accounts for jurisdictional and federal standards; emphasizes local watershed sources.	Adapted from Mack 1988
TAINTING OF FISH AND WILDLIFE FLAVOR	When ambient water quality standards, objectives, or guidelines, for the anthropogenic substance(s) known to cause tainting, are being exceeded or survey results have identified tainting of fish or wildlife flavor.	When survey results confirm no tainting of fish or wildlife flavor.	Sensitive to ambient water quality standards for tainting substances; emphasizes survey results.	See American Public Health Association (1980) for survey methods
DEGRADED FISH AND WILDLIFE POPULATIONS	When fish and wildlife management programs have identified degraded fish or wildlife populations due to a cause within the watershed. In addition, this use will be considered impaired when relevant, field-validated, fish or wildlife bioassays with appropriate quality assurance/quality controls confirm significant toxicity from water column or sediment contaminants.	When environmental conditions support healthy, self-sustaining communities of desired fish and wildlife at predetermined levels of abundance that would be expected from the amount and quality of suitable physical, chemical and biological habitat present. An effort must be made to ensure that fish and wildlife objectives for Areas of Concern are consistent with Great Lakes ecosystem objectives and Great Lakes Fishery Commission fish community goals. Further, in the absence of community structure data, this use will be considered restored when fish and wildlife bioassays confirm no significant toxicity from water column or sediment contaminants.	Emphasizes fish and wildlife management program goals; consistent with Agreement and Great Lakes Fishery Commission goals; accounts for toxicity bioassays.	Adapted from Manny and Pacific, 1988; Wisconsin DNR 1987; United States and Canada, 1987; Great Lakes Fishery Commission 1980
FISH TUMORS OR OTHER DEFORMITIES	When the incidence rates of fish tumors or other deformities exceed rates at unimpacted control sites or when survey data confirm the presence of neoplastic or preneoplastic liver tumors in bullheads or suckers.	When the incidence rates of fish tumors or other deformities do not exceed rates at unimpacted control sites and when survey data confirm the absence of neoplastic or preneoplastic liver tumors in bullheads or suckers.	Consistent with expert opinion on tumors; acknowledges background incidence rates.	Adapted from Mac and Smith, 1988; Black 1983; Baumann et al. 1982
BIRD OR ANIMAL DEFORMITIES OR REPRODUCTIVE PROBLEMS	When wildlife survey data confirm the presence of deformities (e.g. cross-bill syndrome) or other reproductive problems (e.g. egg-shell thinning) in sentinel wildlife species.	When the incidence rates of deformities (e.g. cross-bill syndrome) or reproductive problems (e.g. egg-shell thinning) in sentinel wildlife species do not exceed background levels in inland control populations.	Emphasizes confirmation through survey data; makes necessary control comparisons.	Adapted from Kubiak 1988; Miller 1988; Wiemeyer et al. 1984
DEGRADATION OF BENTHOS	When the benthic macroinvertebrate community structure significantly diverges from unimpacted control sites of comparable physical and chemical characteristics. In addition, this use will be considered impaired when toxicity (as defined by relevant, field-validated, bioassays with appropriate quality assurance/quality controls) of sediment-associated contaminants at a site is significantly higher than controls.	When the benthic macroinvertebrate community structure does not significantly diverge from unimpacted control sites of comparable physical and chemical characteristics. Further, in the absence of community structure data, this use will be considered restored when toxicity of sediment-associated contaminants is not significantly higher than controls.	Accounts for community structure and composition; recognizes sediment toxicity; uses appropriate control sites.	Adapted from Reynoldson 1988; Henry 1988; IJC 1988

GREAT LAKES AREAS OF CONCERN

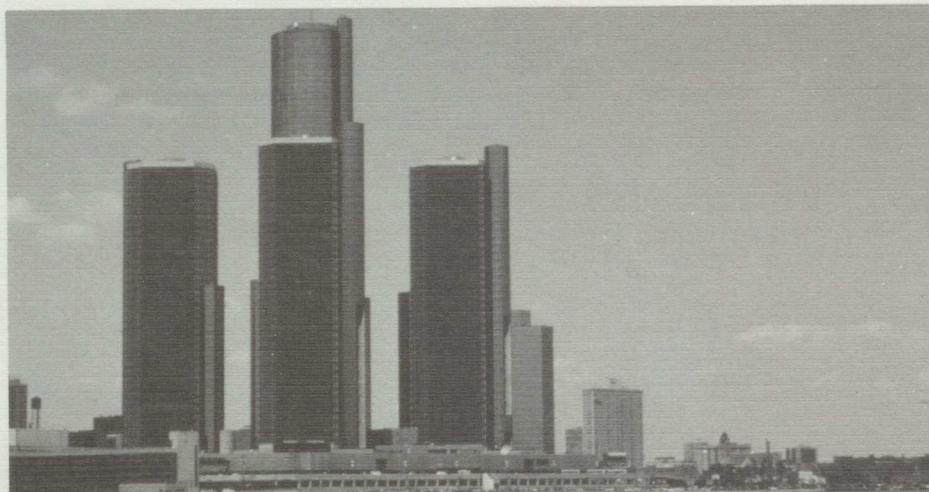
USE IMPAIRMENT	LISTING GUIDELINE	DELISTING GUIDELINE	RATIONALE	REFERENCE
RESTRICTIONS ON DREDGING ACTIVITIES	When contaminants in sediments exceed standards, criteria, or guidelines such that there are restrictions on dredging or disposal activities.	When contaminants in sediments do not exceed standards, criteria, or guidelines such that there are restrictions on dredging or disposal activities.	Accounts for jurisdictional and federal standards; emphasizes dredging and disposal activities.	Adapted from IJC 1988
EUTROPHICATION OR UNDESIRABLE ALGAE	When there are persistent water quality problems (e.g. dissolved oxygen depletion of bottom waters, nuisance algal blooms or accumulation, decreased water clarity, etc.) attributed to cultural eutrophication.	When there are no persistent water quality problems (e.g. dissolved oxygen depletion of bottom waters, nuisance algal blooms or accumulation decreased water clarity, etc.) attributed to cultural eutrophication.	Consistent with Annex 3 of the Agreement; accounts for persistence of problems.	United States and Canada, 1987
RESTRICTIONS ON DRINKING WATER CONSUMPTION OR TASTE AND ODOR PROBLEMS	When treated drinking water supplies are impacted to the extent that: 1) densities of disease-causing organisms or concentrations of hazardous or toxic chemicals or radioactive substances exceed human health standards, objectives or guidelines; 2) taste and odor problems are present; or 3) treatment needed to make raw water suitable for drinking is beyond the standard treatment used in comparable portions of the Great Lakes which are not degraded (i.e. settling, coagulation, disinfection).	For treated drinking water supplies: 1) when densities of disease-causing organisms or concentrations of hazardous or toxic chemicals or radioactive substances do not exceed human health objectives, standards or guidelines; 2) when taste and odor problems are absent; and 3) when treatment needed to make raw water suitable for drinking does not exceed the standard treatment used in comparable portions of the Great Lakes which are not degraded (i.e. settling, coagulation, disinfection).	Consistency with the Agreement; accounts for jurisdictional standards; practical; sensitive to increased cost as a measure of impairment.	Adapted from United States and Canada, 1987
BEACH CLOSINGS	When waters, which are commonly used for total-body contact or partial-body contact recreation, exceed standards, objectives, or guidelines for such use.	When waters, which are commonly used for total-body contact or partial-body contact recreation, do not exceed standards, objectives, or guidelines for such use.	Accounts for use of waters; sensitive to jurisdictional standards; addresses water contact recreation; consistent with the Agreement.	Adapted from United States and Canada, 1987; Ontario Ministry of the Environment 1984
DEGRADATION OF AESTHETICS	When any substance in water produces a persistent objectionable deposit, unnatural color or turbidity, or unnatural odor (e.g. oil slick, surface scum).	When the waters are devoid of any substance which produces a persistent objectionable deposit, unnatural color or turbidity, or unnatural odor (e.g. oil slick, surface scum).	Emphasizes aesthetics in water; accounts for persistence.	Adapted from the Ontario Ministry of the Environment 1984
ADDED COSTS TO AGRICULTURE OR INDUSTRY	When there are additional costs required to treat the water prior to use for agricultural purposes (i.e. including, but not limited to, livestock watering, irrigation and crop-spraying) or industrial purposes (i.e. intended for commercial or industrial applications and noncontact food processing).	When there are no additional costs required to treat the water prior to use for agricultural purposes (i.e. including, but not limited to, livestock watering, irrigation and crop-spraying) and industrial purposes (i.e. intended for commercial or industrial applications and noncontact food processing).	Sensitive to increased cost and a measure of impairment.	Adapted from Michigan DNR 1977
DEGRADATION OF PHYTOPLANKTON AND ZOOPLANKTON POPULATIONS	When phytoplankton or zooplankton community structure significantly diverges from unimpacted control sites of comparable physical and chemical characteristics. In addition, this use will be considered impaired when relevant, field-validated, phytoplankton or zooplankton bioassays (e.g. <i>Ceriodaphnia</i> ; algal fractionation bioassays) with appropriate quality assurance/quality controls confirm toxicity in ambient waters.	When phytoplankton and zooplankton community structure does not significantly diverge from unimpacted control sites of comparable physical and chemical characteristics. Further, in the absence of community structure data, this use will be considered restored when phytoplankton and zooplankton bioassays confirm no significant toxicity in ambient waters.	Accounts for community structure and composition; recognizes water column toxicity; uses appropriate control sites.	Adapted from IJC 1987
LOSS OF FISH AND WILDLIFE HABITAT	When fish and wildlife management goals have not been met as a result of loss of fish and wildlife habitat due to a perturbation in the physical, chemical, or biological integrity of the Boundary Waters, including wetlands.	When the amount and quality of physical, chemical, and biological habitat required to meet fish and wildlife management goals have been achieved and protected.	Emphasizes fish and wildlife management program goals; emphasizes water component of Boundary Waters.	Adapted from Manny and Pacific, 1988

dehyde may have an inadequate margin of safety for human exposure through breathing. These concentrations possibly may result in reproductive problems and birth defects. Chromium, cadmium and arsenic were the only metals found to pose a potential public health problem based on exposure through breathing. The Board also concluded that the concentration of air toxics in the region are similar to other urban areas of comparable size and amount of industry and that not enough information is available to conclude whether or not there is excess illness or death due to exposure to air toxics in the region.

The Board identified 1,688 incinerators in the region, including six with capacities of 18,000 kg/hr or higher, as sources of air pollution. While it concluded that incinerators are emitting pollutants of concern, the Board indicated that data does not provide sufficient information to determine the percentage of the total contaminants in the ambient air that are coming from these specific sources.

Recommendations in the Board's report include:

- regulatory agencies in the region should proceed with pollution prevention initiatives to reduce the emissions of air toxics. Priority should be given to the 15 identified carcinogens of greatest concern.
- Michigan and Ontario should continue to consider the health implications of exposure pathways in addition to breathing, such as exposure through the consumption of water and food, in regulatory decisions. Effects other than cancer, such as reproductive, immune, neurological and endocrine effects should be considered where data are available. Appropriate jurisdictions



Additional control and prevention measures are needed to limit contaminants in air surrounding the Detroit-Windsor and Port Huron-Sarnia region, according to the IJC's Air Pollution Advisory Board.
Credit: Sally Cole-Misch

should promote research activities to develop techniques that consider mixtures, interactions and more sensitive toxicological endpoints.

- A comprehensive air toxic monitoring program should be developed and implemented in the region.
- Existing emission inventory data should be reviewed and the data base upgraded as necessary to identify the sources of air toxics which may adversely impact human health, and implement reduction strategies.
- Emissions from existing incinerators should be reduced through pollution prevention and control initiatives to deal with chemical compounds such as dioxins and furans, metals and hydrochloric acid.

As this issue of *Focus* goes to press, the IJC is scheduling public meetings in the Detroit-Windsor and Port Huron-Sarnia area for mid-March to obtain input on the report. Written comments are also encouraged until April 15, 1991.

Copies of the report can be obtained from any of the three IJC offices. Contact them at 100 Metcalfe Street, 18th floor, Ottawa, ON K1P 5M1, telephone (613)995-2984; 2001 S Street NW, Second floor, Washington, DC 20440, telephone (202)673-6222; 100 Ouellette Avenue, Eighth floor, Windsor, ON N9A/6T3, telephone (519)256-7821 or P.O. Box 32869, Detroit, MI 48232, telephone (313)226-2170.

Fifteen Chemicals of Concern for Inhalation through Breathing

Benzene
Chromium compounds
Formaldehyde
1,3-butadiene
1,4-dichlorobenzene
Nickel compounds
Benzo(a)pyrene
Cadmium

Chloroform
Carbon Tetrachloride
Arsenic compounds
Trichloroethylene
Beryllium
1,2-dichloroethane
Perchloroethylene

PROGRAM AGENDA DEVELOPED FOR 1991 BIENNIAL MEETING

**Traverse City initiatives
abound in preparation for
September 29 - October 2, 1991
Biennial Meeting**

With much enthusiasm and commitment, people in the Traverse City area are organizing to help the IJC present "its best Biennial Meeting yet," in the words of one local citizen. The region has used the meeting as an impetus to develop the Grand Traverse Bay Initiative involving citizens from local, regional and state agencies and a wide variety of interest groups.

The initiative's mission is to "spearhead, coordinate and initiate proactive water quality and environmental protection/education efforts in the Grand Traverse Bay Watershed region in conjunction with the October 1991 International Joint Commission Biennial Meeting and beyond." Grants have been received from various sources to assist with this effort. A local committee along with several issue-specific subgroups are meeting monthly to coordinate planning and implementation.

The local committee will make a presentation on the initiative and other efforts to protect Grand Traverse Bay, one of the last oligotrophic bays in the Great Lakes, during one evening of the Biennial Meeting. The initiative will also be discussed in workshops over the course of the meeting to explore how components of the initiative could be used in other pristine areas around the lakes. Thus their presentation will be worth attending for all meeting participants. The IJC applauds their efforts!

Also scheduled in conjunction with the Biennial Meeting is a RAP Coordinators Forum from Thursday evening, September 26 through Saturday, September 28, 1991. The Biennial Meeting itself will open with presentations from the IJC, its Great Lakes advisory boards and non-government organizations on Sunday afternoon, followed by workshops, public discussion sessions, field trips and other events. Cooperative events are being scheduled by several groups to coincide with the IJC's meeting. These are expected to include a joint US-USSR scientific symposium, a joint US-Canada governmental symposium on pollution prevention, a workshop on the effects of toxic substances on aquatic and wildlife species, and a workshop by the newly formed Council of Great Lakes Industries.

Registration materials and detailed program information will be provided in the next issue of *Focus*, to be sent in early July.



Old Mission Peninsula separates the east and west sides of Grand Traverse Bay.

BRIEFS

Recently appointed by the International Joint Commission to the Great Lakes Science Advisory Board are **Marsha Landolt**, from the University of Washington and **Donald Mallins** from the Pacific Northwest Research Foundation, both in Seattle, Washington. Also appointed are **Ursula Franklin** from the University of Toronto, Toronto, Ontario and **June Fessenden MacDonald** from Cornell University in Ithaca, New York. A term extension was designated for **Linton K. Caldwell** of Bloomington, Indiana.

New members appointed to the Council of Great Lakes Research Managers include **Laure Bensing-Purdie** from Agriculture Canada in Ottawa, Ontario; **Chris Goddard**, Ontario Ministry of Natural Resources, Maple, Ontario; **Douglas Haffner**, Great Lakes Institute, University of Windsor, Windsor, Ontario; and **Judith M. Stockdale**, Great Lakes Protection Fund, Chicago, Illinois. Members whose terms were extended include **Jan A. Miller** (replacing David Roellig), US Army Corps of Engineers, Chicago, Illinois; **Robert Werner**, Great Lakes Research Consortium, Syracuse, New York; and **Grant Gross**, National Science Foundation, Washington, DC.

With strong support from Great Lakes basin governments and regulatory agencies, several industries and associations with interests and investments in the Great Lakes basin have formed the **Council of Great Lakes Industries**. The council will focus on basinwide environmental concerns such as pollution prevention, water quality standards, remedial action plans, technology exchange, zero discharge, critical pollutants, air deposition and improved public education.

For further information on the council write to Dr. Grace Weaver, Program Manager, Environmental Affairs, Rochester Sensitized Products, Kodak Park, Building 26, Rochester, NY 14652.

Directories of "who's who," including their priority issues and activities, are being developed to help groups and agencies build partnerships towards collaborative action.

Health and Welfare Canada and Environment Canada, through contracts with nongovernmental organizations, are publishing **network directories** for regions of the Great Lakes basin. Environment North in Thunder Bay, Ontario will identify environmental and health groups around Lake Superior (contact Chris Clark at (807)344-7346), while Mike Huggard at (519)973-1116 of the Windsor and District Clean Water Alliance will develop a directory of groups and resources active in the Windsor-Detroit, Sarnia-Port Huron, Sault Ste. Marie and Spanish River areas. The Atlantic States Legal Foundation (contact Sue Mihalyi at (315)475-1170) is carrying out a similar contract for Lake Ontario and the lower St. Lawrence River.

Plans still must be made for detailed network building around lakes Erie and Huron. By the end of 1991, networks and updated directories of health and environmental groups and experts are expected to be available for most of the Great Lakes system. For more information on specific areas contact the persons and organizations listed in this article, or call Mary Hegan, Health and Welfare Canada, Environmental Health Centre, Room 136, Tunney's Pasture, Ottawa, ON K1A 0L2. (613)957-1876.

Several free workshops were conducted in 1990 by New York's Department of Environmental Conservation (NYSDEC) to help businesses learn to handle and dispose of their hazardous wastes safely. Many participating companies were in service industries such as auto repair, dry cleaning, painting, printing and schools. Topics covered included hazardous wastes, proper disposal, waste reduction techniques and how to obtain confidential technical assistance. More workshops are planned for 1991.

To receive information on the waste reduction program contact the Bureau of Pollution Prevention, NYSDEC, 50 Wolf

Road, Albany, NY 12233-7253 or dial the Prevention Hotline in New York at (800)462-6553 or (518)457-4105.

A discussion paper outlining recommendations for improving and strengthening **Ontario's Environmental Assessment Act** was released for public review. Public meetings were held in early 1991 to hear comments on the discussion paper. The expert committee is expected to report its findings to Ontario Environment Minister Ruth Grier by the end of May 1991, so that any needed amendments to the act can be passed by the legislature by the end of 1991.

Copies of the discussion paper are available from the Ontario Ministry of the Environment, Public Information Centre, 135 St. Clair Avenue West, Toronto, ON M4V 1P5. (416)323-4321.

An adult female zebra mussel spawns 30,000-50,000 eggs each season, releasing her eggs into open water during the summer. Her release coincides with the males' dispersal of sperm, and fertilization occurs within minutes. Because one-year-old zebra mussels are sexually mature, the mussel population is replenished each summer. Since 1988 the aquatic pests have been choking intake pipes of utilities, water treatment plants and industries along the lakes.

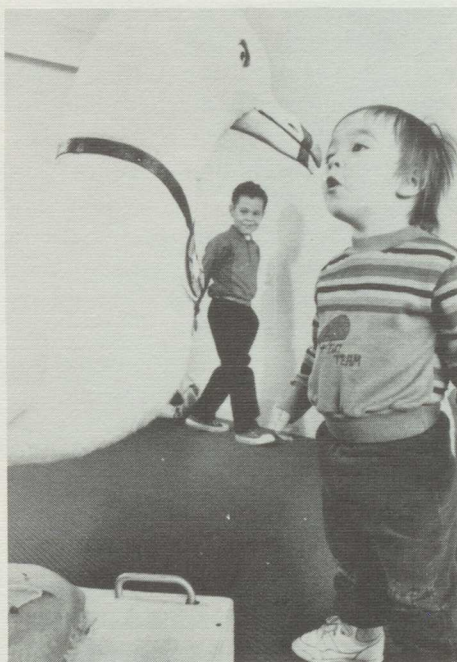
Research from Ohio State University and the Ohio Sea Grant College Program has discovered an inexpensive way to **control zebra mussel infestations** plaguing the Great Lakes: harmless derivatives of the commonly found element potassium. Though lethal to the mussels, potassium phosphate is apparently harmless to most other freshwater animals.

For a copy of the *International Zebra Mussel Research Conference Proceedings* send check for \$2 (US funds) payable to the Ohio State University, Ohio Sea Grant College Program-Publications, The Ohio State University, 1314 Kinnear Road, Columbus, OH 43212-1194. (614)292-8949.

A new provincial drinking water guideline for the chemical N-nitrosodimethylamine (NDMA) has recently been introduced by Ontario Environment Minister Ruth Grier. NDMA is used in plastics, pesticides and lubricating oils and is known to cause cancer in a variety of animal species and is a possible carcinogen to humans. The chemical was first detected in Elmira, Ontario in November 1989 at three and four parts per billion. The proposal revised the previous guideline of 0.014 parts per billion, set by US guidelines, to a more stringent guideline of nine parts per trillion, which represents an incremental lifetime cancer risk of one in 100,000. The proposal will be submitted to Ontario's Advisory Committee on Environmental Standards, which will consult with the public and recommend a final maximum acceptable concentration.

To receive a copy of the guideline contact Dr. Brendan Birmingham, Standards Development Section, Hazardous Contaminants Coordination Branch, 135 St. Clair Avenue West, Toronto, ON M4V 1P5. (416)323-5105. To receive a copy of an Ontario Ministry of Environment report identifying potential guideline numbers and risk levels based on health considerations, contact the Public Information Centre, 135 St. Clair Avenue West, Toronto, ON M4V 1P5. (416)323-4321.

Rouge Steel Company of Dearborn, Michigan will pay a \$20,000 fine and accept a misdemeanor conviction for a wastewater discharge violation that will be treated as a felony in the future under the state's revised Water Resources Commission Act. The company was fined for illegal discharge of 65,000 gallons of wastewater containing ammonia, cyanide, nickel and other metals from a holding tank into the Rouge River, a Great Lakes Area of Concern.



Gulliver the talking gull.
Credit: Minnesota Sea Grant

Gulliver the Talking Gull, who stands about three feet tall, is the creation of the Minnesota Sea Grant College Program. Volunteers do the talking for Gulliver through scripts to draw children into conversations about the Great Lakes, gulls and related topics. The gull is available for educational uses at schools, festivals, museums and other events and can be rented by calling one of the following Great Lakes Sea Grant Networks: IL/IN (217)333-9448; MI (313) 764-1138 (scheduled to be in the state from late September through December 1991); MN (612)625-9288; NY (516) 632-6905; OH (614)292-8949; WI (608)262-0905.

Bulletins highlighting study progress and preliminary findings of the **Technology Evaluation and Development (TED)** subprogram of the **Soil and Water Environmental Enhancement Program (SWEET)** are available. SWEET's objectives are to develop, adapt and evaluate cost-effective technologies to obtain soil

conservation and improved water quality, while the TED subprogram links research and the farming community by conducting research trials on farmers' fields. All study findings will be synthesized in a final report when the program is completed in 1992.

Additional information can be obtained from Dr. W.I. Findlay, Agriculture Canada, Research Station, Harrow, ON N0R 1G0 (519)738-2251 or the Communications Department, Ecological Services for Planning Ltd., 361 Southgate Drive, Guelph, ON N1G 3M5. (519)836-6050.

Field exercises in containment and cleanup of a simulated major oil spill on the Great Lakes were held during 1990 in the Calumet Harbor at the Port of Chicago. The exercises were the result of public and private sector coordination to address concerns about the port's ability to respond to major oil spills. The Illinois International Port District of Chicago presented its findings at the House Water Resources Subcommittee hearing in Grand Haven and made recommendations for preventive measures.

To receive a copy of the full report contact Helen A. Brohl, Director of Marketing, Illinois International Port District, 3600 E. 95th Street, 95th & the Lakefront, Chicago, IL 60617-5193. (312)646-4400.

More than \$4 million will be spent on two rubber asphalt demonstration projects by the Ontario Ministry of the Environment to manage seven to eight million scrap tires produced in Ontario every year. The long-term policy challenge is to divert scrap tires from disposal to productive uses and develop markets for products containing recycled rubber.

A discussion paper on the project, *Scrap Tire Management in Ontario*, is available through the Public Information Centre of the Ontario Ministry of the Environment, 135 St. Clair Avenue West, Toronto, ON M4V 1P5. (416)323-4321.



The nonindigenous Aquatic Nuisance Prevention and Control Act provides funds to control exotic species such as the zebra mussel.

Credit: Ken Brusata

addressed prevention and control of exotic species in the Great Lakes ecosystem. Several U.S. federal agencies will be involved in the effort.

A principal feature of the act is the establishment of an Aquatic Nuisance Species Task Force co-chaired by the director of the U.S. Fish and Wildlife Service and the undersecretary of Commerce for Oceans and Atmosphere. This task force will develop and implement a program for all U.S. waters that prevents introduction and dispersal of exotic species, monitors, controls and studies such species, and disseminates related information. While the task force will remain in place indefinitely, it must describe the program to related committees in the U.S. Senate and House of Representatives within one year after the program's creation.

The task force is also directed to carry out a study and report within 18 months on the environmental effects of ballast water exchange and areas, if any, under U.S. control where there is no threat of the spread of exotic species.

In addition, the Secretary of

Transportation is to issue voluntary guidelines to prevent the introduction and spread of exotic species into the Great Lakes through the exchange of ballast water of vessels before entering the Great Lakes, or the use of environmentally sound alternative ballast water management methods (similar to recommendations in the IJC and Great Lakes Fishery Commission's Report on Exotic Species). Regulations also are to be developed in consultation with the task force that require the exchange of ballast water before entering the Great Lakes or the use of environmentally sound alternative ballast water management methods. The regulations should also prohibit the operation of a vessel in the Great Lakes if the master of the vessel has not certified that the requirements of the regulations have been met.

In carrying out all of these provisions, U.S. agencies are directed to consult with the Government of Canada to develop an effective international program for preventing the introduction and spread of exotic species in the Great Lakes from the ballast water of vessels.

Atmospheric pollutants

Recent amendments to the U.S. Clean Air Act (Public Law 101-549, 104 Stat. 2399) also contain provisions that are particularly important to residents of the Great Lakes basin. In addition to mandates to improve air quality generally, EPA must identify and assess the extent of atmospheric deposition of hazardous air pollution to the Great Lakes. The agency is also required to oversee, in accordance with Annex 15 of the Agreement, the establishment and operation of a Great Lakes atmospheric deposition network to monitor deposition of hazardous air pollutants to the Great Lakes. Data collected by the network must be in a format compatible with databases sponsored by the IJC, Canada and the states and provinces of the Great Lakes region.

Within three years and biennially thereafter, EPA is to provide an assessment of these efforts and whether pollution loadings to the Great Lakes cause or contribute to exceedances of specific Agreement objectives. The EPA administrator has authority to promulgate additional regulations if studies show that existing regulations are inadequate to prevent serious adverse effects to public health or to other important ecological values.

From the above, it is clear that legislation vital to Agreement-related issues was passed in the U.S. Congress and signed into law by President Bush last year. Hopefully these will provide a useful and effective framework within which the public and those of us who are employed by them can work toward the achievement of the purpose and objectives of the Agreement.

THE IJC FROM COAST TO COAST

Activities in the Rainy and Namakan Lakes / Lake of the Woods Drainage Basin

by Rudy Koop and Don Parsons

Westward from Lake Superior, the international boundary between the United States and Canada follows a chain of boundary waters including Namakan Lake, Rainy Lake, Rainy River and Lake of the Woods. These and several smaller lakes and rivers drain the southern portion of the Winnipeg River drainage basin, which eventually empties into Lake Winnipeg and Hudson Bay.

Water-based recreation, fisheries, hydroelectric generation and the forest products industry are a few of the uses that depend on these lakes and rivers. The Boise Cascade Corporation and the Minnesota and Ontario Paper Company prior to it, have produced power, pulp, paper and building products since 1909 at the facilities by the outlet of Rainy Lake. These production facilities have been updated and expanded several times and remain in full production today on both sides of the river.

Over the years the International Joint Commission (IJC) has been given certain responsibilities in this area, including water levels on Lake of the Woods, Rainy Lake and Namakan Lake and water quality of the Rainy River.

Lake of the Woods Water Levels

Concern over fluctuating water levels on Lake of the Woods led the Governments of Canada and the United States to refer the issue to the IJC in 1912. Based on the IJC's study, the two countries signed the 1925 Lake of the Woods Convention and Protocol, which established procedures to regulate the lake's levels. A Canadian control board was established to manage levels and outflows from the lake under normal level conditions, while an international control board manages lake levels when they rise or fall beyond specified levels. The international board provides annual updates to the IJC.

Rainy Lake and Namakan Lake Water Levels

Concurrent with the signing of the 1925 Lake of the Woods Convention and Protocol, the Governments asked the IJC to investigate regulation of water levels of Rainy Lake, Namakan Lake and boundary waters above Namakan Lake for various purposes. The IJC's subsequent study and recommendations led to the 1938 Convention providing for emergency regulation of Rainy Lake and other boundary water levels in the watershed. The Convention also empowered the IJC to determine when high or low emergency water conditions exist in the Rainy Lake watershed and to adopt measures for operating the existing dams at Kettle Falls and at International Falls-Fort Francis in response to these conditions.

Pursuant to the Convention, the IJC issued an order to regulate water levels of Rainy and Namakan Lakes to prevent emergency conditions from occurring. The order, which has been revised several times, specifies a band of upper and lower limits for

water levels on each lake.

An International Rainy Lake Board of Control also was established to provide technical advice to the IJC and to monitor outflows from the Namakan and Rainy Lakes according to regulations specified in the Commission's order. The Board holds annual meetings each spring to discuss general problems of regulation and control with resort owners and other interested parties.

The Board also keeps the IJC informed of various concerns and initiatives in the basin. One such initiative is a recent U.S. Park Service study of alternative regulation-schemes for Rainy and Namakan Lakes aimed at improving the aquatic ecosystem of Voyageurs National Park. Another is the development of a water level management plan by the Boise Cascade Corporation for Rainy Lake to meet the conditions of the U.S. Federal Energy Regulatory Commission license for the powerhouse at International Falls, Minnesota. These initiatives may result in recommendations to the IJC to revise its order for the regulation of Rainy and Namakan lakes

Rainy River Water Quality

In 1959 the Governments asked t^r to determine whether transbor
Article continued at right



Rainy Lake, a boundary water between the U.S. and Canada.

LAKE LEVELS UPDATE

PHASE II REFERENCE STUDY TASKS UNDERWAY

by Doug Cuthbert

A burst of activity characterizes the past four months as the Levels Reference Study Board moves into high gear to complete the investigation under the 1986 Reference from Governments on the adverse consequences of fluctuating water levels in the Great Lakes-St. Lawrence River basin. The Study Board was appointed by the

International Joint Commission (IJC) to conduct Phase II of the water levels study and is led by Co-Chairs Brigadier General Jude Patin of the U.S. Army Corps of Engineers and E. Tony Wagner of Environment Canada.

The Study Board met in December to complete appointments to the four working committees, in January to review the first draft of detailed plans for work programs by the working committees, and in late February to approve and initiate many of the work activities. The Citizens Advisory Committee has been equally active, meeting roughly every six weeks and directly involved in defining and reviewing

plans for detailed study activities. With personnel and funding now largely in place, the coming year will be a beehive of activity for the study.

WORKING COMMITTEE ACTIVITIES

by Frank Bevacqua

In January, co-chairs from working committees one, three and four were asked to answer specific questions about how their committees will fulfill their goals and objectives. Work plans for all four committees likely will be approved and available for review shortly after you receive this issue of *Focus*. Our next issue will describe the activities of working committee two, focusing on land use and management, and those of the Citizens Advisory Committee.

Working Committee One: Public Participation and Information

The Public Participation Committee is responsible for the two-way flow of information between the study team and the broader public, and for ensuring that the public has opportunities for meaningful participation in the study process. In addition, the committee is examining how government agencies could improve their communications with the public about fluctuating water levels after the study is completed. The committee is co-chaired by Doug Cuthbert of Environment Canada in Burlington, Ontario and Charles Lancaster of Charles Lancaster Associates in Charlottesville, Virginia.

The IJC from Coast to Coast (cont'd) pollution of the Rainy River or Lake of the Woods was occurring, the extent, causes and location of any pollution, and to recommend the most practical measures to remedy the situation. In its 1965 report, the IJC found that the discharge of the untreated wastes from two pulp and paper mills had rendered these waters unfit for development and recreation, harmful to aquatic life and a potential menace to health. The recommended water quality objectives were subsequently adopted and the IJC was authorized to establish the International Rainy River Water Pollution Board to monitor water quality and report annually to the IJC.

The major pollution load to Rainy River originates from the operation of the pulp and paper mills at Fort Frances, Ontario and International Falls, Minnesota. These mills are now owned by the Boise Cascade Corporation. The company expects that, with the completion of a modernization process, expansion of its pulp

and paper facility and addition of a state-of-the-art bleaching plant, there will be a reduction of toxic pollutant parameters and compliance with water quality standards.

A water quality study of the Rainy River was conducted by a consultant with the participation of environmental agencies on both sides of the U.S.-Canada border and Boise Cascade and completed in August 1990. The study indicated that water quality has improved dramatically in Rainy River during the past 10 to 15 years as a result of implementation of mill wastewater abatement programs and process modifications and wastewater abatement systems by towns along the river.

For more information on the IJC's involvement in these areas, contact Rudy Koop in the Canadian section office, 100 Metcalfe, 18th floor, Ottawa, ON K1P 5M1, telephone (613)995-2984 or Don Parsons, U.S. section office, 2001 S Street NW, Second floor, Washington, DC 20440, telephone (202)673-6222.

LAKE LEVELS UPDATE



Doug Cuthbert

Question: What opportunities for meaningful participation will the public have in Phase II of the study?

Doug Cuthbert: Our basic approach is to integrate public participation into every step of the Study Board's activities. Meetings of the Study Board will be held throughout the Great Lakes-St. Lawrence River basin to give the Board members a chance to learn how local communities are affected by fluctuating water levels and to interact with local officials, news reporters and other members of the community. The first such meeting was held in Windsor on February 25-26, 1991.

Workshops on several topics such as shoreline erosion and evaluation methodologies will be an important part of the information gathering process in Phase II. Representatives from the various interests and other segments of the public will be invited to participate in these workshops.

Direct and continuous involvement also is provided by the Citizens Advisory Committee, whose 18 members include constituents from the major interests affected by fluctuating water levels. Four members of this committee have been appointed to the Study Board and two additional members serve on each working committee. The

Citizens Advisory Committee provided comment on the Plan of Study and detailed work plans before these documents were approved, and it will be involved in every step of the study process.

Public comment on certain documents, such as the Plan of Study, also is invited. We recently distributed a summary of the Plan of Study to approximately 5,500 people identified as having an interest in the water levels issue during Phase I of the study. Comments on any aspect of the study are welcome throughout the study and should be directed to Neil Fulton, study director, who will distribute the comments or questions to appropriate study personnel (see page 17 for address). In addition to placing articles in *Focus* and other publications, the Public Participation Committee also is considering developing separate newsletters to distribute around the basin.

Working Committee Three: Existing Regulation, Systemwide Regulation and Crises Conditions

The Regulation Committee is studying the two existing lake and river regulation plans and systemwide water level regulation options. Related topics such as climate change, water-level forecasting and frequency analysis will be investigated as well. In cooperation with the Land Use Committee, this group will also examine how governments could improve their response to crises-related extreme water levels. The Regulation Committee is co-chaired by Doug Brown of Environment Canada in Burlington, Ontario and by Ben DeCooke, a private citizen formerly with the U.S. Army Corps of Engineers in Detroit, Michigan.

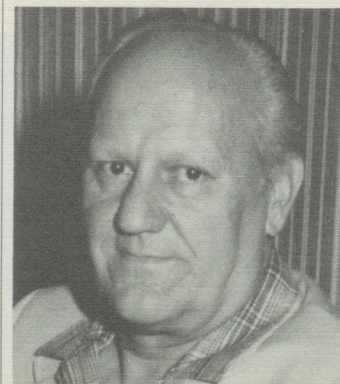
Question: What regulation options will be investigated and how will

they be tested?

Ben DeCooke: In addition to examining the existing regulation plans and regulation options developed in previous studies, the Regulation Committee will develop new options for systemwide regulation. The results of the Citizens Advisory Committee's efforts to identify a desired range of water levels will help us in developing these new options. We also expect that the work of the Land Use Committee will help to identify water level elevations that are critical in terms of potential damages.

It appears that the most promising method for screening the range of options is to test them for their hydrologic effects using computer simulation. This will show how well they perform under different water supply conditions in maintaining the desired range of levels or avoiding the critical elevations.

The impacts of a number of regulation options will then be analyzed in greater detail. Methods to evaluate the economic and environmental impacts, as well as alternative evaluation methods, will be developed in cooperation with the Evaluation Committee. Some of the existing evaluation methods are quite detailed and will require review,



Ben DeCooke

LAKE LEVELS UPDATE



Michael Donahue

such as methods for estimating the economic impacts to the hydropower and navigation sectors. With regard to shoreline property, certain questions must be addressed, such as how expenditures for shoreline protection works should be treated. In addition, dollar figures for damages to shoreline property at different water levels will be difficult to obtain. However, estimated damages may provide an adequate basis for comparing the different regulation options even if they are not precise.

Working Committee Four: Principles, Measures Evaluation, Integration and Implementation

In close cooperation with the other committees, the Evaluation Committee will propose principles and evaluation methodologies to be used as a guide for decisionmaking on alternative measures during and after the study. The committee will also define the social, economic and environmental effects of shoreline management and systemwide water level regulation. The Evaluation Committee is co-chaired by Michael Donahue of the Great Lakes Commission in Ann Arbor, Michigan and Michel Slivitsky of l'Université du Québec in Sainte-Foy, Québec.

Question: If a measure that provides benefits for some people results in

costs to others, how is it possible to achieve equity? How is it possible to compare benefits and losses to interests which are not similar? Will the Evaluation Committee consider whether certain interests have a greater right to their use of the resources than other interests?

Michael Donahue: It is important to realize that all measures produce winners and losers. There is no "utopian" water level at which everyone benefits and no one loses. The community of water users in the Great Lakes-St. Lawrence River basin is simply too diverse for such a scenario to take place.

Our challenge in the Evaluation Committee is to provide the governments with the tools and methodologies to evaluate alternative measures with respect to their costs and benefits, and their social, economic and environmental impacts and consequences. We will not establish public policy, but will assist the various levels of governments that are charged with that role. The governments will ultimately determine what is equitable. We hope to ensure that all affected interests understand the consequences of alternate measures and have an opportunity to participate in or otherwise contribute to the decisionmaking process.

No single evaluation methodology can provide the necessary information for sound public policy decisions. A "tool box" of evaluation methods is needed; we will consider benefit-cost analysis, impact analysis, conflict analysis and others. Each has its strengths and weaknesses and we will provide guidance on which tool is most useful for a particular set of circumstances.

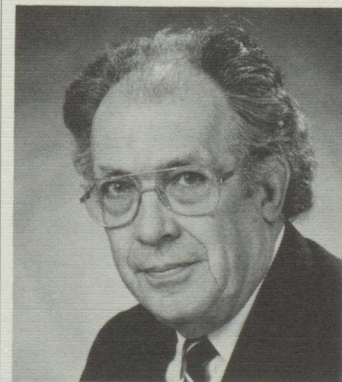
Whether certain interests have a greater right than others to use the resource is a difficult question, yet

one that must be addressed. For too long, we have viewed the Great Lakes as a virtually inexhaustible resource with an endless assimilative capacity for abuse and overuse. Many past and present land and water use decisions directly impact the user community, foreclosing opportunities for some and opening up opportunities for others.

The Evaluation Committee will provide the means to evaluate the consequences of alternate measures. The question as to whether one interest's "right" to the resource under various lake level scenarios takes priority over another's is a public policy issue most appropriately addressed by the governments themselves, drawing from the information this reference can provide.

Comité de travail no 4 — Principes, évaluation, intégration et mise en oeuvre des mesures

En collaboration étroite avec les autres comités, le Comité d'évaluation proposera des principes et des méthodes d'évaluation qui pourront orienter la prise de décisions sur les mesures de rechange pendant et après l'étude. Le Comité se chargera également de délimiter les incidences sociales, économiques et environnementales de la gestion des rives et de la régulation du niveau des eaux à la



Michel Slivitsky

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grandeur du réseau. Le Comité d'évaluation est sous la présidence conjointe de Michael Donahue de la Great Lakes Commission à Ann Arbor et de Michel Slivitsky de l'Université du Québec à Sainte-Foy.

Question: Si une mesure est profitable à certaines personnes, mais nuit à d'autres, est-il possible de procéder de façon équitable? Est-il possible de comparer les avantages acquis et les pertes subies lorsque les intérêts en jeu ne sont pas les mêmes? Le Comité d'évaluation se demandera-t-il si certains intérêts possèdent un droit supérieur à celui d'autres intérêts pour ce qui est de l'utilisation de la ressource?

Michel Slivitzky: Le système des Grands Lacs est complexe non seulement du point de géographique, hydrologique et environnement, mais aussi du point de vue social et économique. Une solution qui pourrait satisfaire des intérêts à la tête du Lac Supérieur, pourrait causer des dommages importants à d'autres intérêts entre Montréal et Trois-Rivières. Il ne peut exister de solutions idéales qui pourront satisfaire tous les intérêts, ainsi que des moyens faciles pour compenser les dommages des uns par les bénéfices des autres; quelque soit la solution retenue, il y aura toujours, quelque part, des «gagnants» et des «perdants».

Par ailleurs, aucune solution ne pourrait s'imposer d'une manière permanente, pour les années à venir. Les conditions tant hydrologiques que environnementales, sociales et économiques vont évoluer d'une manière impossible de prévoir présentement avec certitude. Une solution qui pourrait être acceptable aujourd'hui, et rallier les intérêts majoritaires, risque d'être rejetée par tous les intervenants dans 15 ou 20 ans.

Le défi du Comité de travail no 4 est

donc de proposer, non pas une solution idéale, qui ne peut exister, où des règles fixes de décision, mais une série d'«outils», qui permettraient aux gouvernements d'évaluer l'impact des différentes solutions. Chacun de ces «outils» possède ses «points forts» et ses «points faibles», et il est important que tous les intervenants comprennent, même s'ils ne peuvent les accepter, tous les enjeux.

Le choix définitif des solutions qui seront mises en oeuvre, va et doit demeurer la responsabilité des pouvoirs publics.

EVALUATING THE OPTIONS IS NO EASY TASK

by Frank Bevacqua

One central task of the study is to determine how the various options available to governments should be evaluated. Previous IJC studies have relied heavily on benefit-cost analysis to determine whether additional water levels regulation was justified. This study must not only examine regulation but other options as well. Since the choice of evaluation methods will determine what data should be collected, it is clearly one of the most important considerations before the Study Board.

A number of evaluation methods are being scrutinized in terms of the resources they would require and how useful they would be to the overall study

effort. Three methods specifically mentioned in the Plan of Study are highlighted below.

Benefit-Cost Analysis

Benefit-cost analysis has been used for decades to assess whether an action is efficient in terms of the economic benefits generated for the dollars invested. The policies of both federal governments encourage economic efficiency in the development of water resources. U.S. law requires that the estimated benefits exceed the costs before the federal government can participate in a flood control project. The 1986 Reference to the IJC also requests a full accounting of the benefits and costs for any new regulation projects that appear to be economically and environmentally practicable.

To estimate the benefits of a particular action, the economic consequences of taking the action are compared with those of not taking action. This requires a considerable amount of information about the physical impacts of various water levels on different interests and the impacts resulting from the action. The complexity and scale of the Great Lakes-St. Lawrence River system limit how accurately these impacts can be estimated on a systemwide basis. For example, an analysis of water levels regulation requires estimating the amount of damage expected to occur to shoreline property at different water levels. As much reliable information as possible must be gathered about historical damages to property, the topography and geology of the coastal area, and the amount and type of development. With more than 12,000 miles of shoreline, all conditions cannot be examined in great detail. This can limit the

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accuracy of damage estimates when changes in water levels in small increments such as one-half foot or less are examined. Damage estimates also depend on how certain technical issues are resolved, such as the relationship of water levels to storm impacts and to long-term erosion rates. In addition, the analysis requires information on the impacts on commercial navigation, hydro-power, recreational boating, municipalities and other interests.

As with any evaluation methodology, there are difficulties inherent to benefit-cost analysis. The value of goods not traded on the market place, such as aesthetics and ecosystem integrity, must be accounted for. In addition, assumptions must be made about how economic variables such as property values and the price of energy will change over the 50 or more years of a project's life cycle. A major issue with respect to natural resource and environmental evaluations is the use of discount rates to reduce the present value of future benefits, a practice that encourages projects yielding short-term over long-term benefits. Such assumptions can influence the outcome of a benefit-cost analysis. Another question to be investigated during the study is how accurate any benefit-cost analysis must be for it to serve as a basis for recommendations.

Type-Specific Site Studies

Type-specific site studies attempt to overcome the lack of precision of systemwide methods by applying benefit-cost analysis or another evaluation method to a smaller geographic area. On a small section of the shoreline, one can examine the impacts of water level fluctuations in greater detail and thus assess the performance of a particular option

with greater confidence. By choosing sites that are representative of the major shoreline types, such as urban areas, residential areas and sensitive environmental reaches, the finding might have broader application.

Information derived from type-specific site studies could theoretically be used in different ways. First, the data could be extrapolated to cover similar types of sites at other locations leading to a basinwide evaluation. Second, the data from a type-specific site study might be used as a quality control to check the accuracy of systemwide analyses. Finally, the information gained might be used for a preliminary evaluation to screen the options before systemwide analytical methods are applied.

The major question regarding type-specific site studies is how to apply the information gathered to areas outside that specific location. How many type-specific site studies could be performed within the time and resources available to the study is also under consideration.

Evaluation Framework

An evaluation framework attempts to include a broad range of decision

making criteria into a standard framework. One product from Phase I of the study was an evaluation framework based on six core criteria. The criteria, including economic sustainability, environmental integrity and equitability, are applied using a standard set of questions. For example, the equitability of an option would be assessed by determining the extent to which the costs and benefits are shared by the different interests, the different geographical areas and the two nations. The evaluation framework also requires a considerable amount of information about the impacts of any changes resulting from a particular option.

The strength of the evaluation framework method is that it provides a broad basis for comparing dissimilar options, such as water levels regulation and coastal zone management. While this can be accomplished with difficulty, using standard criteria is one way to apply the economic, environmental and social considerations in an explicit and consistent manner. Since this is a relatively new approach, one question being considered is how much further development is required before it could be applied convincingly.

Your Views are Requested

The Study Board wants to talk with all interested citizens. Please write to us to let us know what is important to you about the Levels Reference Study. In addition to the Plan of Study, a directory of study personnel and list of Phase II Study Products are available on request. Please contact Neil Fulton, Director, Levels Reference Study, 72 Lyme Road, Hanover, NH 03755-1290.

Where are the numbers?

If you are a regular reader to the levels update section of *Focus*, you may have noticed that the monthly levels figures chart is missing. Because the data are available from other sources and we need additional space to let you know what's going on in the study, we are eliminating the chart from the section. To be added to the mailing list for the monthly levels charts, contact the U.S. Army Corps of Engineers, P.O. Box 1027, Detroit, MI 48231 or the Department of Fisheries and Oceans, Canadian Hydrographic Service, P.O. Box 5050, Burlington, ON L7R 4A6.

TEACHING TODAY'S YOUTH TO MAKE TOMORROW'S DECISIONS FOR THE GREAT LAKES ECOSYSTEM

by Beverley Croft and Sally Cole-Misch

In its Fifth Biennial Report, the International Joint Commission (IJC) specifically identified the educational system as vital to developing society's understanding of and respect for the Great Lakes ecosystem. The IJC found a general lack of Great Lakes subject matter in established curricula, and specifically recommended that "the Great Lakes states and provinces incorporate the Great Lakes ecosystem as a priority topic in existing school curricula."

To encourage action on this recommendation and the broader goal of societal awareness and action to restore and protect the Great Lakes, the IJC and its Great Lakes Science Advisory Board have initiated a variety of programs and ongoing projects over the past six years.

Teachers Making a Difference

Most recently, the IJC hosted a live-by-satellite television conference, "Teachers Making a Difference," to build on its commitment to Great Lakes education. Almost 1,000 educators, students and parents in 33 Great Lakes communities participated in the five-hour meeting, which provided a unique opportunity to discover how innovative Great Lakes programs and curricula can be incorporated into a variety of

subject areas. Participants also focused on how these and other programs can encourage youth to develop the values that will lead to positive actions for the ecosystem.

The live, satellite television format was chosen because the immediacy and scale of information sharing provided could not be accomplished by any other process. By communicating directly with experts, community leaders, teachers and students involved in a variety of innovative programs, conference participants learned how educators in other areas are teaching about the Great Lakes. Thus, attendees shared experiences and developed ties with others in their own communities and across the basin. Feedback to date indicates that the conference was successful in motivating participants to provide a greater focus on the Great Lakes in their education programs.

As a further step in support of its recommendations in the Fifth Biennial Report, the IJC will issue a Special Report to Governments in May 1991 on its education initiatives and the need for furthering Great Lakes education. Plans are also underway for a second live-by-satellite television conference in February 1992. This second conference, currently titled "Learners Making a Difference," will build on the success of the first conference by providing the opportunity to compare experiences and assess progress, and to discuss the potential for teachers, students and others to communicate directly with each other whether they live in Duluth, Cornwall or communities in between. The IJC also will produce 15-minute and 40-minute videotape summaries of the first conference. Look for further updates in coming issues of *Focus*.

Teachers Teaching Teachers

The Great Lakes Science Advisory Board began working on Great Lakes education in 1984, when it surveyed several hundred educators and producers of educational materials to determine what was available and was used most often. Results of this survey and a subsequent survey in 1987 were used to produce the first edition of the *Directory of Great Lakes Education Material*.

The following year, more than 600 educators were again surveyed to determine whether there had been an increase in the type and amount of materials available on the Great Lakes, as well as the frequency with which teachers were using these materials. The results showed that greater information was being produced and teachers were finding the materials useful in developing their own educational programs. Materials are getting into teachers' hands more quickly, from a wider variety of sources, and teachers are seeking out information on the lakes more than ever before. In fact, approximately 60 percent of the 20,000 requests for Great Lakes information received annually by the IJC's Regional Office come from either teachers or students.

While most materials produced in the 1970s were for young audiences and tended to emphasize geography, history and shipping, books written in the early 1980s were written for older audiences and focused on Great Lakes water quality or quantity issues. Since 1985, the emphasis has shifted back to younger audiences — kindergarten through eighth grade, generally — and these new materials tend to include information on how humans affect the ecosystem.

As a result of the surveys and

creation of the Directory, now in its third edition, a pilot Great Lakes awareness program was created by Information Services in the IJC's Regional Office and tested in the Windsor area. The program introduced over 2,500 elementary teachers and students to Great Lakes issues. It also included supplementary activities and questions for students to discuss with each other and with their parents. The program has subsequently been presented at the Children's Environmental Festival in Toronto, Ontario and provided to interested educators throughout the region.

While a single Great Lakes presentation might reach 30 students, a teacher training workshop of 20 teachers could reach up to 600 students, with the potential to reach tens of thousands of students annually. It is clear that the best educational materials may be largely useless if teachers, adult leaders and decisionmakers do not know about them and how to best use them. As little as four percent of materials are used when simply given to teachers, while materials provided in cooperation with teacher training have up to 78 percent use over a multi-year period.

To respond to these findings, the

Board created an Educators Advisory Council to design and implement a series of teacher training workshops in each state and province in the Great Lakes basin. The workshops provide participants with information about the lakes and issues affecting them, and encourage incorporation of the Great Lakes into a variety of subject areas in formal and nonformal settings.

The workshops will continue through 1992, and the Council has developed further proposals for consideration by the SAB — such as a week-long Great Lakes teacher's workshop each summer — to further encourage teachers to incorporate the Great Lakes into their curricula.

For most of us, a home is something to be taken care of, protected, defended and cherished. Thanks to

IJC's and other organizations' efforts in the educational arena, increasing numbers of elementary and secondary school students in the Great Lakes basin define the five Great Lakes of Huron, Ontario, Michigan, Erie and Superior with the acronym HOMES and its associated meaning. The acronym may not yet be a household term for many adults, but individuals can be moved to consider the Great Lakes as part of their own homes and everyday lives.

For more information on the IJC and Science Advisory Board's education initiatives or to receive a *Directory of Great Lakes Education Material*, contact Information Services, International Joint Commission, 100 Ouellette Avenue, Eighth floor, Windsor, Ontario N9A 6T3, (519)256-7821 or P.O. Box 32869, Detroit, Michigan 48232-2869, (313)226-2170.

Throughout the basin, teachers are learning how to test for water quality, identify benthic organisms and develop Great Lakes teaching materials in training workshops.

Credit: Karen Plass



PRÉPARER LES JEUNES D'AUJOURD'HUI AUX DÉCISIONS DE DEMAIN CONCERNANT L'ÉCOSYSTÈME DES GRANDS LACS

Par Beverley Croft et Sally Cole-Misch

Dans son Cinquième rapport biennal, la Commission mixte internationale (CMI) qualifie le système d'éducation d'élément vital pour amener la société à comprendre et à respecter l'écosystème des Grands Lacs. Ayant constaté l'absence générale de cours sur les Grands Lacs dans les programmes scolaires établis, la CMI a spécifiquement recommandé "que les États et les provinces des Grands Lacs ajoutent le thème des Grands Lacs aux matières scolaires principales".

Depuis six ans déjà, la CMI et son Conseil consultatif scientifique des Grands Lacs mènent des programmes et des projets permanents pour faciliter les initiatives allant dans le sens de cette recommandation ainsi que pour sensibiliser et intéresser concrètement le public à l'objectif plus général de la restauration et de la protection des Grands Lacs.

Le rôle des enseignants

Conformément à sa volonté de faire mieux connaître les Grands Lacs, la CMI a organisé récemment une téléconférence en direct par satellite ayant pour titre "Teachers Making a Difference". Près de 1 000 éducateurs, étudiants et parents de 33 collectivités des Grands Lacs ont participé à cette conférence de cinq

heures, qui s'est avérée une occasion exceptionnelle de découvrir comment des programmes novateurs sur les Grands Lacs peuvent être incorporés dans divers domaines d'étude. Les participants ont aussi examiné comment ces programmes et d'autres peuvent encourager les jeunes à développer les valeurs qui les amèneront à poser des gestes concrets pour l'écosystème.

Le format de la téléconférence en direct a été retenu car il était le seul à permettre l'échange immédiat de nombreuses informations. En communiquant directement avec des experts, des leaders communautaires, des enseignants et des étudiants engagés dans divers programmes novateurs, les participants à la conférence ont appris comment les éducateurs d'autres régions s'y prenaient pour mieux faire connaître les Grands Lacs. Ils ont donc pu partager leurs expériences et nouer des liens avec d'autres personnes de leurs communautés et de l'ensemble du bassin. A en juger par les réactions observées à ce jour, la conférence a réussi à motiver les enseignants qui y ont participé à mettre davantage l'accent sur les Grands Lacs dans leurs cours.

Toujours dans la lignée des recommandations de son Cinquième rapport biennal, la Commission publiera en mai 1991 un Rapport spécial aux gouvernements, dans lequel elle fera part à ceux-ci de ses initiatives en matière d'éducation relative aux Grands Lacs et des besoins à ce chapitre. Des plans sont aussi à l'étude pour la tenue en février 1992 d'une deuxième téléconférence par satellite. Celle-ci, intitulée "Learners Making a Difference" fera fond sur le succès de la première conférence et permettra de comparer les expériences de chacun,

d'évaluer les progrès et de discuter de la possibilité pour les enseignants, les étudiants et d'autres personnes de communiquer directement entre eux, qu'ils vivent à Duluth, à Cornwall ou encore dans un centre urbain situé entre ces deux villes. La CMI produira également deux vidéo-cassettes, l'une de 15 minutes, l'autre de 40 minutes, résumant les délibérations de la première conférence. Les prochains numéros de FOCUS donneront davantage de détails à ce sujet.

Enseigner aux enseignants

Le Conseil consultatif scientifique des Grands Lacs a commencé à s'intéresser à l'enseignement relatif aux Grands Lacs en 1984. Il avait alors interrogé des centaines d'éducateurs et de producteurs de matériel pédagogique afin de déterminer ce qui était disponible et ce qui était le plus utilisé. Les résultats de cette enquête et d'une autre menée en 1987 ont servi à la réalisation de la première édition du *Directory of Great Lakes Education Material*.

L'année suivante, le Conseil s'est adressé encore une fois à plus de 600 éducateurs afin de déterminer s'il y avait eu amélioration du genre et de la quantité de matériel pédagogique disponible sur les Grands Lacs, et à quel rythme ce matériel était utilisé. Le sondage a révélé que les informations avaient augmenté en quantité et que les enseignants considéraient le matériel disponible comme un outil valable dans l'élaboration de leurs propres programmes. La documentation leur parvient plus rapidement, de sources plus nombreuses, et plus que jamais ils sont eux-mêmes à la recherche d'informations sur les Grands Lacs. En fait, environ 60% des 10 000 demandes de renseignements sur les Grands Lacs que le



Environ mille enseignants ont participé à la téléconférence en direct par satellite de la CMI ayant pour titre "Teachers Making a Difference". Almost 1,000 educators participated in the IJC's live-by-satellite television conference.
Crédit: Sally Cole-Misch

Bureau régional de la CMI reçoit annuellement viennent de professeurs et d'étudiants.

Si la documentation produite dans les années 70 était surtout destinée à un jeune public et mettait davantage l'accent sur la géographie, l'histoire et le transport maritime, celle publiée au début des années 80 s'adressait avant tout aux adultes et portait d'abord sur la qualité et le volume des eaux des Grands Lacs. Depuis 1985 toutefois, l'attention se porte de nouveau vers les jeunes - en gros, les élèves de la maternelle à la huitième année - et la nouvelle documentation utilisée fait état de l'influence de l'homme sur l'écosystème.

Par suite des sondages susmentionnés et de la publication du *Directory*, qui en est maintenant à sa troisième édition, les Services d'information du Bureau régional de la CMI à Windsor ont lancé dans la région un projet pilote qui vise à sensibiliser plus de 2 500 professeurs et élèves de l'élémentaire aux problèmes des Grands Lacs. Le projet comprend également des activités supplémentaires ainsi que des questions dont les élèves peuvent

discuter entre eux et avec leurs parents. Le programme a par la suite été présenté au Children's Environmental Festival de Toronto et mis à la disposition des éducateurs intéressés dans l'ensemble de la région.

Avec un exposé sur les Grands Lacs, on peut atteindre une trentaine d'étudiants ; par contre, grâce à un atelier de formation destiné à 20 enseignants, on peut atteindre quelque 600 étudiants, ce qui veut dire éventuellement des dizaines de milliers d'étudiants chaque année. Il est évident que même la meilleure documentation est largement inutile si les enseignants, les adultes et les décideurs ignorent son existence ou encore ne savent pas comment en tirer le meilleur parti possible. Le matériel que l'on se contente de remettre aux professeurs n'est utilisé que dans une maigre proportion de 4 %, alors que si une formation est donnée en même temps, la proportion est de 78 % sur une période de plusieurs années.

Devant ces constatations, le Conseil a créé le Conseil consultatif de l'éducation, qu'il a chargé de concevoir et d'organiser, dans

chaque Etat et province du bassin des Grands Lacs, une série d'ateliers de formation à l'intention des enseignants. Ces ateliers permettent de fournir aux participants des renseignements sur les lacs et sur les problèmes qui les touchent, et d'encourager l'insertion du thème des Grands Lacs dans toute une variété de domaines d'étude, en milieu aussi bien formel qu'informel.

Les ateliers se poursuivront jusqu'en 1992. Le Conseil a par ailleurs élaboré d'autres propositions - par exemple la tenue, chaque été, d'un atelier d'une fin de semaine à l'intention des enseignants - afin d'encourager l'étude des Grands Lacs dans le cadre des programmes d'enseignement.

Pour la plupart des anglophones, le mot "home" a une connotation affective particulière et désigne quelque chose qu'il faut chérir, défendre et protéger, mais pour un nombre de plus en plus grand d'élèves des écoles élémentaires et secondaires du bassin des Grands Lacs, le symbole "HOMES" a pris une signification toute spéciale, car il est composé de la première lettre de chacun des cinq Grands Lacs : Huron, Ontario, Michigan, Erié et Supérieur.

Pour obtenir de plus amples renseignements sur les initiatives en matière d'éducation prises par la CMI et le Conseil consultatif des Grands Lacs, ou encore pour recevoir le *Directory of Great Lakes Education Material*, veuillez communiquer avec les Services d'information, Commission mixte internationale, 100 avenue Ouellette, 8^e étage, Windsor (Ontario), N9A 6T3, tél. (519) 256-7821 ou P.O. Box 32869, Detroit, Michigan 48232-2869, tél. (313) 226-2170.

COUNCIL OF GREAT LAKES RESEARCH MANAGERS HOLDS ECOSYSTEM MODEL WORKSHOP

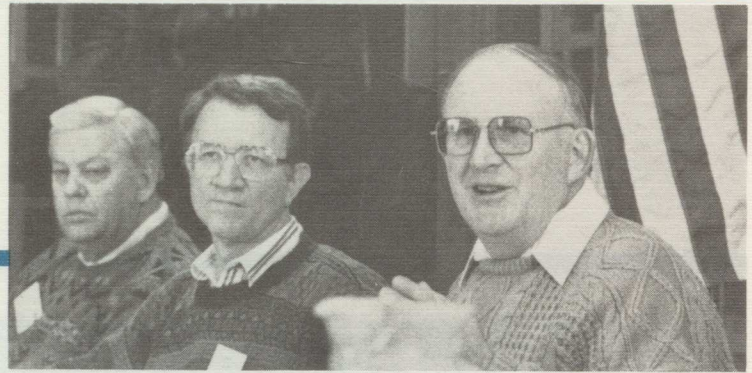
by Peter Seidl

At the Ecosystem Model Workshop hosted by the Council of Great Lakes Research Managers on December 4-6, 1990 in Milwaukee, Wisconsin, 35 participants contributed to developing a framework for natural and social research in the Great Lakes - St. Lawrence River basin. Such a framework is designed to serve as a catalyst for the further development of an ecosystem model, a concept for which originated at the Council-sponsored Futures Workshop held in September 1989 (see *Focus*, Volume 15, Issue 2, page 20).

The goal of the ecosystem model is to provide a basis for top-down identification of research and information needs, a framework for the development and evaluation of a broad array of policy options for basinwide issues, and a framework for implementing the notion of an ecosystem approach.

To design the model, workshop participants focused on creating a framework that would:

- be integrative, issue driven, verifiable and capable of tying together submodels that could be revised and adapted to emerging issues or scenarios;
- provide a much-needed structure for organizing databases and make them more accessible to the research and decision-making community;
- provide support for scenario analysis (anticipation of issues and solutions) and help to identify research needs and data gaps; and
- support state-of-the-environment reporting.



Commissioner Gordon Durnil and Council Co-chairs Jon Stanley and Roy Hickman discuss various issues with other participants at the workshop.

Workshop participants initially split into subgroups to identify the major issues at three spatial scales — watershed, lake and the basin as a whole — and to determine how those issues at each spatial scale are linked to information needs from other scales. Global warming, as an example, is seen on a global scale, but is created at the local scale. Similarly, air quality is controlled at the watershed level but its impact is at a much larger scale.

During the second phase of the workshop, new subgroups determined what types of tools, research and data are required and what sort of process is needed to develop the concept of the ecosystem model further, and to promote those ethics that are consistent with a sustainable development approach. Participants identified three areas: research needs, policy, and ethics.

Research Needs The research needs subgroup focused on developing a process for model development. The subgroup created a process design for multidisciplinary links in dealing with individual problems and suggested that models are needed which target particular issues, but whose focus is more broadly based to interact with other problems.

Policy The policy group identified the goal of managing the Great Lakes basin for resiliency, with certain attributes for the biophysical system: diversity, integrity, productivity and, on the human scale, flexibility, sustainability and recognition of the unexpected. In identifying policy design, the group felt there is a need to shift away from individual prob-

lem analysis to focusing on cumulative effects, from short timeframe analysis to long timeframe analysis, and from a process of policy development that is competitive and negotiated to one that is cooperative and consensual.

The policy group recommended the creation of a relatively simple model, rather than a mega-model, that incorporates all major components necessary to explain ecosystem resiliency and would be used primarily as a learning tool. It also recommended that further model development needs to be issue oriented, with a relatively broad scale of orientation in dealing with each issue.

Ethics The ethics group discussed how ethics and belief systems influence policy development and, in the process, affect the development of science. They recommended a process to learn more about how values influence policy development and direct the type of actions that are initiated to address large-scale problems.

All three subgroups recommended a process for model development that fosters the creation of multidisciplinary initiatives and involves a wide spectrum of stakeholders in policy formulation and model development.

Proceedings of this workshop can be obtained in summer 1991. For more information, contact Peter Seidl, International Joint Commission, 100 Ouellette Avenue, Eighth floor, Windsor, ON N9A 6T3, telephone (519)256-7821 or P.O. Box 32869, Detroit, MI 48232, telephone (313)226-2170.

BOOKSHELF

The following reports are available for distribution from the International Joint Commission's Great Lakes Regional Office, 100 Ouellette Avenue, Eighth floor, Windsor, ON N9A 6T3 or P.O. Box 32869, Detroit, MI 48232. For further information about these or other IJC reports, call (519)256-7821 in Canada or (313)226-2170 in the U.S.

- *Great Lakes 2000: Building A Vision, Summary Report of the Workshop of the Council of Great Lakes Managers on Futures* (22 pages)
- *Proceedings of the Workshop of the Council of Great Lakes Managers on Futures* (103 pages, limited supply)
- *Production, Usage and Atmospheric Emissions of 14 Priority Toxic Chemicals*
- *The International Joint Commission and the Boundary Waters Treaty, (includes Treaty and map of 1990 activities of Commission)*
- *La commission mixte internationale et le Traité relatif aux eaux limitrophes*

Canada has two new national environmental magazines. *Earthkeeper* hopes to provide a "hands and minds on" approach and a consistent source of environmental information for concerned individuals. To subscribe to the bi-monthly magazine, contact Earthkeeper Magazine, 99 Edinburgh Road South, Guelph, ON N1H 5P5. (519)763-9357.

Ecodecision is a quarterly bilingual magazine on environmental decision-making and policy. Published by the Environment and Policy Society, the magazine will include policy papers and scientific findings. For more information contact Yvan Michaud, *Ecodecision*, 276, rue Saint-Jacques Ouest, bureau 924, Montréal, PQ H2Y 1N3. (514)284-3043.

The Great Lakes are in trouble and the warning signs are clear, noted two new video releases. The National Geographic Society with WQED-TV in Pittsburgh, Pennsylvania produced the *Great Lakes: Fragile Seas* and WNED-TV in Buffalo, New York recently aired *The Great Lakes*

in Crisis. Both videos were viewed on local PBS channels and may be shown again at some future date. To learn more about the video *Great Lakes in Crisis*, contact Sharon Hernandez, WNED-TV, 184 Barton Street, PO Box 1263, Buffalo, NY 14240. (716)881-5000 ext. 201. For *Great Lakes: Fragile Seas*, contact station WQED-TV, 4802-5th Avenue, Pittsburgh, PA 15213. (412)622-1444.

Field Manual for Water Quality Monitoring: An Environmental Education Program for Schools. This fourth edition by Mark K. Mitchell and William B. Stapp includes explanation of nine water quality parameters and a water monitoring program designed for secondary school students and adults. The 234-page manual can be purchased for \$9.95 (US funds) by check or money order payable to William B. Stapp, 2050 Delaware Avenue, Ann Arbor, MI 48103. (313)764-1410.

Water in Your Hands, a 16-page, full-color educational booklet on water resources, focuses on awareness of water quality and how individuals can help prevent water pollution. It includes an instructor's guide, background information, activities and a list of resources. A single copy for .75 and the instructor's guide for \$2 (US funds) are available from the Soil and Water Conservation Society, 7515 NE Ankeny Road, Ankeny, IA 50021-9764. (515)289-2331 or 1-800-THE SOIL in the United States.

A joint project of Environment Canada and the United States Army Corps of Engineers has produced a brochure entitled *Great Lakes-St. Lawrence River Regulation: What it Means and How it Works*. Copies of the brochure are available in french and english and can be ordered by contacting the Great Lakes Water Level Communication Centre, Environment Canada, Inland Waters Directorate, Ontario Region, 867 Lakeshore Road, P.O. Box 5050, Burlington, ON L7R 4A6. (416)336-4581.

My Earth Book is a 24-page activity book for children to learn how changes are taking place in their world through energy, chemicals and natural resources. The book can be purchased for \$5 (Cdn funds) through EB Publications, 28 Beaufort Road, Toronto, ON M4E 1M7. (416)690-7430. Proceeds from the sale will contribute to the establishment and preservation of wilderness areas locally, nationally and globally.

Encyclopaedia Britannica Educational Corporation has produced a series of educational video programs entitled *Problems of Conservation: Water* (second edition), *Problems of Conservation: Air* (second edition) and *Problems of Conservation: Acid Rain*.

For a copy of the videos *Water* (\$250; *Air* \$260 or *Acid Rain* \$260, US funds) contact Emily Clott, Production Planner, Encyclopaedia Britannica Educational Corporation, 310 South Michigan Avenue, Chicago, IL 60604. (312)347-7900 ext. 6579 or in the US 1-800-558-6968.

Fishing for Answers: How to Reduce the Chemical Contaminants in Sport Fish is a 13-minute video program produced by Wisconsin Sea Grant Communications with support from the UW-Madison Division of University Outreach and UW-Extension. The video features an overview of toxic industrial chemicals and pesticides in sport fish and discusses the relative health risks of consuming these contaminants.

The video is available in VHS \$16, Beta \$16 and broadcast-quality 3/4" \$25 (US funds). Free loan copies of the tape are available from the Communications Office, University of Wisconsin-Madison, 1800 University Avenue, Madison, WI 53705. (608)263-3259.

The St. Lawrence Centre, within the framework of the St. Lawrence Action Plan, has published three fact sheets: 1) *Clean up - The 50 Industrial Plants Targeted for Priority Action*; 2) *The St. Lawrence River and Maritime Transport - Striking a Balance*; and 3) *Toxics in the St. Lawrence - An Invisible, But Real Threat*. The Centre



has also reissued an insert entitled *The St. Lawrence River: Its Uses and Its Environment*, published formerly in the journal *L'Escale*.

Copies of the fact sheets and insert may be obtained free of charge from Knowledge of the State of the Environment Branch, St. Lawrence Centre, Conservation and Protection, Environment Canada, 105 McGill Street, Fourth floor, Montreal, PQ H2Y 2E7. (514)283-7000.

A new 28-minute video about the Izaak Walton League of America's *Save Our Streams* program is now available to help citizens assess local waterways by becoming active stream monitors.

The video teaches volunteers how to detect and test for pollution. To obtain a free video brochure or to order a copy of the video, write to Karen Firehock, Izaak Walton League of America, Save Our Streams, 1401 Wilson Boulevard, Level B, Arlington, VA 22209. (703)528-1818.

For computer whizzes looking for networking contacts on environmental topics, the following systems are available to anyone with a computer and modem: *EcoNet*, 3228 Sacramento Street, San Francisco, CA 94115, (415)923-0900; *Environet* (800)759-7779; *Web*, for nonprofit organizations in Canada, 456 Spadina Avenue, Second floor, Toronto, ON M5T 2G8, (416)929-0634; *RACHEL*, Environmental Research Foundation, PO Box 3541, Princeton, NJ 08541, (609)683-0707; and *RTK Net*, Unison Institute/OMB Watch, 1731 Connecticut Avenue NW, Washington, DC 20009, (202)234-8494.

Fact Sheets are available free of charge on the Lakewide Management Plans being prepared for each Great Lake by the Canadian and U.S. Federal Governments. Fact sheets are available on the plans for Lake Michigan and Lake Ontario, as well as an overview of the process.

To order fact sheets, contact the Information Service at The Center for the Great Lakes, 35 E. Wacker Drive, Suite 1870, Chicago, IL 60601. (312)263-0785.

Presque Isle Bay Designated an Area of Concern; RAP Reviews Completed for Toronto and Port Hope; GM Settlement for St. Lawrence River; Michigan RAP Workshop

In a letter dated January 30, 1991, the United States and Canada agreed to designate Presque Isle Bay and the waters of Lake Erie in the immediate vicinity of Erie, Pennsylvania as an Area of Concern, under the terms of the revised 1978 Great Lakes Water Quality Agreement. The IJC recommended such a designation in February 1990 as a result of analyses that found that the area does not meet Agreement objectives and beneficial uses of the waterway are impaired.

Under the U.S. Critical Programs Act (see page 10), the Presque Isle Bay RAP must be submitted to U.S. EPA's Great Lakes National Program Office by January 30, 1993.

At its February Executive Session, the IJC endorsed the findings of the review of the Toronto and Port Hope RAPs as coordinated by the Great Lakes Water Quality Board. The review of the Toronto RAP found that considerable work had gone into preparation of the Stage 1 plan, which includes an extensive summary of the impacts on beneficial uses from several environmental problems in the Toronto watershed. However, the document focuses on traditional pollutants and does not provide sufficient information on

toxic substances, and particularly an assessment of the extent and causes of specific use impairments. Because toxics have become such an important concern in the Great Lakes system, the IJC concluded that the plan as submitted is incomplete.

The Port Hope Area of Concern contains contaminated sediments from a known source, which has caused degraded benthic organisms and restrictions on dredging. The IJC agreed with the coordinated review that the RAP is an excellent Stage 1 document, and that further exploration is needed in the Stage 2 submission on the potential interrelationships between the degradation, related resource use considerations and remedial options designed for the area. Additional information on the public involvement process was also considered helpful.

A Record of Decision in late 1990 taken by U.S. EPA under Superfund requires the General Motors Corporation to remediate all contamination from its plant and the surrounding area in Massena, New York and cap the plant's landfill. In 1983, the central foundry at the plant in Massena — part of the St. Lawrence River Area of Concern — was placed on the national priority list as a Superfund site. PCB contaminated soils and sediment were found onsite and have migrated onto the neighboring St. Regis Mohawk Indian reservation and nearby waterways. The expected cost for this cleanup is \$80 million. The IJC has a letter concerning this decision from the area's public advisory committee.

Administrative orders were previously issued in September 1989 to ALCOA and Reynolds Corpora-

tion to investigate and remediate their sites and the upstream Grasse and Raquette Rivers, respectively. Since then, ALCOA has spent over \$7 million to reduce flow and increase treatment at two of its five outfalls, and remove PCB contaminated sediment and soil below a third outfall and from a small nearby marsh. The Reynolds Metal Corporation has installed a carbon treatment system in one outfall, eliminated another, is collecting and treating discharge from a third outfall, and has removed contaminated soil and sediment below two outfalls. Thus far pollution abatement measures have cost the corporation over \$2.25 million.

Over 160 citizens, government agency officials, scientists and others met to discuss the status of RAPs in Michigan early last December. Hosted by the state's Department of Natural Resources, the day-long workshop provided an update on the RAP for each Area of Concern in Michigan, how the plans relate to other state programs, and included discussion of future directions.

Several ideas were presented by attendees for public participation in the plans' continued development and implementation. Two proposals — for the development of a state-wide public advisory council for Areas of Concern and an annual RAP workshop — were agreed to immediately by the DNR. For more information on the workshop and its outcomes, contact Susan Benzie, Michigan Department of Natural Resources, P.O. Box 30028, Lansing, MI 48909. (517)335-4188.

THE IMPACTS OF GREENHOUSE GAS WARMING IN THE TRANSBOUNDARY REGION

The following article is based on a presentation given by Dr. Lester Machta during the appearance of the International Air Quality Advisory Board before the IJC at its October 1990 semi-annual meeting.

In advising the International Joint Commission (IJC) on broad issues and trends relevant to transboundary air quality, the International Air Quality Advisory Board has given a series of brief presentations in which the state of knowledge and implications of the so-called greenhouse gas warming in the transboundary region have been reviewed. The text below summarizes the third presentation dealing with the impacts of potential greenhouse gas warming and briefly notes the Board's previous conclusions.

The Past and Future Climate

In its first presentation, the Board reported that for weather stations in the transboundary region, there was a warming of ground level temperature and an increase in precipitation during the last 70 to 90 years. Next, the Board reported on predictions of future change of temperature and precipitation in the transboundary region. There seems to be fairly unanimous opinion that a warming

in the next 70 or so years of 1 1/2 to 4 1/2 degrees Celcius or 3 to 8 degrees Fahrenheit is likely. But while most climate predictions expect the annual precipitation to increase, effects on crucial summertime rainfall in continental areas is in much dispute with some climatologists expecting a reduction. However, all agree there is a strong measure of uncertainty in the predictions in specific areas of either temperature or precipitation change. Virtually every prediction is qualified.

This presentation looks at what matters most: the impacts on life and property on the transboundary region of climate change in the next 70 years or so. All of the statements about such impacts must now be doubly qualified for the uncertainty in the climate prediction and because of additional doubts about their impacts. These assorted uncertainties will haunt the final discussion on greenhouse gas warming that the Board will present to the IJC in its next report. It will deal with the problem of what should or should not be done to accommodate or prevent the unwanted changes. The question invariably asked is, "What if you spend large amounts of money and disrupt society and you're wrong?"

Impacts

The picture painted in the Board's current semi-annual report of impacts due to greenhouse gas warming in the next 70 years is a relatively benign one. The worst impact is sea level rise and it is argued that this rise over the next 70 years will be about a foot-and-one-half or less. This is approximately two or three times the rate of sea

Many questions remain concerning how our atmosphere will change in the coming decades



level rise that we think has been going on for the past 70 or more years. If the expected rate of sea level rise of one to two feet per century is correct, it is likely that society would be capable of adapting to it.

The second most serious problem is the impact of warming and precipitation change on food supplies. Here, the evaluation is one of confusion due to uncertainties rather than great concern or complacency. If rainfall during the agricultural growing season decreases as one model prediction expects, then there should be very great concern. If rainfall increases slightly, together with a warming, agriculture could benefit. In either case, the warming will tend to desiccate plants and force them to use more water. The fertilization of plants and trees by the elevated carbon dioxide reduces water requirements and stimulates growth. This carbon dioxide fertilization effect is quite certain — current commercial greenhouses often increase the carbon dioxide concentration to improve growth. Some

warming is also likely, but whether rainfall during the summer will increase or decrease in the Great Plains region is highly uncertain.

Small changes in average temperature over decades are usually not considered a frightening prospect in a culture that is changing so fast anyhow. Usually people are more bothered by the extremes of temperature — protracted heat waves or cold spells — or extremes of precipitation causing droughts or floods. But there are few, if any, meteorologists bold enough to predict that there will or will not be more numerous weather extremes when greenhouse warming occurs.

The trouble with this “it’s not so bad” picture is that it may be wrong. True, the moderate picture may even be too pessimistic if the climate does not change or if change brings improvement. But, as far as we know, there is an equal chance that the changes will be worse than the most likely predictions. There is enough water tied up in the earth’s ice caps that the melting of even a

small part could be devastating. We talk of climate changing slowly, as in the past. But unexpected feedback mechanisms could speed things up and we would lose the time to adjust to the changes. The unexpected could also pervade the area of climate impacts. Weeds could grow so fast that they might negate all the advantages of carbon dioxide fertilization for food crops. Parts of the current transboundary ecosystem which cannot adapt to changes might be permanently lost or their replacements might be less desirable.

Conclusion

One could go on with hypothetical bleak pictures which do not necessarily strain incredulity. Currently, though, the most likely predictions of impacts are more or less as we portrayed them. But many of the extremes of future climate and weather and their impacts, the horror stories, are still within the realm of possibility.

EVENTS

International Joint Commission Schedule of Meetings

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

March

- 5-6 Biological Effects Subcommittee
Windsor, ON
- 6-7 Task Force on Data
and Information Needs
Toronto, ON
- 11 Great Lakes Education
Advisory Council
Detroit, MI

April

- 8-9 Great Lakes Water Quality Board
Washington, DC
- 9-12 IJC Semi-Annual Meeting
Washington, DC
- 11-12 IJC Legislative Roundtable
Washington, DC
- 24 Virtual Elimination Task Force
Public Meeting
Milwaukee, WI (tentative)

May

- 1 Virtual Elimination Task Force
Public Meeting
Hamilton, ON
- 15-17 Great Lakes Science Advisory Board
Michigan City, IN
- 21-23 Second Roundtable on Zero Discharge
Thunder Bay, ON

June

- 10-11 Great Lakes Water Quality Board
Toronto, ON
- 12-13 IJC Executive Meeting
Waterville Valley, NH

For registration inquiries contact Pollution Control Association of Ontario, 63 Hollyberry Trail, North York, ON M2H 2N9. (416)502-1440. For any further information contact conference chairman, Brian Evans, Proctor & Redfern Ltd. (416)445-3600 or Fax: (416)445-5276.

An **Interdisciplinary Symposium on Agriculture and Water Quality** will be held at the University of Guelph, Guelph, ON on April 23-24, 1991. The state-of-the-art in contaminant sources and biophysical processes, impacts and risks, and perception and policy responses will be presented to assist the choice of research and policy priorities.

For further details contact Murray Miller, Centre for Soil and Water Conservation, Richards Building, University of Guelph, Guelph, ON N1G 2W1. (519)824-4120 ext 2482, Fax (519)824-5730.

The Institute for Earth Education will present its **Sixth International Earth Education Conference** on Star Lake Campus, Potsdam College, SUNY, Star Lake, New York on May 1-5, 1991. The conference will include program previews, hands-on activities, instructional workshops and special sessions.

For registration and/or information contact The Institute for Earth Education, Box 288, Warrenville, IL 60555. (509)395-2299.

The Canadian Foundation for Economic Education is sponsoring a national conference on **The Economy and the Environment: Strengthening the Partnership**, May 12-14, 1991 at the Radisson Hotel in Toronto-Don Valley, Ontario.

For more conference information contact Karen Helps, Canadian Foundation for Economic Education, 2 St. Clair Avenue West, Suite 501, Toronto, ON M4V 1L5. (416)968-2236 or Fax (416)968-0488.

General Conferences

An International Symposium on **Water Diversions and Pipelines** in the Great Lakes Basin will be held March 12-13, 1991 at the Waterloo Inn, Waterloo, Ontario, sponsored by the Water Network at the University of Waterloo. The purpose of the symposium is to bring together people knowledgeable about present water pipelines and diversions in the Great Lakes basin.

For further information contact Marie Sanderson, director, The Water Network, Faculty of Environmental Studies, University of Waterloo, Waterloo, ON N2L 3G1. (519)885-1211 ext 6962 or 2433.

Great Lakes Fisheries: A Resource Under Stress, is the theme of a conference to be held on March 21, 1991 at Michigan State University. Topics include the effects of contaminants on fisheries and fish consumption by

wildlife; impacts of exotic species on the fisheries resource; history and future of sea lamprey control; values and expectations of fisheries users; fish stocking; allocation and management of the fisheries resource; and perspectives on the future of the Great Lakes. The conference is free and open to the public.

For further information or a conference brochure, contact Lois Wolfson, Institute of Water Research, 334 Natural Resources, Michigan State University, East Lansing, MI 48824. (517)353-3742.

The annual conference of the **Pollution Control Association** will be held at the Brock Hotel, Niagara Falls, Ontario on April 21-24, 1991. Topics covered range from site remediation, Great Lakes cleanup, industrial waste treatment solutions, plant operations, and the impact of MISA on industry and municipalities to environmental legislation and new technologies.

The **1991 International Great Lakes St. Lawrence Mayors' Conference** will be held from May 14-17, 1991 at the Radisson Hotel and Conference Center in Merrillville, Indiana. For more information contact Barbara Waxman, Lake Michigan Marina Development Commission, 8149 Kennedy Avenue, Highland, IN 46322. (219)923-1060.

An **International Museum's Day Festival** sponsored by the St. Catharines Historical Museum will be held on Lock 3 of the Welland Canal on May 18, 1991. To receive more information on the museum and festival contact Suzanne Melville, St. Catharines Historical Museum, P.O. Box 3012, St. Catharines, ON L2R 7C2. (416)984-8880.

The Canadian Water Resources Association and Waterscapes Inc. will present an international conference on **Water Management for the Sustainable Environment** from June 3-7, 1991 in Saskatoon, Saskatchewan, Canada.

To obtain further information on Waterscapes '91 contact Dr. W. Nicholaichuk, #3-3002 Louise Street, Saskatoon, SK S7J 3L8. (306)373-9089 or Fax (306)373-3778.

The **Third Annual Process Design Workshop on Industrial and Toxic Wastewater Management** will be held at the Waterloo Inn, Waterloo, Ontario on June 10-14, 1991. This practical, applications-oriented workshop will cover process fundamentals, design and application, hands-on experience in problem solving and demonstration of various state-of-the-art technologies.

For more information contact Evelyn James, Computational Hydraulics, Inc., 36 Stuart Street, Guelph, ON N1E 4S5. (519)767-0197.

A short course on the **Design of Water Quality Monitoring Networks**, June 10-14, 1991 and on **Activated Sludge Process Control**, June 24-28, 1991 will be given at Colorado State University. For additional information contact Thomas G. Sanders, Department of Civil Engineering, Colorado State University, Fort Collins, CO 80523.

The International Institute for Civil Engineering is also offering a series of short courses for continuing professional education and/or academic credit. For more information on these courses contact Janet Lee Montera, Department of Civil Engineering, Colorado State University, Fort Collins, CO 80523. (303)491-7425 or Fax (303)491-7727.

FOCUS
On International Joint
Commission Activities

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