
The following is excerpted from the 1987 Water Quality Board Report, which will be formally presented to the IJC and the public at the Commission’s Biennial Meeting on November 17, 1987 in Toledo, Ohio. Copies of the full report can be obtained from the IJC’s Great Lakes Regional Office, 100 Ouellette Avenue, Eighth Floor, Windsor, ON N9A 6T3 or P.O. Box 32869, Detroit, MI 48232. In Canada call (519) 256-7821 or in the U.S. call (313) 226-2170.

In order to properly fulfill its role as principal advisor to the Commission, the Water Quality Board in 1986 developed a Water Quality Management Strategy as a framework to facilitate the identification of program needs and the development of recommendations and schedules to resolve issues confronting the Great Lakes ecosystem.

Since its formation in 1972, the Board has provided advice on numerous issues, most notably over-enrichment, toxic substances, Areas of Concern and the general health of the Great Lakes ecosystem. The Water Quality Board translated these issues into the five components which comprise its Management Strategy:

1. The Primary Track, focusing on abatement and control of selected Critical Pollutants known to be persistent and highly toxic, and known to be present in the Great Lakes ecosystem at levels of concern.
2. The Comprehensive Track, dealing with the many chemicals reported to be present in the Great Lakes ecosystem, but about whose environmental hazard little or nothing is known.
3. Remedial action plans for restoration of Areas of Concern.
4. Tracking and control of phosphorus.
5. Reporting on the state of the lakes and on indicators of ecosystem health.

The Report of the Water Quality Board is structured around the Management Strategy. Municipal and industrial sources contribute not only to the whole lake burden of many persistent contaminants but also, in localized areas, the impact can be proportionately greater. In accordance with the goal of zero discharge and the intent to virtually eliminate the input of persistent toxic substances, the Water Quality Board recommends that:

1. Jurisdictional programs be reviewed to assure better quantification of loadings of Critical Pollutants from municipal and industrial sources and to reduce their release to the maximum extent possible.

On both sides of the border, toxic substances in municipal discharges, especially from those facilities which receive industrial influent, have not been fully characterized or quantified. To a great extent, Canadian initiatives have focused on toxic metals and relatively few selected organic compounds; adequate identification of other toxic substances is only now beginning. The United States pretreatment program has focused on the control of inorganic and organic priority pollutants. Limitations based on best available technology, water quality, treatment plant process inhibition, and municipal sludge disposal practices have been applied to industrial users of municipal systems throughout the basin. The Water Quality Board recommends that:

2. The United States and Canada provide sufficient resources and, where necessary, accelerate program development and implementation, to meet the pretreatment requirements of Article VI of the Agreement. This includes resources for education and assistance at the local level.

Chemicals in Storage

Industry, agriculture and householders often have sizeable quantities of restricted, banned or other unwanted substances in storage, perhaps forgotten or because of uncertainty about proper handling and disposal. As an example, a recent “clean sweep” program conducted by Wisconsin located a tonne of DDT in a shed. The jurisdictions should look at this and similar programs as a sensible way of addressing this aspect of the toxic substances problem. However, such programs can be successful only if accompanied with proper education as to their benefits and if there are no penalties against those who possess such chemicals.
"... persistent toxic substances has emerged as the major issue confronting the Great Lakes today."

The Water Quality Board recommends that:

3. The Great Lakes jurisdictions consider voluntary disposal programs to locate and ensure the proper disposal of restricted, banned or other unwanted chemicals.

Waste Disposal and Destruction

Of more serious concern are contaminants which reside in landfills and which, under certain conditions, can be mobilized by volatilization, surface water runoff or groundwater leaching. It is clear that land waste disposal is not disposal but, rather, only a transference of contamination from one geographic location to another and from one medium to another. The potential for future contamination remains, perhaps with a delay/lag time of decades before emergence.

Although containment of wastes may be viewed as a suitable solution by some, the Board recognizes the near impossibility of this task. The circumstances illustrate the need for a permanent solution. A combination of programs may be appropriate, in order to effect both environmental and economic benefits. The Water Quality Board recommends that:

4. Industry and governments accelerate the investigation and implementation of technologies to destroy persistent toxic substances, and accelerate incentives to reduce the production of wastes.

The Board will seek a report on progress, technological improvements and incentives to achieve this purpose.

Atmospheric Emissions, Transport and Deposition

Atmospheric transport and deposition into the Great Lakes basin, either directly onto the water surface or indirectly into the drainage basin with subsequent transport, has been clearly demonstrated. Even though the magnitude of the input (relative to other sources and pathways) has not been fully defined, the available evidence indicates that atmospheric deposition is a major pathway for contamination of the Great Lakes ecosystem.

Releases of lead to the atmosphere, primarily from automotive exhausts, have decreased as the use of leaded gasoline in the United States and Canada has decreased. Since the phaseout of the use of leaded gasoline has been proven to reduce atmospheric concentrations of lead, the Water Quality Board recommends that:

5. The manufacture and use of alkyl lead compounds be eliminated as soon as possible.

6. Canadian regulations limiting the lead content of gasoline be made more stringent, and the schedule for phasing out lead be accelerated.

Atmospheric transport and deposition of certain pesticides (e.g. DDT) into the Great Lakes continues today, even though their use has been banned or severely restricted in both the United States and Canada. These chemicals are still manufactured and used in great quantities in other locations in the world. Short of a worldwide ban on the manufacture, transport and use of these contaminants, appreciable contamination of the Great Lakes ecosystem will continue indefinitely.

The international dimensions of this problem cannot be overstated. In its 1985 Report, the Board noted that authority to regulate emissions into the atmosphere was based on clean air requirements. Since atmospheric transport and deposition of contaminants contributes to the overall degradation of the Great Lakes ecosystem, the Water Quality Board recommends that:
7. Protection of the Great Lakes ecosystem be incorporated into legislation, executive agreements and regulatory programs to control emissions of persistent toxic substances into the atmosphere.

Rural Land Runoff
Many Critical Pollutants reside in soil, where they were initially applied (e.g., pesticides) or were deposited as a result of atmospheric deposition (e.g., lead and PCB). The evidence indicates that these chemicals are strongly sorbed to soil particles, especially those containing organic matter, and are relatively immobile. However, erosion can transport sediment particles—with their attached contaminants—to the aquatic ecosystem, where they can become available to the aquatic food chain and undergo further recycling.

The contribution of contaminants from rural land runoff to the total contaminant burden of the Great Lakes has not been unequivocally established, but available data indicate that loadings may be sizeable. In order to reduce pollution of the water courses of the basin and the Great Lakes themselves from land use activities, the Water Quality Board recommends that:

8. The jurisdictions accelerate implementation of soil erosion and other control measures to reduce loadings of pesticides and other persistent toxic substances into the Great Lakes.

Monitoring conducted at the mouth of a tributary would provide an integrated measure of contaminants emanating from a drainage basin. To estimate loadings, however, the number of water and suspended sediment samples required, coupled with the cost of analysis, renders prohibitive the conduct of any long-term, large-scale monitoring program. The Water Quality Board recommends that:

9. Surveillance and monitoring be enhanced to allow development of reliable estimates of contaminants emanating from rural land runoff.

Urban Land Runoff
Studies have confirmed that runoff from urban areas contains a wide variety of contaminants including PCB, hexachlorobenzene, aldrin and dieldrin, DDT and its metabolites, mirex, polynuclear aromatic hydrocarbons, lead and mercury. These contaminants impact not only the immediate receiving water but, because of their persistence, they also contribute to the lakewide contaminant burden. The Water Quality Board recommends that:

10. Where water quality problems exist, the jurisdictions characterize and quantify discharges from stormwater and combined sewer systems and implement corrective measures.

Contaminated Sediment
The presence of persistent toxic substances in sediment remains a major concern, especially in Areas of Concern. These sediments can function as a source of pollutants into and through the food chain, preventing full restoration of the ecosystem. Federal, state or provincial programs currently do not specifically provide funding to implement comprehensive cleanup of contaminated sediment. The Board views this lack of a coordinated programmatic approach to this complex issue as a major obstacle in efforts to restore and protect the Great Lakes ecosystem. This represents a major institutional challenge. The Water Quality Board recommends that:

11. The Parties and the jurisdictions adopt and fund a comprehensive program to evaluate and remediate contaminated sediment problems in the Great Lakes ecosystem.

RESTORATION OF AREAS OF CONCERN
Since 1973, in its annual assessments of Great Lakes water quality, the Board has identified Areas of Concern (originally called problem areas). These are areas where Agreement objectives or jurisdictional standards, criteria or guidelines established to protect uses have been exceeded and remedial measures are necessary to restore all beneficial uses. Areas of Concern include the major municipal and industrial centers on Great Lakes rivers, harbours and connecting channels.

The number of Areas of Concern has changed with time due to improvements in water quality, the emergence of new problems or, based on more comprehensive data, reinterpretation of the significance of previously reported problems. Despite considerable progress, particularly in abating bacterial pollution and cultural eutrophication, there are still 42 Areas of Concern in the Great Lakes basin with serious water quality problems.

The development of remedial action plans (RAPs) represents a challenging departure from most historical pollution control efforts. Previously, separate programs for regulation of municipal and industrial discharges, urban runoff and agricultural runoff were implemented without considering overlapping responsibilities or whether they would be adequate to restore all beneficial uses. All programs, agencies and communities affecting an Area of Concern must work together on common goals and objectives in the RAP to assure its successful implementation. The Water Quality Board recommends that:

12. The jurisdictions allocate sufficient resources to complete and submit remedial action plans for the Areas of Concern.

13. The jurisdictions make every effort to involve other responsible agencies, organizations, programs, industries and concerned citizens in remedial action plan development processes to help generate and sustain the broad community support necessary to fully implement RAPs and restore beneficial uses.

14. The Parties and jurisdictions ensure that adequate resources are devoted to quantifying the sources (including industrial and municipal discharges, combined sewer overflows and contaminated sediments) and detecting and biological effects of toxic substances in Areas of Concern.

15. The International Joint Commission, through its Water Quality Board, develop a common set of criteria to determine when ecosystem conditions have been impacted enough to warrant designation as an Area of Concern and when ecosystem conditions have sufficiently improved to delist an Area of Concern.

CONTROL OF PHOSPHORUS
Phosphorus Load Reduction Plans
The 1978 Agreement established phosphorus target loads for each of the Great
Lakes. Since the first Agreement was signed in 1972, a steady decrease in phosphorus levels has occurred in the lower lakes, including a coincident improvement in ecosystem health.  
Annex 3 to the 1978 Agreement called for the Parties to confirm future phosphorus loads and to establish load reduction allocations and compliance schedules. In October 1983, the Parties signed a Phosphorus Load Reduction Supplement to Annex 3 of the 1978 Agreement. The purpose of the Supplement was to outline measures necessary to fulfill the obligations under Annex 3. Plans were required to address point and nonpoint sources and review progress toward achieving the target loads.  
The United States and Canada submitted plans to the Commission in November 1986 and April 1987, respectively. The plans affirm the allocation of load reductions between the Parties for Lake Erie. For Lake Ontario, separate initiatives were taken that may or may not lead to achievement of the target load. In order to make this determination, the Water Quality Board recommends that:  
16. The Parties resolve their differences in program requirements to meet the target load of 7,000 tonnes per year for Lake Ontario.  
The Board notes that the acceleration of United States phosphorus reduction programs called for in the plan is not taking place, particularly for programs supporting changes in tillage practices. The Water Quality Board recommends that:  
17. The United States either accelerate, where necessary, agricultural programs and commitments to implement the Phosphorus Load Reduction Plan, or take other measures to achieve the specified load reductions.  
While the creation of new national United States agricultural programs to control erosion could help reduce phosphorus loads, it is possible that these programs could have the opposite effect. This could result from a shift in the work effort to higher priority areas of rapid soil erosion in other parts of the country, outside the Great Lakes basin. The Water Quality Board recommends that:  
18. The United States adjust the priority system being used in new agricultural programs to recognize water quality benefits for the Great Lakes basin.  
The slow start for several elements of the Canadian agricultural program is of concern. The Water Quality Board recommends that:  
19. Canada and Ontario either accelerate programs to implement the Phosphorus Load Reduction Plan to recover lost time, or take other measures to achieve the specified load reductions.  
The Water Quality Board recommends that:  
20. The Parties both assign high priority to the careful conduct of the required 1988 review of progress under the Phosphorus Load Reduction Plans, and make the necessary revisions to their programs if shortfalls are identified.  

Industrial and Municipal Sources  
Phosphorus monitoring of industrial sources provides important information for evaluation of progress towards meeting phosphorus target loadings as specified in Annex 3 of the 1978 Agreement. Comprehensive industrial monitoring is critical for obtaining reliable estimates. While the 1986 point source data base has not been reviewed in detail to determine the extent of implementation of this recommendation by the jurisdictions, there are indications that pressures are mounting to simplify permits, in part by reducing monitoring requirements. The Water Quality Board recommends that:  
21. The jurisdictions require phosphorus effluent monitoring of all industrial facilities which have the potential to discharge over one tonne of phosphorus per year.  
For municipal sources, bringing 97 plants into compliance with the 1 mg/L requirement is important. This is particularly true for the 60 plants located in the lower Great Lakes basin if the Parties are to meet the phosphorus load reductions agreed to in the 1983 Supplement to the 1978 Agreement. The Water Quality Board recommends that:  
22. The Parties and jurisdictions take the necessary steps to ensure that all municipal waste-
23. The jurisdictions review and upgrade, as necessary, the performance of laboratories serving municipal treatment plants in the Great Lakes basin, to ensure that the data reported are accurate and comparable.

**Tributary Loading Estimates**

Two problems have been identified in estimating tributary phosphorus loads to the Great Lakes. These directly affect the ability to determine whether the target loads specified in the 1978 Agreement are being met. First, tributary phosphorus loadings vary naturally, because they are related to stream flow; loadings can vary enormously from year to year, depending on the amount and timing of precipitation. Second, the design of the tributary monitoring program and the timing for sample collection are critical: sampling must adequately account for major events which affect the stream flow, such as spring runoff from snow melt and rain storms. Sometimes, these two types of problems combine. The Water Quality Board recommends that:

24. The Parties, in cooperation with the Commission, develop procedures which take into account the yearly variability in tributary loading estimates due to the weather, for assessing whether the phosphorus target loads specified in the 1978 Agreement are being met.

25. The Parties identify key tributaries and ensure that sampling is conducted so that reliable phosphorus loading estimates are obtained.

**Detergent Phosphorus Limitations**

The 1972 and the 1978 Agreements advocate limitation of the amount of phosphorus in household detergents to help minimize eutrophication problems in the Great Lakes. Ohio and Pennsylvania remain the only two Great Lakes jurisdictions whose Great Lakes drainage area is not covered by a detergent phosphorus limitation. As in previous years, the Water Quality Board recommends that:

26. Ohio and Pennsylvania reconsider their previous positions and implement detergent phosphorus limitations as part of their phosphorus management strategies.

**SURVEILLANCE AND MONITORING**

Results from interlaboratory quality control/assurance programs for toxic contaminants in water, sediments and biota continue to be discouraging. This finding has two pronounced impacts on the data bases being produced and reported for the Great Lakes: the accuracy and precision of many data bases are questionable, and the compatibility of data bases produced by different laboratories is difficult to determine. Therefore, the Water Quality Board recommends that:

27. The Parties and the jurisdictions make a strong commitment to improve the quality and compatibility of the data being collected in the Great Lakes basin.

The current focus throughout the Great Lakes basin is on toxic contaminants. This emphasis needs to continue but not at the expense of the baseline eutrophication programs. Therefore, the Water Quality Board recommends that:

28. The Parties and the jurisdictions implement surveillance and monitoring as outlined in the Great Lakes International Surveillance Plan, to track ecosystem response to phosphorus control programs.

Furthermore, the Parties are required to undertake (in 1988) a review of progress under the Phosphorus Load Reduction Plans. The review will include an examination of the adequacy of the existing phosphorus load data base. In response to the observed increasing trend in nitrate-nitrogen concentrations throughout the Great Lakes basin and the recommendations of the Commission in its Third Biennial Report, the Water Quality Board recommends that:

29. The Science Advisory Board examine the actual and potential effects of present and increasing nitrogen levels in the Great Lakes ecosystem and address the question of establishing an Agreement objective.

30. The Parties and the jurisdictions provide to the Water Quality Board, existing data on sources of nitrogen to the Great Lakes basin, for use in evaluating their relative contributions.

Concentrations (of dieldrin) measured in lake trout, bloater chubs and herring gull eggs from the Lake Michigan basin remain above the Agreement objective and the fish consumption advisory level (0.3 mg/kg in the edible portion of the fish). Therefore, the Water Quality Board recommends that:

31. The Lake Michigan jurisdictions undertake (in 1988) a review of progress in identifying and determining the relative contributions from all sources, to ascertain if active sources remain and what remedial actions can be taken to reduce concentrations in Lake Michigan fish.

Impairment of Great Lakes biota is frequently correlated with the presence of persistent toxic substances. Therefore, the Water Quality Board recommends that:

32. The Parties and the jurisdictions initiate studies to better define cause-effect relationships between concentrations and loadings of persistent toxic substances, and changes in Great Lakes biological communities.

The following is excerpted from the 1987 Science Advisory Board Report, which will be formally presented to the IJC and the public at the Commission’s Biennial Meeting on November 18, 1987 in Toledo, Ohio. Copies of the full report can be obtained from the IJC’s Great Lakes Regional Office, Information Services, 100 Ouellette Avenue, Eighth Floor, Windsor, ON N9A 6T3 or P.O. Box 32869, Detroit, MI 48232. In Canada call (519) 256-7821 or in the U.S. call (313) 226-2170.

The Great Lakes Science Advisory Board has come to accept that it is unrealistic to assume that we can effectively manage systems as complex as the Great Lakes or Great Lakes Basin Ecosystem; what we can do is influence human uses and abuses of the natural resources systems on which we depend. Based on this belief the Board recommended to the International Joint Commission in July 1978 the adoption of an ecosystems approach to restoring and maintaining the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem. In November of that year the Governments of Canada and the United States incorporated the ecosystem concept into a revised Great Lakes Water Quality Agreement. The words “integrity” and “ecosystem” were specifically linked in the preamble to that Agreement.

The Great Lakes Science Advisory Board has restructured its activities to address two major priorities: integrative science in respect to an ecosystems approach to managing human uses and abuses of the Great Lakes Basin Ecosystem, and persistent toxic chemicals. There is a growing consensus among organizations with basinwide interests on the necessity of an ecosystems approach because most problems are intractable without it.

Accordingly, the Science Advisory Board’s primary concern is with values and strategies for cooperative problem solving to overcome the comparative lack of integration and cooperation among separate political jurisdictions and agencies concerned with social, environmental and economic interests. This concern lies with the development of equitable and sustainable relationships between the human components of the Great Lakes Basin Ecosystem and the ecosystem as a whole.

The Board continues to view persistent toxic chemicals and their impact on the Great Lakes Basin Ecosystem as the most pressing issue under the terms of the Great Lakes Water Quality Agreement. In accordance with its strategic plan, the Science Advisory Board will be giving specific attention to the identification and control of problems and threats arising from toxic substances.

In addition to the above priorities, the Board expects to contribute to other initiatives, specifically the process of developing remedial action plans in designated Areas of Concern. All programs, agencies and communities affecting an Area of Concern must work together on common goals and objectives, using an ecosystems approach. The process of developing remedial action plans may in fact constitute a first and necessary step in implementing an ecosystems approach.

In 1986 the Commission was given a Great Lakes Levels Reference by the Governments of the United States and Canada. The Science Advisory Board offered to assist the Commission in examining systemic effects of fluctuating lake levels. Given an ecosystems approach, the Board’s concerns fall into three main areas: the need to predict trends in lake levels, ecosystemic effects of major fluctuations in lake levels and the socioeconomic consequences of these changes.

What follows is a consolidated list of recommendations received by the Board through its infrastructure. While all these recommendations are of interest to the Commission, many are directly pertinent to other international organizations (e.g. Great Lakes Fishery Commission), governments (e.g. municipal, regional, provincial, state and federal agencies), internal advisory groups (e.g. the Water Quality Board, the International Air Quality Board, the Council of Great Lakes Research Managers), and SAB subunits.

RECOMMENDATIONS ON POLICY AND PROGRAMS

1. An ecosystems approach is required for the control of toxic chemical emissions, many of which originate outside the Great Lakes basin. Particular attention must be paid to institutional obstacles to the control of sources contributing to the deposition of toxic chemicals in the Great Lakes basin. For example, existing laws and regulations fail to address satisfactorily the long-range transport and distant impacts of airborne contaminants.

2. The Commission should ensure that there is a unified international emergency prevention plan which encourages Great Lakes jurisdictions to establish a clear delineation of responsibilities and provides research and guidance to local communities, thus minimizing the risk and impacts of spills.

3. There is a need to investigate the issue of responsibility and liability in the event of a disaster resulting from a major spill in the Great Lakes Basin Ecosystem. In accordance with Annex 9 of the Water Quality Agreement.
"The process of developing remedial action plans may in fact constitute a first and necessary step in implementing an ecosystems approach."

4. There is a need to promote the development of a corporate ethic toward the ecosystem and associated codes of practice for persons involved in the design of technical systems, operator training, and human motivation and interaction in work situations.

5. Each state and province in the Great Lakes basin should be encouraged to establish and assist in programs for use at each age level to provide basic information on the ecological and cultural history of the Great Lakes Basin Ecosystem, on how human activities interact with and affect that ecosystem, and on the importance of protecting the lakes from human abuses.

6. Risk analysis should be used for determining the relative risks associated with pollution from contaminants and other perturbations to Great Lakes biota and regional human populations.

7. Complete public participation programs for the Areas of Concern should be initiated to establish community goals and wishes. The causal, socio-economic-environmental interactions that contributed to the degraded conditions should be studied to identify the ecosystemic modifications necessary for rehabilitation.

8. Lake Superior should be maintained as a balanced and stable oligotrophic ecosystem with the lake trout as the top aquatic predator and Pontoporeia hoyi as the major benthic macroinvertebrate of the coldwater community.

9. Additional studies on fish tumour incidence, pathology and etiology, and underlying causes should be funded.

10. Mesocosm research facilities are required in the Great Lakes to conduct controlled, field-oriented experiments on the effects of toxic substances and other stresses on aquatic biota.

11. The concentration of total zinc in an unfiltered water sample should not exceed 10 micrograms per litre to protect aquatic life.

**RECOMMENDATIONS ON MONITORING AND SURVEILLANCE**

1. In order to enhance monitoring efforts, the Commission should urge the Parties to adopt a uniform and comprehensive reporting system for the spills of hazardous substances and hazardous wastes, and offer to coordinate the attainment of such a system.

2. Water quality and fisheries agencies should coordinate monitoring activities, standardize techniques, and establish and maintain long-term data sets to evaluate the effects of water quality and fisheries management activities separately as well as in terms of their potential additive effects.

3. A centralized system should be established for data storage and monitoring programs (biotic, including fish health indicators and selected species of birds and mammals, and abiotic including data on atmospheric deposition of toxic chemicals).

4. Once the known sources of contamination have been eliminated, a protocol should be devised for remediating contaminated sediments, and be applied to two or more areas in the Great Lakes basin.

5. Data on organo-tins and the toxicological significance of organo-tins should be reviewed and through additional monitoring, their sources, distribution and present levels be determined.

6. The Water Quality Board should be asked to monitor and report in greater detail on the quantities, trends and causes of spills including human factors.

7. There is a need for the Parties to establish specimen banks for archiving eggs, tissue and in some cases, whole carcasses of birds, mammals, fish and other selected aquatic organisms both now and in the indefinite future.

8. Data to permit the evaluation of the health of the Lake Superior ecosystem should be collected. In addition, it is probable that comparable objectives and measures of system health will be described for Lakes Huron and Michigan in the next year. It is recommended that similar data for these two lakes be collected and
coordinated among researchers and the Great Lakes Fishery Commission.

9. Because fish-eating birds and mammals are strongly affected by contaminants, these biota should be utilized as integrative indicators of ecosystem health.

10. Edible portions of fish (suitably defined) should be analyzed for both inorganic and organic species of lead, along with the age and species of fish analyzed.

11. Lead concentrations in fish in the St. Lawrence River should be monitored so that potential human exposure can be assessed more reliably and changes in potential exposure noted.

12. Studies should commence on the effects of changes in food web dynamics on the levels of toxic substances in Great Lakes sport and commercial fishes.

13. Additional indicator organisms should be selected for more effectively measuring changes in nearshore planktonic and benthic communities.

RECOMMENDATIONS ON RESEARCH

1. There is a need for research on the effects of toxic contaminants on humans including the measurement of body burden, multi-generational effects, metabolic impact, immunological impact, the effects on diseases and the application of new technologies.

2. There is a need to determine and quantify modeling coefficients required to calculate mass balances for specific toxic chemicals for each of the Great Lakes and thus estimate the relative contribution of the atmosphere as a source and sink for these chemicals.

3. An integrated research and monitoring network needs to be established to measure the atmospheric deposition of toxic chemicals. The research component should be established first at master stations.

4. Models of aquatic fate and recycling of toxic chemicals need to be better validated and should be linked to atmospheric transport and fate models for the same chemicals.

5. The results of studies in Areas of Concern such as Hamilton Harbour and the Grand Calumet River should be monitored and evaluated for the social learning processes inherent in them and with reference to the Green Bay experience. Pertinent knowledge gained from such experiences should be used to develop site-specific remedial action plans for the 42 Areas of Concern identified by the Water Quality Board.

6. Research is needed on the rates and reversibility of the sorption of contaminants on particulate material, the rates and significance of methylation of metals, and the biodegradation processes in contaminant breakdown in sediments.

7. Pathways, quantification of fluxes of contaminants, and microbiological/chemical interactions of contaminants in sediments need to be more clearly identified.

8. Research is needed on the effects of changes in food web dynamics on the levels of toxic substances in Great Lakes sport and commercial fishes.

9. Research is needed on factors affecting alewife abundance and how that abundance affects lower trophic levels and water clarity.

10. Research is needed on the influence of water hardness on the toxicity of forms of zinc to aquatic organisms.

11. Continued research is needed on clinical and biochemical measurements of stress and on the mechanisms of toxic action in the biota, including studies of etiology of fish tumors.

12. An understanding is needed of why people in the Great Lakes basin are reluctant to accept facilities for the destruction of PCBs that have been accepted in other countries.
JUNE

<table>
<thead>
<tr>
<th>Lake</th>
<th>Recorded Level</th>
<th>Maximum Level</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior</td>
<td>600.69</td>
<td>601.77</td>
<td>1986</td>
</tr>
<tr>
<td>Michigan-Huron</td>
<td>580.25</td>
<td>581.07</td>
<td>1986</td>
</tr>
<tr>
<td>St. Clair</td>
<td>575.66</td>
<td>576.51</td>
<td>1986</td>
</tr>
<tr>
<td>Erie</td>
<td>572.80</td>
<td>573.70</td>
<td>1986</td>
</tr>
<tr>
<td>Ontario</td>
<td>245.61</td>
<td>248.06</td>
<td>1952</td>
</tr>
</tbody>
</table>

JULY

<table>
<thead>
<tr>
<th>Lake</th>
<th>Recorded Level</th>
<th>Maximum Level</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior</td>
<td>600.81</td>
<td>601.91</td>
<td>1986</td>
</tr>
<tr>
<td>Michigan-Huron</td>
<td>580.14</td>
<td>581.28</td>
<td>1986</td>
</tr>
<tr>
<td>St. Clair</td>
<td>575.68</td>
<td>576.57</td>
<td>1986</td>
</tr>
<tr>
<td>Erie</td>
<td>572.82</td>
<td>573.68</td>
<td>1986</td>
</tr>
<tr>
<td>Ontario</td>
<td>245.30</td>
<td>247.74</td>
<td>1947</td>
</tr>
</tbody>
</table>

AUGUST

<table>
<thead>
<tr>
<th>Lake</th>
<th>Recorded Level</th>
<th>Maximum Level</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior</td>
<td>600.98</td>
<td>602.04</td>
<td>1986</td>
</tr>
<tr>
<td>Michigan-Huron</td>
<td>579.98</td>
<td>581.34</td>
<td>1986</td>
</tr>
<tr>
<td>St. Clair</td>
<td>575.48</td>
<td>576.45</td>
<td>1986</td>
</tr>
<tr>
<td>Erie</td>
<td>572.52</td>
<td>573.37</td>
<td>1986</td>
</tr>
<tr>
<td>Ontario</td>
<td>244.71</td>
<td>247.45</td>
<td>1947</td>
</tr>
</tbody>
</table>

SEPTEMBER 1-15, 1987

<table>
<thead>
<tr>
<th>Lake</th>
<th>Recorded Level</th>
<th>Maximum Level</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior</td>
<td>600.89</td>
<td>602.05</td>
<td>1985</td>
</tr>
<tr>
<td>Michigan-Huron</td>
<td>579.72</td>
<td>581.26</td>
<td>1986</td>
</tr>
<tr>
<td>St. Clair</td>
<td>575.28</td>
<td>576.31</td>
<td>1986</td>
</tr>
<tr>
<td>Erie</td>
<td>572.27</td>
<td>572.96</td>
<td>1986</td>
</tr>
<tr>
<td>Ontario</td>
<td>244.29</td>
<td>246.91</td>
<td>1947</td>
</tr>
</tbody>
</table>

1987 Great Lakes Levels and Flows: Dry Weather Helps to Lower Water Levels During Summer Months

Dry weather in some parts of the Great Lakes basin and higher than average temperatures over much of the basin resulted in some modest favourable effects on water levels over the summer months. As a result, Lakes Superior and Ontario reached levels slightly below long-term averages.

While Lakes Michigan, Huron, St. Clair and Erie reached levels of 8-12 inches below those of one year ago, they are still substantially above their long-term average. Hence the danger of flooding and shoreline erosion during storms continued to exist at locations on the middle lakes.

Precipitation was 50 and 80 percent of normal in June for Lakes Superior and Michigan-Huron respectively, while Lake Erie received 40% more than the average June precipitation and Lake Ontario received 20% more than normal. Lake Superior was the only lake where precipitation was higher than normal in July (128%), while Lakes Michigan-Huron, Erie and Ontario received 65, 87 and 96 percent, respectively.

Heavier precipitation in August over all lakes except Ontario (103% of normal for August on Superior, 170% for Michigan-Huron, 161% for Erie and 73% for Lake Ontario) caused some localized flooding.

Lake Superior outflows continued according to Plan 1977, with flows reduced from 76,000 cubic feet per second (cfs) in June to 55,000 cfs in July. August and September: Emergency storage of 30,000 cfs months from previous IJC actions remained on the lake.

Lake Ontario outflows continued according to Criterion (k), which provides relief to riparians upstream and downstream of the St. Lawrence River power projects. However, high discharge rates combined with dropping Lake Ontario levels caused low water levels along the St. Lawrence River, which have led to concerns for recreational boating. On July 27, the IJC determined that outflows higher than those called for by Plan 1958-D were no longer required and that actual lake levels (without accounting for previous over-discharges) should be used to determine outflows.

Monthly summaries of recorded water levels for June-September 15, 1987 and maximum levels for each of the lakes are presented at left. Recorded water levels are stated in elevation (in feet) above sea level.
Up to 98 percent of the potential risk of developing cancer from pesticide residues on food grown in the United States could be eliminated if the federal government were to set uniform standards for those residues, according to a report released in late May by the National Academy of Sciences. The study focused on 28 pesticides and concluded that the cancer risk would be reduced dramatically if the U.S. Environmental Protection Agency (EPA) applied the same standards to both old and new chemical compounds found on processed and raw food.

Many older pesticides are not as strictly regulated as new chemicals because they were not tested as rigorously as the tests performed by the EPA in the last decade. Almost 90 percent of the potential cancer risk, according to the report, is posed by the pesticides registered with the EPA before 1978. Milk, meat and poultry products, and many fruits and vegetables also are not subject to the strict standard that regulates pesticide residues on additives in processed food.

Study participants also researched the use of the Delaney Clause of the Food, Drug and Cosmetic Act, which bans the use of any pesticide as a food additive for human consumption if it has been shown to be carcinogenic in any animal species. While the agrichemical industry has been urging revision or modification of the clause as a barrier to greater use of pesticides, research by the study panel found that the Delaney Clause has been directly applied to ban a pesticide fewer than ten times since the law was enacted more than 20 years ago.

The study recommends that a uniform, negligible-risk standard should be set on all pesticides and food. Such a standard would define an estimated risk of cancer in one out of every million people exposed over a lifetime. Academy panelists stressed that the analysis determines the possibility of risk rather than an actual assessment of risk associated with these pesticide residues. The study was completed at the request of the EPA.

The Ontario Ministry of the Environment has launched a $500,000 study into underground sources of pollution contaminating the St. Clair River. A 1986 St. Clair River pollution report, completed by the Great Lakes Institute, University of Windsor, found that contaminants disposed of beneath the ground could be migrating through cracks or faults in the bedrock into the river. Abandoned oil, gas, salt and water wells were also identified as potential sources of pollution.

The ministry’s study is expected to determine precise sources of contaminants into the river, particularly from disposal wells where chemical industries deposited wastes. Phenols, hydrocarbons, caustics and brines are known to have been injected into wells by companies such as Imperial Oil Ltd., Polysar Ltd., Suncor Inc. and CIL Inc. from 1958 to 1976.

The Illinois State Geological Survey has established a computerized Lake Michigan Research Information Database, comprised of information on over 300 research projects on Lake Michigan completed since 1984 or ongoing and a bibliography of 5,000 research publications from 1960-1986. Computer searches on specific subjects are available for a small fee and a research project listing has also been published. For information, contact Nancy Peterson Holm or Beth Morgan, Illinois State Geological Survey, 615 East Peabody Drive, Champaign, IL 61820. (217) 333-6470.

A recently completed two-year study of toxic chemicals in fish-eating birds found widespread birth deformities in Great Lakes water birds. James P. Ludwig, a scientist who completed the study for the Michigan Department of Natural Resources, analyzed eggs and dead baby birds from Saginaw Bay, northern Lake Michigan and Green Bay. He found nearly one-third of Caspian tern embryos, a bird which is considered a threatened species in Michigan, with deformities. Defects included crossed or malformed beaks, club feet, no skulls, brains and hearts developing outside the body, widespread hemorrhaging and split spines.

The study indicates that deformities in birds are directly caused by toxic chemicals in the lakes. Such pollution is absorbed by small fish, which are then eaten by the birds. The study’s findings also show that toxic contamination of the lakes remains a serious public health threat, according to Ludwig.

The Third Biennial Report on Great Lakes Water Quality received a printing and layout award in August at the annual International Convention of Printing House Craftsmen, held in Toronto. Entries are submitted for various categories from the United States and Canada and are judged according to printing quality, layout, colour, choice of type and paper stock. The Third Biennial Report received an honorable mention in the multi-colour house organ category, and printer Kim Preney of Preney Printing and IJC’s graphic artist Yvan Gagné will attend the association’s banquet in November to receive the award.

A University of Wisconsin researcher has found evidence that breezes are not only blowing PCBs into Lake Michigan but are also carrying industrial pollutants out of the lake and into the atmosphere. David Armstrong, a water chemistry professor, found that PCBs are vaporizing from Lake Michigan at the rate of about 700 pounds per year. More than 50 percent of the lake’s PCBs enter from the atmosphere in rain or on PCB-contaminated dust particles that settle on the surface of the lake. The remaining amount comes either from direct dumping of the toxins or from polluted tributaries feeding into the lake.

The study’s results are expected to help other scientists to calculate more accurately how long it takes for PCB levels in polluted lakes to drop once dumping has stopped, and to determine where the PCBs have gone.
Development Stages Begin for Maumee River Remedial Action Plan

by Ed Hammett and Sally Cole-Misch

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

The Maumee River, which runs through northwestern Ohio and Toledo into southwestern Lake Erie, contributes the largest tributary load of suspended sediments and phosphorus to the lake. The major source is agricultural runoff from upstream, while discharge from municipal sewage treatment plants and combined sewer overflows (CSOs) contribute pollutants at levels which exceed Ohio water quality standards for warm water habitat. At least 25 point sources discharge into the Maumee River Area of Concern.

Water quality sampling by the Ohio Environmental Protection Agency (Ohio EPA) and the City of Toledo has documented violations of water quality standards for dissolved oxygen, ammonia, arsenic, lead, copper, zinc, cadmium, iron, mercury and fecal coliform bacteria. Fish composite indices from 1986 surveys indicated good water quality upstream of the shipping channel, but only fair conditions in the channel itself. The most impacted areas were at the mouth and the immediately adjacent Maumee Bay nearshore area.

Based on 1982 and 1984 surveys, sediments in the ship channel are polluted with oxygen-consuming materials, cyanide, arsenic, copper, nickel, zinc, iron, ammonia, total phosphorus, oil and grease. PCBs have been detected at low levels in sediments, but cannot account for elevated PCB concentrations found in tests on fish tissue.

The Dura landfill on the Ottawa River has been found to be leaking PCBs, volatile organics, phthalates and PAHs. Based on the most recent fish contaminant monitoring, PCB levels ranged from 2.1 to 11.5 mg/kg. The U.S. Food and Drug Administration action level for PCBs (for safe consumption of fish) is 2 mg/kg. The Stickney, Libbey Owens Ford and several closed Toledo landfills are known to be leaching various conventional pollutants, metals and organic contaminants.

Ohio EPA announced in late August that the Toledo Metropolitan Area Council of Governments (TMACOG) has been contracted to prepare the remedial action plan for Maumee Bay and to design and implement activities to involve local citizens in the RAP process. Dr. Richard L. Shank, newly appointed director of Ohio EPA, states: "it is important that citizens and those responsible for the problems or their solutions be involved from the start. They're familiar with the area and are most affected by the pollution problems. Since the RAP will guide future activities..."
and financing of the solutions in upstream communities, citizen and local government involvement and commitment is crucial.

Focus of the Maumee RAP will be to involve local agencies and individuals who will be responsible for further cleanup of Lake Erie in the preparation of the RAP for the lower Maumee River. Because most of the sources of the problem (including agricultural sediment and associated chemicals, combined sewer overflows, urban runoff, contamination of sediment, landfill leachate and industrial contributions) require locally generated solutions, several agencies and organizations will work together to develop a clear understanding of the problems and the solutions and to gather financial support. General principles that will govern the RAP process for the Maumee River are:

- All stakeholders (including citizens) will have the opportunity to comment during the development of the document.
- Implementors will be asked to recommend remedial actions and will be provided the opportunity to present their views.
- The goal of the RAP process is to identify the sources of documented water quality problems, recommend solutions to those problems, and obtain commitments from the major stakeholders to implement the solutions. Where this cannot be done, the problems will be identified as an unresolved issue and preliminary steps necessary to begin to resolve the issue will be recommended.
- Consensus will be sought on all issues. If consensus cannot be achieved, all relevant technical and remedial information will be presented to Ohio EPA for final decision.

Several groups have been defined and included in the RAP process in order to encourage local support for the plan. These include the general public, who will be invited to public meetings and hearings and asked to submit written comments; the organized public, such as members of yacht clubs, environmental groups, charter boat associations and others, who will also be invited to review and comment on the plan; the affected public, including those who have a specific interest in the RAP because the recommendations affect them directly (farmers, specific industries, port authorities, etc.); and all levels of local and state government.

Primary participation will be accomplished through a Remedial Action Plan Advisory Committee (RAPAC), which will be formed for the duration of the study. It will provide a forum for debate and discussion and will include representation from each of the listed groups as well as all members of the Areawide Water Quality Planning Council. Issue-oriented subcommittees will also be developed to review specific recommendations. The final RAP is scheduled for submission to the IJC’s Water Quality Board for review by December 31, 1988.

For further information about the Maumee River and the planned RAP process, contact Ed Hammett, Director of Regional Planning, TMACOG, 123 N. Michigan Street, Toledo, OH 43624. (419) 241-9155.

Great Lakes Mayors Meet in Quebec City

by Ray Lavereau
Reeve, Village of Port Stanley

The following article was excerpted with the kind permission of Municipal World (July 1987 issue) and the author.

N}

avigation, recreation, tourism, drinking water and the emerging problem of water levels provided the primary focus for this new forum seeking to identify common problems and the unique opportunities for expanding economic utilization of the Great Lakes St. Lawrence Waterway.

The first international conference was held under the auspices of the Great Lakes St. Lawrence Maritime Forum, a binational alliance established in 1983 for the expansion of commerce and trade by leading organizations of the Great Lakes St. Lawrence region. The forum includes representation from the Provinces of Ontario and Quebec and the Great Lakes Commission, which represents eight states bordering the waterway. Several federal agencies from both the United States and Canada and major Maritime industry associations are also members of the forum.

The conference, which was held in Quebec City, was first and foremost a meeting of mayors. The program was put together by an international organization committee, encompassing a wide range of topics selected to increase visibility and understanding for both the commercial navigation system and the recreation/tourism assets shared by all communities on the Great Lakes and the St. Lawrence River system.

Economic Significance

The economic significance of the region to the North American economy...
is considerable. Total population of the region exceeds 70 million. Within the area of 3,711,436 square km (1,432,987 square miles) lies the industrial heartland of North America. Almost half of the largest 500 companies are headquartered in the Great Lakes region. Two-way trade between Michigan and Canada is $32 billion. With Canada's population concentrated in the Provinces of Ontario and Quebec, the Great Lakes region also accounts for 60% of Canada's gross national product.

Delegate Rapport

It was interesting to observe the chemistry between the various representatives from cities and towns. These leaders were brought together without knowing each other, or where they came from, or the different cultural backgrounds or even different countries. Yet, they worked together to seek solutions to common problems. For example, representatives of one municipality wanted to know what to do about a minority protest group of local ratepayers, who did not want tourists. They were parading with signs telling the tourists to go home, even throwing stones at cars because the tourists were affecting their way of life. Others were concerned that the lakes and the St. Lawrence had been among the planet's most abused resources, poisoned by decades of toxic waste disposal, discharged pesticide runoff and sewage dumping. In some instances, this process of destruction is still going on. Now the states, provinces, cities and towns are seeking a remedy and striving to prevent the pollution of the Great Lakes, with notable success.

Resolutions Adopted

Four key resolutions were adopted at this first conference:

Tourism and recreation resolution: That the International Great Lakes/St. Lawrence mayors’ conference petition the governors of the Great Lakes states and the premiers of Quebec and Ontario, together with federal officials of the United States and Canada, to support and commit to a program of promotion and development of tourism and recreation opportunities of the Great Lakes and St. Lawrence region.

Environmental quality resolution: That the mayors of the Great Lakes/St. Lawrence River region urge cooperation and communication/coordination in the search for equitable solutions and that sufficient resources be pledged by the local, state, provincial and federal governments to control water levels and quality, prevent and reverse pollution trends and to otherwise protect the Great Lakes/St. Lawrence environment as a treasure for future generations.

Organizational resolutions: That the mayoral Organizing Committee remain for another year and that it establish and propose a formal organizational structure for submission to the next meeting. It was further resolved that the next annual meeting of the whole conference be held in Duluth, in the spring of 1988.

Issues resolutions: This resolution called for immediate measures to resolve the inequities in law and regulation that inhibit and restrict the competitive abilities of the Great Lakes/St. Lawrence River system. It called for the replacement of tolls with a system of user or service fees that reflect the equality of the Seaway with other coastal ranges and river systems of North America. It also called for the establishment of a minimum guarantee program for increasing the length of the shipping season of the Seaway to its practical limits, including the setting of firm opening and closing dates announced well in advance in order to allow definite planning of cargo movements.

UMI Research Collections has recently announced the availability of International Joint Commission reports published from the Great Lakes Regional Office from 1972 to 1982 in microfiche format. The collection contains over 200 titles, including reports of the boards, task forces and subcommittees completed under the 1972 and 1978 Great Lakes Water Quality Agreements. For more information, contact UMI Research Collections Information Service, 300 North Zeeb Road, Ann Arbor, MI 48106. Call toll free at 800-423-6108 in the U.S. or 800-343-5299 in Canada (in Michigan and Alaska call collect (313) 973-9821).

The Great Lakes Commission recently published two new booklets concerning Great Lakes water quality issues: Water Level Changes: Factors Influencing the Great Lakes provides an overview of the Great Lakes system, how natural and manmade events impact lake levels, and what plans have been proposed in recent years to try to modify levels. Great Lakes Shore Erosion and Flooding Assistance Programs outlines structural and nonstructural options to protect shorelines, state and federal permits and fees, as well as available programs from each of the state and federal governments to deal with shoreline erosion and flooding. Key contacts and more than 80 publications from the states and federal agencies are also listed.

Copies of the publications are available for $1.25 (US) each from the Great Lakes Commission, 2200 Bonisteel Boulevard, Ann Arbor, MI 48109. (313) 665-9135. Discounts are available for orders of 100 or more.

The ninth volume of Aquatic Toxicology and Environmental Fate and other related publications were recently made available by the American Society of Testing and Materials (ASTM). Biomonitoring, quality assurance aspects of aquatic toxicity testing, and new methods of testing are a few of the chapters included in the 548-page, hardcover book. Other publications include Aquatic Toxicology and Hazard Assessment, Community Toxicity Testing, and Rationale for Sampling and Interpretation of Ecological Data in the Assessment of Freshwater Ecosystems. For a complete listing of these and other publications, write to ASTM, 1916 Race Street, Attention: Customer Service Department, Philadelphia, PA 19103. (215) 299-5585.

Two new publications and a 30-minute documentary have been released by Sea Grant Offices. First, a free fact sheet on PCBs in Lake Michigan fish is available from the University of Wisconsin Sea Grant Institute: Eating Lake Michigan Fish answers the most commonly asked questions about PCBs in fish. Summarizes the current health consumption advisories for sport-caught fish, and explains who faces the greatest risks of developing...
health problems from eating PCB-tainted fish. Copies of this and a 50-cent reference guide on fish cleaning are available from the UW Sea Grant Communications Office, 1800 University Avenue, Madison, WI 53705. (608) 263-3259.

Michigan Sea Grant has published a bulletin on the same topic, entitled “Eating Great Lakes Fish.” The eight-page booklet explains what is considered a toxic chemical, how it contaminates fish, how to tell if a fish is contaminated and what precautions can be taken to reduce one's exposure to contaminants in fish. A 30-minute documentary, “The Trouble with Toxics:” covers sources, fate and control of contaminants, chronic effects of toxic substances, managing freshwater fisheries and prevention measures. It is available on videocassette for loan or purchase from Michigan Sea Grant Extension, 334 Natural Resources Building, Michigan State University, East Lansing, MI 48824. (517) 353-9568.

A guide to the U.S. Coastal Zone Management Act and its use in protecting fragile coasts is available for $2.00 (U.S.) from the Coastal Alliance. And Two if by Sea: Fighting the Attack on America’s Coasts also examines the impacts on the coastal zone from residential and industrial development, focusing on the Great Lakes, Atlantic and Pacific shorelines. For copies, contact Beth Millemann, Coastal Projects Director, Coastal Alliance, 218 D Street SE, Washington, DC 20003. (202) 797-6854.

Multispecies Toxicity Testing presents papers from a 1983 symposium held by the Society of Environmental Toxicity and Chemistry (SETAC) to explore the potential results of expanding chemical testing to include “nucrocosms” — artificial communities where several species interact with each other. This is in contrast to current testing performed on proposed chemicals by the U.S. Environmental Protection Agency, which are designed to test individual chemicals for a representative species only. The book is available for $44 (U.S.) from Pergamon Press, Fairview Park, Maxwell House, Elmsford, NY 10523. (914) 592-7700.

The Soil Conservation Society of America (SCSA) has added another information-packed cartoon booklet, “Plants: Improving Our Environment,” to its series of conservation education units. The booklet covers four main concepts and helps readers learn how plants are used for pollution abatement, soil conservation, beautification, building materials, fuel, medicine and other uses. An accompanying teacher's guide provides background and sources of additional information: four activity masters; and 19 multi-subject activities. The booklet is written for upper elementary grades, and discounts are available for multiple orders. For a free brochure describing all of its educational materials, contact SCSA, 7515 Northeast Ankeny Road, Ankeny, IA 50021. (515) 289-2331.

Common Boundary/Common Problems: The Environmental Consequences of Energy Production is the title of a compilation of papers from the joint American Bar Association — Canadian Bar Association conference held in March 1981. The full proceedings are available for $10.00 (U.S.) from the American Bar Association, Order Fulfillment, 750 North Lake Shore Drive, Chicago IL 60611. Ask for Product Code 399-0008-01. a $2.00 handling fee is also added.

The 1987 Consumer Directory includes a comprehensive listing of more than 12,000 individuals and 2,000 organizations concerned with natural resource management in the United States and other countries. It is available for $15.00 plus $2.50 shipping fee (U.S.) from the National Wildlife Federation, 1412 16th Street NW, Washington, DC 20036. (202) 797-6854.

Urban Waterfronts: What Makes a Difference summarizes the 1985 Urban Waterfronts conference by covering topics such as city waterfront initiatives: port-initiated waterfront redevelopments; water sport activities and waterfront wids. Resource listings and diagrams of developments are included. Contact Waterfront Press, 1536 44th Street NW, Washington, DC 20007.

The Canadian Environmental Law Research Foundation announces the release of three new publications on environmental protection in Ontario. Environmental Assessment in Ontario provides a comprehensive examination of implementation of the Ontario Environmental Assessment Act of 1976. Ontario Hazardous Waste Policy. A Provincial Forum examines hazardous waste law and policy for the province and includes proceedings of a forum discussion held in late 1986; and Pollution and the Law contains the proceedings from a February 1987 conference on recent and pending changes to environmental law. including the Spills Bill increased fines in Bill 112, the Municipal-Industrial Strategy for Abatement or MISA, and the new federal Environmental Protection Act. For ordering information contact Canadian Environmental Law Research Foundation, 243 Queen Street West, 4th Floor, Toronto, ON M5V 1Z4, (416) 977-2410.

A new set of innovative interdisciplinary acid rain projects have been incorporated into a curriculum by the Acid Rain Foundation, Inc. to teach the scientific method through actual experiments. Acid Rain: Source Projects includes experiments and exercises for grades 5-12 in the areas of Life, Earth and Physical Sciences, Biology, Chemistry, Environmental Science and Social Studies. It is available for $9.95 (U.S.) plus $2.00 postage and handling from the Acid Rain Foundation, Inc., 1630 Blackhawk Hills, St. Paul, MN 55122. (612) 455-7719.
The Detroit River serves as a boundary between metropolitan Detroit in southeast Michigan and southwestern Ontario, including the Windsor metropolitan area. The river stretches for 48 km (30 miles) between Lake St. Clair and Lake Erie and serves as a drinking water source for more than four million people. It is also one of the most heavily used commercial waterways in the world, as well as a popular sport fishing area.

At its widest point, the Detroit River spans five km (three miles); its depth varies between 12.2 and 15.2 m (40 and 50 feet). Because of its size and its rapid flow — each second more than 200,000 cubic feet of water pass beneath the Ambassador bridge connecting the two countries — the river is able to absorb enormous loads of pollution without suffering severe degradation. For many years human and industrial wastes were discharged directly into the river. Although the days of such wanton pollution are over, huge loads of unregulated pollutants still enter the water from industry, municipalities, urban and rural runoff and atmospheric deposition.

Ontario and Michigan recognize several pollution problems which impair the river’s use: mercury-contaminated sediments; PCBs in the water column, and in the fish and waterfowl; PCBs and other organic chemicals and heavy metals in the sediments; and high levels of fecal coliform bacteria.

Michigan announced in October 1986 that its DNR and Ontario MOE would identify pollution problems, develop a plan for restoring beneficial uses to the river and involve the public in the process. Shortly thereafter, a steering committee (the Detroit River RAP Team) was formed to oversee the development of the plan. Members include representatives from Environment Canada, U.S. EPA, Ontario MOE and Michigan DNR. The Southeast Michigan Council of Governments (SEMCOG) was contracted by Michigan DNR to coordinate plan preparation and public participation activities.

The RAP Team established four goals for the overall public participation program:

- inform the public
- improve the plan by gaining information and advice from an informed public
- gain support for plan implementation
- provide a mechanism for accountability to the public.

SEMCOG and its subconsultants, CRW and Associates, held four stakeholders’ meetings in Windsor and Detroit in May 1987 to obtain advice from recreational organizations, environmental groups, business, industry and government representatives on the form that public participation should take throughout the planning process.

A public meeting was also held in Windsor, Ontario in early June to receive comment from the public at large. Topics discussed at the meeting included beneficial uses of the Detroit River, water quality issues and suggestions for public participation and education. More than 75 citizens participated in small group discussions to develop priorities for the three topic areas.

As a result of these meetings, a formal citizens’ committee was created (Bilateral Public Advisory Council, or BPAC) to serve in an advisory capacity for the RAP planners. Fourteen principles were established for the BPAC, including the following:

- The BPAC is viewed as only one element of a comprehensive public participation program. Other outreach activities will also be developed, including public meetings, hearings, newsletters and other materials.
- The BPAC serves as advisory to the RAP Team, which will make all final decisions regarding preparation of the plan.
- Representatives should be included from industry, labour, government, environmental groups, the technical community, and citizens at large from the U.S. and Canada.
- Meetings of the BPAC will be open to the public. Notice of these meetings will be sent to all interested parties and each agenda will include time for public comment.
- The Council should advise the RAP Team on key aspects of the RAP preparation and adoption, including plan goals, problems to be addressed, planning methodology, technical data and plan recommendations.

For more information about the public participation process developed for the Detroit RAP, contact Patrick J. Brunett, Southeast Michigan Council of Governments, 800 Book Building, Detroit, MI 48226. (313) 961-4266.
Focus on International Joint Commission Activities, Vol. 12 [1987], Iss. 3, Art. 1

INTERNATIONAL JOINT COMMISSION

Schedule of Meetings

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

November
16-18 IIC 1987 Biennial Meeting
Toledo, OH
16-19 Science Advisory Board
Toledo, OH
19-20 Second Forum for Remedial Action Plan Coordinators
Toledo, OH

December
8-10 IIC Executive Meeting
Washington, DC

January
8 Science Advisory Board Executive Committee
Windsor, ON

February
3-4 IIC Executive Meeting
Ottawa, ON
24-26 Science Advisory Board
Erie, PA

March
2-3 Workshop on Epidemiological Consultation, Guild Inn
Scarborough, ON

General Conferences

The Eighth Annual Meeting of the Society of Environmental Toxicology and Chemistry (SETAC) will be held November 9-12, 1987 at the Hilton Hotel and Pensacola Civic Center in Pensacola, Florida. Short courses, two plenary sessions, poster presentations and concurrent sessions will focus on the chosen theme: "Environmental Risk: Recognition, Assessment and Management."

For further information, contact SETAC, P.O. Box 4352, Rockville, MD 20850, (301) 468-6704.

Local microcomputer-based groundwater data and management systems will be the focus of a two-day conference to be held November 12-13, 1987 at Western Michigan University's Business Development Center. "Policy, Planning and Resource Protection: A Groundwater Conference for the Midwest" will feature results of a three-year effort conducted by the Southwest Michigan Groundwater Survey and Monitoring Program. The conference also will present applications of hydrogeologic and groundwater quality data bases for land use planning and for public health policy.

Registration materials and additional conference information can be obtained from the Science for Citizens Center, Western Michigan University, Kalamazoo, MI 49008, (616) 383-3983.

The Banff Centre School of Management is sponsoring a seminar on the "Use of Computer Simulation Models in Resource Management" from December 6-12, 1987. The course is designed for resource managers and others who conduct resource management programs, and will include sessions on how to evaluate the role of computer models in resource management application, how to guide the development or modification of models, and how to communicate results from the process in a way which leads to effective management action. Further information is available from Felicity Edwards, Program Manager, The Banff Centre School of Management, Box 1020 Banff, AB T0L OCO, (403) 762-6133.

The Bradley Institute for Democracy and Public Values of Marquette University, in conjunction with the University of Wisconsin's Water Resources Center, will conduct a conference on "Political, Institutional and Fiscal Alternatives for Nonpoint Pollution Abatement Programs" December 7-9, 1987 in Milwaukee, Wisconsin. Participants will be selected based on submitted abstracts and/or statements of qualification Partial travel support is available.

Send pertinent information to Professor Vladimir Novotny, Conference Chairperson, Marquette University, 1515 West Wisconsin Avenue, Milwaukee, WI 53233. For information on the conference, contact C. Michael Farmer at the above address or call (414) 224-6360.

The first national gathering to consider the restoration of all natural resources and the redesign of urban areas will be held on January 13-16, 1988 at the University of California, Berkeley. The conference is organized by the Restoring the Earth project of The Tides Foundation, San Francisco, and cosponsored by the College of Natural Resources and the Center for Environmental Design Research at the University. Topics to be covered include restoration of coastal ecosystems and estuaries; rivers and lakes; streams and fisheries; forest and wildlife; atmosphere and climate; agricultural lands; urban environmental planning; and control of toxic wastes.

Information is available from Restoring the Earth Conference, 1713 C Martin Luther King Jr. Way, Berkeley, CA 94709, (415) 843-2645.