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Workshop Report. Anticipatory Planning for the Great Lakes: Volume 2 Workshop Work Group Reports, Held March 5-7, 1979, Windsor, Ontario

Great Lakes Science Advisory Board. Societal Aspects Expert Committee

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WORKSHOP REPORT

ANTICIPATORY PLANNING

FOR THE GREAT LAKES

VOLUME II - WORKSHOP WORK GROUP REPORTS

Held

March 5-7, 1979

Windsor, Ontario

Sponsored by the

INTERNATIONAL JOINT COMMISSION'S

SCIENCE ADVISORY BOARD

THROUGH ITS

SOCIETAL ASPECTS EXPERT COMMITTEE

IJC GREAT LAKES REGIONAL OFFICE

WINDSOR, ONTARIO

FEBRUARY, 1980
Statements and views presented in this Summary Report are those of the participants and do not necessarily reflect the views and policies of the International Joint Commission or those of its Science Advisory Board and Committees framework. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.
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The International Joint Commission (IJC) was established under the Boundary Waters Treaty of 1909. It consists of six Commissioners, three from Canada and three from the United States. A Commissioner of each section is chairman. The Commissioners act as a single body seeking common solutions, with decision reached by majority.

The Treaty was established to aid in settling and preventing disputes regarding the use of boundary waters, by means of joint deliberations of the Commission. Headquarters of the Commission are located in Ottawa, Ontario and in Washington, D.C., for the Canadian and United States Sections, respectively.

Three categories of Commission responsibility derive from the 1909 Treaty:

- decisions regarding the approval of applications for the use, obstruction or diversion of boundary waters or of works affecting boundary water levels;
- undertaking investigations and studies of specific problems along the common frontier when requested by one or both Governments as a Reference; and
- decisions on questions or matters of difference referred by the Governments.

The international advisory Boards assist the Commission by organizing and preparing required technical studies and field work. Board reports to the Commission are made public and public hearings are held so that individuals, organizations and governments may comment. The resulting information together with the Board report, is used when the Commission reports to both Governments with its recommendations. These reports are also made public.

In 1972 the Great Lakes Water Quality Agreement was signed by both countries. After extensive review a new Agreement was signed in 1978, to restore and enhance the water quality of the Great Lakes. The Governments have given to the Commission specific responsibilities and functions to assist them in the implementation of the Agreement. Included in these responsibilities is the requirement to tender advice and recommendations. The Agreement also provided for two international boards to assist the Commission, the Great Lakes Water Quality Board and the Science Advisory Board. Secretariat functions are provided by the IJC Regional Office, established under the Agreement in Windsor, Ontario in 1973.
This report presents the findings of the Workshop on Anticipatory Planning held March 5-7, 1979 in Windsor, Ontario. The Workshop was sponsored by the Expert Committee on Societal Aspects, Science Advisory Board of the IJC under the Commission's authority to carry out the terms of the Great Lakes Water Quality Agreement of 1978.

The Workshop was an experiment to determine how the IJC could be better informed about unmet current or emerging problems affecting the Great Lakes in order to increase its ability to advise the Governments of the United States and Canada. During this experiment the participants were asked three questions:

1. On the basis of what you are aware of now, to what particular issues should the IJC be alerted and monitor, and what do you see their implications to be in terms of possible consequences or impacts on the resources and environment of the Great Lakes Basin?

2. Assuming that the IJC should be in touch with important developments and events in the making, in your considered opinion what particular organizations, groups or individuals should they get in touch with in the areas with which you are familiar?

3. How would you suggest this communication be organized and carried out: that is, what would be the best way to proceed; how closely should contacts be maintained; and so on?

This report (Volume II) includes the detailed reports of the work groups engaged in the Workshop and is supplemented by a Summary (Volume I), published separately.

The Societal Aspects Expert Committee expresses its gratitude to the Workshop Committee which organized the Workshop, prepared these reports, and to the 95 persons who volunteered valuable time to participate. Names of persons involved in these activities are listed in Appendix 1.

Our thanks go to those members of the IJC Windsor Office who made significant contributions to the Workshop and to preparing this report.
MAJOR RECOMMENDATIONS

The five major recommendations that emerged from the participants at the Workshop are:

1. It is imperative that the Governments of Canada and the United States confirm in writing their expectation that the IJC take the initiative to advise them on unmet current or emerging problems in order for the countries to respond to these problems in a timely manner, with emphasis to be placed on preventive measures.

2. The anticipatory planning process initiated by the Workshop be continued as a means of providing up to date information to the IJC on these problems.

3. The IJC should establish a special panel or advisory board to assist in developing specific program elements to carry out this process.

4. The need for an integrated/ecosystem management approach, recognizing the interrelationships of water, land, air, and biological and social systems, be strongly supported and continue to be the adopted policy of the IJC and the two Governments. Close collaboration among the Parties to develop improved implementation strategies is essential if this policy is to be successful.

5. The underlying priority task to facilitate the above recommendations as well as the more specific "next steps" noted in this report, is an arrangement to provide the IJC with information and analysis capability from a Great Lakes Basin wide perspective.

Detailed recommendations following from the main themes identified during the Workshop, are presented in Volume I - Summary.
The letter can be summarized as follows:

1. It is important that the governments of Canada and the United States continue to maintain peaceful relationships. The U.S. should take the initiative to develop and maintain a climate of understanding and cooperation.

2. The participation of these two nations will be a key factor in maintaining peace and prosperity in the region.

3. The efforts of both countries to establish a balance of power are essential for the stability of the region.
INTRODUCTION

The IJC and its supporting institutions are now faced with the need to become "anticipatory" and "forward looking" in dealing with problems in the Great Lakes Basin. There is no other way that commitments to "ecosystem quality" objectives and the intent of the 1978 Great Lakes Water Quality Agreement can be fully carried out.

The main responsibilities of the Commission derive now from its role in responding to requests from the United States and Canada to investigate problems arising within the common environment shared by both countries. For various reasons, the investigations are often lengthy, taking years to complete, especially when they must deal with complex and poorly understood problems like those in the Great Lakes Basin ecosystem. This approach is reactive. In practice, problems have had to be quite severe or likely to become so before the Commission has been asked to investigate them. Since authorities have delayed acting until problems reach a stage when they can no longer be ignored, solutions have proved to be much more costly and difficult, if not virtually impossible, to implement. Early detection and prevention is preferable by far.

The Governments have given the Commission a series of requests, formally called References, asking it to: determine the extent of water pollution in the Great Lakes; examine the seriousness of pollution arising from land use activities; monitor the concerted attempts by both countries to reduce pollutants discharged directly into the Great Lakes by industries and municipalities; monitor air quality at selected transboundary points; investigate additional engineering possibilities for controlling Great Lakes levels; assess the impacts of diverting water into and out of the Great Lakes Basin; and study the extent of consumptive uses of water from the Great Lakes.

The strongest commitment by Canada and the United States to do something about water quality problems is evidenced by the Great Lakes Water Quality Agreements of 1972 and 1978. Under the first agreement, Governments reduced the rate of degradation of Great Lakes aquatic ecosystems. This was done by pollution control strategies which required quite stringent reductions in the point source wastes discharged directly into the Great Lakes. Concurrently, through studies coordinated by the IJC, a better understanding of the overall extent and seriousness of the presence of toxics and hazardous substances in the aquatic ecosystems and the impact of land-based activities on water quality became evident. The 1978 Agreement is a commitment to tackle these latter problems as a matter of high priority. Because water quality was the initial concern of citizens, and subsequently of Governments, it is quite understandable that attention was devoted first to data gathering and research on water quality and aquatic fauna. The hoped for improvements from pollution control measures will also have to be looked for in the water and the biota. Preventive measures, however, require more than just a concern with water and its associated resources. Ecosystem quality problems arise from human activities on land and they ultimately have to be solved there.
This means that, in addition to stringent point source controls over waste discharges into the Great Lakes, other preventive measures will have to be incorporated more directly and explicitly into land use practices, industrial production processes and the design of development schemes. Prevention requires anticipation and early action. For the Great Lakes Basin this entails a substantially new dimension in the collective capabilities and activities of institutions dealing with Great Lakes problems. As a start it means taking the initiative to work more closely with organizations and individuals who make and implement decisions about infrastructure developments, industrial activities and land use. This requires establishing effective arrangements for communication and consultation that will allow those responsible for ecosystem quality within the overall Great Lakes Basin perspective to be alerted to impending developments before they become fixed commitments. This will at least give an opportunity to have ecosystem quality considerations taken into account early in the planning and decision processes, when there is still ample flexibility to examine options and remedial measures.

The IJC has a crucial and timely role to play. It is authorized to view the entire Great Lakes Basin, irrespective of jurisdictional boundaries. It is the chosen instrument of the two countries for dealing with ecosystem quality issues. In responding to a challenge to expand working perspectives and supporting activities, the IJC has other important assets. It is a venerable institution whose commissioners have enjoyed an enviable reputation for objectivity and balanced judgement in carrying out the tasks assigned to them over the years. In turn, they continue to receive good cooperation and support from governmental organizations in both countries. It was, essentially, for these reasons that a workshop was convened to explore what the IJC might do to help develop an anticipatory capability by drawing upon expertise from a number of sources.

APPROACH OF THE WORKSHOP

The practical question was how to develop an anticipatory capability for a binational region of some 37 million people embracing much of the urban-industrial heartland of North America. Clearly, all a workshop could do was to help develop some feasible guidelines for a futures-anticipatory process which would evolve over time. It is impossible to make definitive statements about what the results of this process will turn out to be.

The workshop was also intended to serve as one example of the kinds of consultations which are needed to create a sense of mutual awareness and cooperation among all concerned parties. It brought together over 95 people affiliated with organizations directly involved with decisions leading to development and change in the Great Lakes Basin, or who were otherwise knowledgeable about important trends and circumstances.

The participants were asked to give guidance on three interrelated questions as follows:
On the basis of what you are aware of now, to what particular issues should the IJC be alerted and monitor, and what do you see their implications to be in terms of possible consequences or impacts on the resources and environment of the Great Lakes Basin?

Assuming that the IJC should be in touch with important developments and events in the making, in your considered opinion what particular organizations, groups or individuals should it be in touch with in the areas with which you are familiar?

How would you suggest this communication be organized and carried out: that is, what would be the best way to proceed; how closely should contacts be maintained; and so on?

Discussion groups were convened to address these questions in the context of seven broad, overlapping subject areas: human settlements and urbanization trends; land uses and resource management; local and regional planning; transportation development; energy issues; regional economics; and future technological and social change. These general areas were chosen because, collectively, they constitute important determinants of resource uses and ecosystem quality. Decisions made in regard to them go a long way towards determining the kind of future that will eventually unfold in the Basin.

Participants in the workshop discussions had not previously had an occasion to meet and exchange views on these subjects. Some had only recently learned of the IJC and its responsibilities. None were there to formally represent some organization. None were invited as the appointed "expert" for some one field of endeavor, and none were assumed to have special powers to divine the future.

Nevertheless, the expectations of what such a first round of discussions could produce remained high. It was nothing less than sound advice on how the IJC can begin to tune into the forces of change, become part of the informal "intelligence" which links those whose decisions significantly help create the future, and initiate the two-way consultations necessary to make more certain that all concerned - be they governments, corporations, or citizen groups, - become more alert and responsive to the likely consequences of these changes on the resources and environment of the Great Lakes Basin.

The participants succeeded admirably in meeting these expectations. The discussion group reports highlighting their views and suggestions are published herein. A summary report (Volume I) supplementing these group reports, is presented separately. It is from such modest first steps that the more comprehensive futures oriented perspective urged on the IJC can now begin to evolve.

**METHODOLOGY OF PREPARING THE WORKSHOP REPORTS**

**Volume I - Summary Report**

Analysis of the individual work group reports revealed eight major themes in
common, viz. Great Lakes Basin-wide planning; environmental control elements, land/water/air; regional perspective; economic aspects; regulatory aspects; communication for implementation; institutional arrangements and capabilities; and integrated (ecosystem) water resources management.

The Workshop Committee prepared the report based on the above themes. Adherence to a consistent format was requested, where the problem would be outlined on a left hand page and "the next steps" on the opposite.

After consideration, the main themes eventually chosen for this report were as follows: information, a basis for wise use; integrated (ecosystem) water resources management; regional and economic perspectives; environmental control and regulation, land/water/air; institutional arrangements and capabilities; communication for implementation; and dealing with the future.

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VOLUME II - WORKSHOP WORK GROUP REPORTS

This volume contains the reports of the work groups, developed initially during the workshop and revised, clarified and edited by the work group co-chairpersons.
HUMAN SETTLEMENTS
WORK GROUP ON HUMAN SETTLEMENTS

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HUMAN SETTLEMENTS

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I. INTRODUCTION

In reviewing the direction originally given to the Work Group and its area of primary concern, the Work Group concluded that both would be more accurately described by the term "Evolution of Human Settlements in the Great Lakes Region."

The term "urban" by definition, by implication and by usage, excludes some of the very phenomena which have significant impact upon the Great Lakes, such as:

- villages, small towns and hamlets;
- ex-urban settlements such as cottages and resort developments;
- industrial developments such as refineries, pulp and paper mills, steel mills and mining mills;
- power generation plants, dams and diversion projects as well as nuclear power stations; and
- bridges, canals, throughways, railroads, airports and seaports.

Yet, all of these are necessitated by and come about because of the way in which various societies and civilizations make the spatial/operational arrangements at certain scales (house, town, city or metropolis) in order to support life and to pursue their aspirations, goals and targets, i.e. because of the way in which various societies make human settlements.

It follows then, that what we are talking about and what the IJC is interested in, is not urban growth but human settlements growth.

This brings us to the usefulness of the term "growth." Growth means "the process of getting bigger or larger", yet the IJC (and many of us) are interested not only in the process of "getting bigger" but in the process of change; the evolution of settlements from small, isolated, self-contained cities and towns into the large, interdependent system of human settlements which presently all but surround the Great Lakes. In addition, it is essential to understand the pulsating and oscillating changes of short duration, as distinct from the long term evolutionary path in order not to confuse one with the other. Lastly, it is essential to understand the qualitative and secondary pattern changes within settlements and within systems of human settlements.

In view of the above, it is clear that use of the term "growth" is limiting and misleading. What we are concerned about is evolution of the phenomenon of human settlements, not "urban growth."

We therefore propose that the IJC address the problems and issues of the evolution of human settlements within the Great Lakes region, in order to better understand their impact upon the Great Lakes and their future.
II. THE CURRENT SITUATION

In recent years, the impact of urban growth and development on water quality and supply has raised a number of pressing issues and concerns. These have included:

- growing consumptive demands upon existing water supplies, particularly by energy producing facilities;
- continuing concern over water pollution from both point and diffuse sources;
- growing recognition that urban wastewater treatment systems may be inadequate or obsolete and that better ways need to be found to separate storm water and sewage disposal systems;
- concern over the quality and safety of public drinking water supplies; and
- rising public interest in the adequacy of approaches to toxic waste disposal.

Traditionally, these issues have been viewed within the context of continuing economic growth and population increase and responses were shaped accordingly. But it now seems possible that, within the Great Lakes region, this approach is no longer particularly appropriate. Some urban areas around the Great Lakes (e.g. Detroit, Buffalo, and Cleveland) are experiencing slow or retarded growth and are suffering from substantial social and economic problems.

This is not to say, however, that urbanization and population redistribution (urban/suburban/rural population shifts) are not continuing to bring about major changes in these areas. It is only to point out that resource management efforts in the Great Lakes region must take account of a different set of real world conditions than have been commonly perceived in the past. The region's systems of human settlements find themselves facing serious institutional, political, financial and economic barriers to dealing adequately with key concerns. It is important that the relationship between the evolution of settlements and water quality/supply be examined in these terms in order that suitable responses can be developed to meet existing problems.

III. TWO POSSIBLE SCENARIOS OVER THE SHORT AND LONG TERMS

The future growth (or lack it) and the distribution of that growth in the Great Lakes region will certainly affect the work of the IJC. The Great Lakes region, one of the major industrial areas in the world, has evolved over time. The region may, at this point in history, be at a critical point in its development. Most people would agree that it has matured
over the past twenty years. There is not, however, a consensus as to the future of the region. Some would predict a gradual decline in the area and a continued loss of industry, jobs and economic development to other regions of North America. Others would argue that, given its resource base, historic predominance in industry and its existing economic infrastructure, the Great Lakes Region will continue to grow and maintain or even enhance its position among the regions of North America.

These two scenarios are presented for consideration below. Both possibilities suggest a major impact on the work of the IJC. However, depending on the alternatives chosen, the implications for the IJC may be substantially different.

A. Short Term (5 - 10 years)

There is considerable variation in the long term scenarios for the Great Lakes region. In the shorter term there is some consensus.

1. Overall population growth in the Great Lakes region has markedly slowed. In the 50's and 60's some central cities of the U.S. have shown absolute population declines. By 1970-71 whole metropolitan areas (SMSA's) have shown absolute declines. Canadian (Ontario) cities and metropolitan areas have lagged behind American areas in this trend, but there is now some evidence that they may be starting to follow the same path, though this is not yet clear.

Population change is generally based on four significant trends.

a) Migration to ex-urban areas outside statistically defined metropolitan or urban areas (SMSA, CMA);

b) Reduced natural increase in population (fertility);

c) A reduction in traditional growth based on a loss of population to economically growing or climatically-superior regions: in the U.S., growth in the south; in Canada, growth in the west, (Alberta, British Columbia); and

d) Reduction in the traditional influx of new immigrants to the Great Lakes region based on either competitive disadvantages with other regions, or absolute declines based on national immigration policy.

2. Most new growth and development, however, will still continue to take place within existing metropolitan areas, largely in the more recently-built suburban areas. There is also some evidence suggesting a "return to the core cities" movement and the related renewal and renovation of the older central sections of metropolitan areas.
3. Some rural areas and smaller towns will continue to experience a lively growth.

4. Central cities, especially those in the U.S.A., may continue to experience slow growth or decline and grapple with substantial social, economic and fiscal problems. The ability of these urban areas -- where much of the region's population problems reside -- to respond effectively to water quality related problems, will be seriously affected by these conditions. Constant or declining population levels within municipal jurisdictions will lead to increasing problems in the allocation of correspondingly limited financial resources, and water quantity and quality problems may decline in priority in the public eye.

5. There appears to be a shift in both public and private attitudes with respect to the need for additional pollution controls, land use regulations and, in general, the level of governmental intervention in various arenas.

In terms of environmental management vs. economic growth, new jobs seem to outweigh clean water when a choice is involved. One implication of this is that the objective of maintaining and enhancing water quality in the Great Lakes Basin may be undercut by areas seeking new economic development at any cost and willing to compromise water quality goals to attract this growth.

B. Longer Term (10 - 25 Years)

The apparent contradiction between the existing economic infrastructure of the Great Lakes region and its natural advantages, as compared with its relative decline over the past 20 years, leads to a rich diversity of opinion on the longer term future for the region. Two scenarios, perhaps representing the extremes of opinion, are presented below.

1) There will be a continued inflow of population into the region and this population increase will occur at rates higher than either the national (U.S.A.) or continental (Canadian) average. This growth will occur for a number of reasons, including those relating to the region's abundant water supply, the economic infrastructure that is already in place, the skilled labor supply, cultural diversity and opportunities. Also, the pressure on the region to absorb greater numbers of migrants from other nations will likely increase in the years to come.

2) Growth will take place at rates well below national or continental averages and could well decline. Based on this view, other regions in North America will grow at the expense of the Great Lakes region considering competitive advantages in climate, labor costs, recreational and life style advantages and other benefits not currently available in the Great Lakes region.
IV. ISSUES AND PROBLEMS

Growth does not necessarily mean an equivalent increase in environmental and water pollution problems any more than an absolute decline in human settlements would bring about an automatic reduction in environmental priorities and in pollution levels. An analysis of the trends noted above suggest several issues.

1) The short term growth in rural areas may lead to an uncontrolled increase in phosphorus loadings because of the 1 million gallons per day (mgd) cutoff in the Great Lakes Water Quality Agreement.

2) There will be continuing concern over water pollution from both point and diffuse sources, but it may be increasingly difficult to achieve success because of:

   (i) more limited financial resources for cleanup programs; and
   (ii) less support for environmental regulatory programs than in the past.

3) In the U.S. the general decline of the central cities may lead to delay of the cleanup, particularly the correction of combined sewer overflows and storm water.

   The IJC may wish to elaborate on Article VI, 1 (a) of the Water Quality Agreement, relating to storm and combined sewer discharges. If cities have different financial ability, the level of "practical programs" will vary.

4) Do the water quality control requirements place a limit on growth?

   No "absolute" limits to growth are envisaged under the current Water Quality Agreement. It is possible that some industries may choose to locate outside the Great Lakes area because of water quality requirements. On the U.S. side, the only part of the Great Lakes Water Quality Agreement that is more restrictive than national minimum requirements is the phosphorus loading limit. The specific objectives for certain heavy metals are violated naturally in many waters and this condition can and will create problems.

5) Do the Great Lakes water quality goals conflict with the regional growth goals?

   Yes, to the extent that the growth goals demand an unconstrained latitude in development. The IJC should be careful to explain the Water Quality Agreement so that the water quality goals are not considered unreasonable and unrealistic.

6) New on-lot disposal techniques may (will) open areas for development that presently cannot be developed.
For domestic wastes, satisfactory on-lot disposal is more effective than mechanical treatment, as far as Great Lakes Water Quality is concerned.

7) The implications of the fundamental change from continuous growth to stability or even decline -- if such a change takes place -- are not clearly apparent on cursory examination. They need and should receive careful study, bearing in mind the important distinctions between economic and demographic growth/decline and between short term and long term consequences.

8) Shoreline development and coastal zone management: potential impacts include water quality degradation; excessive diversion and consumption, poorly planned land use; and deterioration of the visual and amenity quality of shoreline lands with public access. Are existing programs adequately addressing these problems in the Great Lakes Basin?

9) Obsolescence or inadequacy of existing urban water supply and wastewater treatment infrastructure. If cities cannot afford to replace obsolete systems, what will the impact be on Great Lakes water quality?

10) An urgent need exists to effectively monitor levels of toxic wastes in the Great Lakes Basin, and to effectively manage their cleanup.

V. PRIORITIES:

This Work Group assumes that the IJC already has the mandate from both Parties to the Agreement to act as a watchdog over any activity, program or policy which is likely to have a detrimental impact upon the Great Lakes water system and upon those human and natural environmental activities that depend upon the Great Lakes.

The Work Group further assumes that the IJC's role of monitoring human and natural environmental activities and processes does not require any legislative or contractual amendments if such a monitoring role were to be organized to perform in such a way that the monitoring of the forthcoming, i.e. anticipated, activities were to be added to the present function of monitoring past events and activities.

The change would not be at the legislative or at the institutional level, but at the operational level only. The IJC would become like a two-headed eagle looking to the past and anticipating the future at the same time. This being so and in order to implement the IJC's program aimed at understanding human settlements and their evolution, we now propose the following priorities at both policy and program levels:

A. Policy Priorities
1. In order to more effectively discharge its responsibilities for water quality and quantity, the IJC should add the operational activity of monitoring the evolution of human settlements in the Great Lakes region. It should take a comprehensive, holistic stance, considering all matters directly and indirectly relevant to its mandate - insuring that it omits from its area of concern only that which it has, after careful consideration, omitted deliberately, rather than by default or lack of awareness.

2. In order to meet the priority 1 above, the IJC should also reorient its operations to include the prospective as well as the presently-reactive mode.

3. The IJC should also undertake a review of long term demographic and economic prospects of the Great Lakes region and of their implications for its mandate.

B. Program Priorities

(In relation to the Great Lakes Water Quality Agreement of 1978)

1. Article VI 1(a)(v), Storm, sanitary and combined sewers.

   The pollutant loads from these sources may not have been adequately tabulated. In meeting the lake basin pollutant loading rates that are established, pursuant to Art. IV 3(b), the IJC should undertake more detailed studies of controls from these sources as well as controls from the more "conventional" sources of pollution.

   In consideration of controls over storm sewers and combined sewers, the IJC should consider, within the context of practicality, the economic ability of cities to install controls. This may result in control measures and schedules for achievement that are not uniform for all affected cities.

2. The IJC should have the objectives of the 1978 Water Quality Agreement compared to the requirements of other regions in both countries. The existence of the Agreement has lead to the belief that water quality requirements for the Great Lakes are extraordinarily strict. We believe that the phosphorus requirements are the only unique component of the Agreement. In the U.S. there are other regions having unique requirements that are more stringent than the national minimum requirements.

   A clarification of the status of the Agreement relative to national requirements will, we believe, allay many concerns that the Agreement will cause economic harm to the area.
3. The IJC should place adequate emphasis on prospective analysis in the surveillance and monitoring programs that are established under Art. VI (m). In particular, it appears that data collection and analysis must go beyond the water sampling process that is analyzed in Annex 11, but must include the assembly and evaluation of reports, etc. on expected changes in human-settlement development activity that can have an effect on water quality.

4. The IJC should be aware of the widespread violation of some of the metals objectives that are set forth in Annex 1. It is likely that many of these violations are natural. The existence of such widespread, natural, violations will create confusion in the regulatory process and may lead to general abandonment of the objectives as being unworkable.

5. The IJC should have prepared lake basin pollutant load limits, pursuant to Art. IV 3(b), for all pollutants that show violations. This will allow for comparison of the monitored waste loads with clear limits.

6. For dredging activities, the IJC should require coordination of the dredged material disposal concerns with those of waste source controls. Presumably, polluted dredgings occur because of pollutant inputs. It may be wiser to prevent the pollution than to worry about disposal of the polluted dredgings. The IJC outlook on this phenomenon must be more comprehensive than it has been historically. In particular, the IJC should consider the long range cost effectiveness and environmental impact of prevention against that of dredge spoil containment.

VI. ORGANIZATIONAL NETWORK

The group sees it as highly desirable for the IJC to develop an intelligence system in order to be kept informed of current activities and prospective changes and developments in the Great Lakes Basin that are relevant to the IJC's responsibilities. The intelligence system would keep the IJC supplied with current information on, for example, demographic studies, economic forecasts, major developmental projects and similar matters. It would thereby enable the IJC to carry out its responsibilities with an improved understanding of the context of trends and changes which affect them.

The group is not recommending the creation of a large new research arm for the IJC. It believes, on the contrary, that it would be unnecessary and undesirable for the IJC to embark on a large scale program that would merely duplicate what is already being done by other agencies. Its recommendation is that the IJC's objective should be to compile systematically the information that is available from such agencies, to
organize, reconcile and synthesize this information in relation to the needs and concerns of the IJC and to identify data gaps. Only if such gaps proved to be serious, or if the available information proved to be inadequate for the needs of the IJC, would new studies be undertaken. The group believes that this task could be answered with a very small increase, indeed conceivably with no increase, in the IJC's present staff.

It would, however, require a changed style of operation for the IJC. It would entail a systematic, continuous working liaison with a large number of federal, state/provincial, local and non-governmental bodies as in the summary list below. The group recognizes the administrative and perhaps even constitutional difficulties involved, but stresses that the system cannot work unless such contacts are regular, broad and fairly informal. This may require the IJC to examine its own administrative style and attitude as well as possible formal barriers to interaction with other agencies. The group firmly believes that if this course is not followed, then the IJC will be unable to take the broader, anticipatory and forward-looking approach to its responsibilities that the group strongly favors.

In addition to the creation of an intelligence system, the group sees other activities of a complementary nature which might be pursued. For example, it might be desirable either to expand the role of the Science Advisory Board into the areas of human settlements, demographics, economic development, transportation and related matters, or to set up another Advisory Board to deal with these matters. The IJC could also promote improved understanding of water quality information and of its relevance to the responsibilities of other agencies and it could encourage communication, information exchange and collaboration between such agencies where this would help to achieve the IJC's own objectives.

In brief, the group urges on the IJC, as a way of taking a more positive approach to its responsibilities, an active, open and outgoing stance towards the many bodies which could help it achieve its objectives through the provision of information; but perhaps in other ways as well.

A preliminary list of "entities with which the IJC should be in communication" (U.S.A.) is given below.

<table>
<thead>
<tr>
<th>I. FEDERAL</th>
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<tbody>
<tr>
<td>• Environmental Protection Agency</td>
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<td>• Department of Energy</td>
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<td>• Department of Commerce</td>
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<tr>
<td>• Department of Housing and Urban Development</td>
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<td>• Corps of Engineers</td>
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<th>II. STATE</th>
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<tr>
<td>• Departments of Environmental Resources, Environmental Protection, or Natural Resources</td>
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</tbody>
</table>
III. REGIONAL

- Great Lakes Basin Commission
- Various regional economic development commissions sponsored by the Federal Economic Development Administration

IV. LOCAL

- Local industrial development agencies.

VII. COMMENTS ON THE WORKSHOP

The IJC Anticipatory Planning Workshop has been an effective tool in pulling together and organizing a diverse group of people and opinions for a single task. There are, however, several alternative means of obtaining the same information. Such techniques include regular meetings of a smaller, select group of experts or consultants.

The existing workshop technique could, perhaps, be improved with the recognition of several changes in format, noted below.

1. Early planning is essential. Participants should be selected, material distributed, etc. well in advance of the workshop.

2. Judicious selection of participants is the key to obtaining the best results. Groups should not be large (8-10 max.) but should comprise a carefully thought out balance of participants. It is suggested that the workshop planning committee should concentrate as early as possible on choosing co-chairmen. They should be warned that a substantial commitment of effort in advance of the workshop is needed and that they should agree to serve only on that understanding (see 6 below). The two co-chairmen should be primarily responsible for choosing group members, in consultation with the planning committee. This process should be undertaken at least 6 months before the workshop to allow for refusals, finding substitutes, briefing, etc.

3. All participants should be provided well ahead of time with a "data book" containing as much relevant, factual, e.g. demographic information as possible. This will take time to prepare and should be undertaken as early as possible by the planning committee in consultation with the co-chairmen. The IJC secretariat should also be responsible for providing each group with additional material as recommended by the co-chairmen.

4. At the same time, paper overload should be avoided. It is felt that much of the material distributed in this case was repetitious and redundant.


**CANADA**

**Preliminary list of "entities with which the IJC should be in communication" (Canada)**

<table>
<thead>
<tr>
<th>Economic Trends and Economic Development</th>
<th>Federal</th>
<th>Provincial</th>
<th>Local</th>
<th>Non-governmental</th>
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</thead>
<tbody>
<tr>
<td>Economic Council of Canada</td>
<td>Ministry of Treasury &amp; Economics (T. &amp; E.)</td>
<td>Regional and local municipalities and counties</td>
<td>Ontario Economic Council</td>
<td>Boards of trade and Chambers of Commerce</td>
</tr>
<tr>
<td>Dept. of Industry, Trade &amp; Commerce</td>
<td>Ministry of Industry &amp; Tourism (I. &amp; T.)</td>
<td>Planning boards</td>
<td>Ontario Hydro</td>
<td>Various policy and economic research institutes</td>
</tr>
<tr>
<td>Dept. of Regional Economic Expansion</td>
<td>Ministry of Energy</td>
<td>Industrial development agencies</td>
<td></td>
<td>Universities</td>
</tr>
<tr>
<td>Bank of Canada</td>
<td>Ontario Economic Council</td>
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<td></td>
<td>Commercial Banks</td>
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<td></td>
<td>Ontario Hydro</td>
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<td>Conference Board</td>
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<tr>
<th>Human Settlement</th>
<th>Federal</th>
<th>Provincial</th>
<th>Local</th>
<th>Non-governmental</th>
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<tbody>
<tr>
<td>Central Mortgage &amp; Housing Corp.</td>
<td>Ministry of Housing</td>
<td>Local municipalities and counties</td>
<td></td>
<td>Urban Development Institute</td>
</tr>
<tr>
<td>Department of Transport</td>
<td>Ministry of T. &amp; E.</td>
<td>Planning Boards</td>
<td></td>
<td>Housing and Urban Development</td>
</tr>
<tr>
<td></td>
<td>Ministry of I. &amp; T.</td>
<td></td>
<td></td>
<td>Assn. of Canada</td>
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<td></td>
<td>Ministry of Revenue</td>
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<td></td>
<td>Ontario Real Estate Assn.</td>
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<tr>
<td></td>
<td>Ministry of T. &amp; C.</td>
<td></td>
<td></td>
<td>Universities</td>
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</tbody>
</table>

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<tr>
<th>Water Quality</th>
<th>Federal</th>
<th>Provincial</th>
<th>Local</th>
<th>Non-governmental</th>
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</thead>
<tbody>
<tr>
<td>Dept. of the Environment</td>
<td>Ministry of the Environment</td>
<td>Local municipalities and counties</td>
<td></td>
<td>Pollution Probe</td>
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<tr>
<td></td>
<td>Ministry of Natural Resources</td>
<td>Conservation authorities</td>
<td></td>
<td>Canadian Environmental</td>
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<td></td>
<td></td>
<td>Harbour commissions</td>
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<td>Law Association</td>
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<td></td>
<td>Other public interest</td>
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<td>groups</td>
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**Note:** Neither of these two lists (Canada-USA) should be construed as complete, but are offered as an illustration only. A more comprehensive, systematic analysis should still be made.
With careful advance planning it should be possible to supply each participant with a single folder of clear, relevant, information a month before the workshop.

5. The IJC may want to consider hiring or retaining a full time conference organizer.

6. It should be remembered that the co-chairmen and participants are likely to be busy people with limited time. Their responsibilities should be limited and clearly defined. Recognizing the limited resources of the IJC, the planning committee and secretariat should nevertheless relieve them of as much preliminary organizational work as possible. It is suggested that greater use of subcommittees by the planning committee might facilitate this. For example, a planning subcommittee might be responsible for working directly with the co-chairmen of each group. Such a subcommittee might be only one person. The report prepared by the initial work group should be reviewed, edited and revised by the whole group after the conference.

7. One advance commitment of the co-chairmen should be to draft a comprehensive group statement after the workshop. This is difficult during the workshop without greatly reducing discussion time. Groups should, of course, produce written raw material during the workshop.

8. The IJC may want to re-analyze the whole workshop process. For example, it may be useful to hold a "follow up" workshop within six months of the initial one, with the same participants, to gain the maximum benefit.

9. A much freer interplay between groups and group members could enhance the effectiveness of the workshop output.

10. Observers should be asked to participate in the discussion only if expressly invited to do so by the chairmen. Not being familiar with earlier discussion and not having responsibility for report drafting, they may otherwise interfere with the group's work. This does not, of course, apply to observers who join a group full-time.
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<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mimi Becker</td>
<td>Co-Chairman, President Great Lakes Tomorrow</td>
</tr>
<tr>
<td>James Keenan</td>
<td>Co-Chairman, Director, Land and Water Resources, Ontario Ministry of Natural Resources</td>
</tr>
<tr>
<td>Charles Girdwood</td>
<td>Ontario Federation of Mining</td>
</tr>
<tr>
<td>James Bauer</td>
<td>Chairman, Grand River Valley Conservation Authority</td>
</tr>
<tr>
<td>Derek Foulds</td>
<td>Director General, Environmental Management Service, Environment Canada</td>
</tr>
<tr>
<td>Lee Botts</td>
<td>Chairman, Great Lakes Basin Commission</td>
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<tr>
<td>John Judd</td>
<td>Michigan Sea Grant</td>
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<tr>
<td>David Roellig</td>
<td>Detroit District Army Corps of Engineers</td>
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<tr>
<td>James McIntosh</td>
<td>Ontario Federation of Agriculture</td>
</tr>
<tr>
<td>Joe Leach</td>
<td>Fish and Wildlife Research Branch, Ontario Ministry of Natural Resources</td>
</tr>
<tr>
<td>Dora Passino</td>
<td>Great Lakes Fishery Commission</td>
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</table>
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I. **INTRODUCTION**

1. **Definition**

The work group's attention was directed towards consideration of the impacts of land management and resource development within the Great Lakes Basin on the basin's ecosystem - which was defined to include land, air, water, biological and social systems. Specific attention was directed towards definition of problem areas related to agriculture, forestry, recreation, environmentally-sensitive lands such as wetlands and nearshore fisheries habitat, shorelands, natural hazard lands, and mining. The impacts/pressures posed by urban and industrial development and waste management practices were considered. Land capability was examined in relation to actual and potential use in discussing problems. An attempt was made to discuss conflicting use. Attention was given to identifying air, land, water and biological resources which require careful management and/or protection due to their uniqueness, fragility, sensitivity to perturbation and/or significance to the natural environment. Considerable time was spent in discussion of the institutional capacity to deal with identified problem areas.

2. **Methodology**

Group members received prior to the workshop a set of references related to the defined subject area to use in their thinking and preparation for completing the workshop assignment. Each was asked to provide a short informal briefing relative to their area of expertise at the first session of the work group. Problem areas were noted and during the second session, were specifically identified. The group then identified those problems which were existing and still unsolved and those which seemed to be emerging or potential future problems. Problems were grouped into topical areas and assignments for further definition or clarification were made. The group agreed that the multiplicity of actors had been identified in vast and terrible detail through the IJC Pollution from Land Use Activities Reference Group (PLUARG) studies, 208 Wastewater Management Studies and Coastal Zone Management Studies. Lists can be obtained from those studies. The group did agree that the local governments and individual actors were heavily involved in both problem creation and problem solution and needed effective educational and technical tools. It also agreed that the Commission had a major role to play in ensuring that the informational tools were available to them.

Major problem areas identified were described in some detail. Summary
statements of those problems and some recommendations are included herein. The initial "informal" briefing transcription and the list of problem areas identified are attached. The problem areas defined represent, for the most part, work group consensus. There was no basic disagreement within the group with problems defined or possible solutions for consideration.

II. PRIORITY PROBLEMS

If action were underway, or scheduled, with respect to all the resource-related land use problems for which acceptable solutions are now known, then this work group would have a very short list of unresolved or new problems. In fact, there are numerous reports and studies which both identify land use problems and issues and propose recommendations for corrective action. Some of these are inputs to the IJC, the most recent of which is the PLUARG Report. Others are believed to be found in reports from the IJC to the governments of the United States and Canada.

The major unresolved problem, then, seems to be to translate recommended solutions into successful action. The work group is unable, by reason of time and some support informally, to undertake any comprehensive analysis of this problem. The existing institutional framework and the fiscal climate of constraint seem to be significant causal factors which have contributed to a lack of successful action. There may also be a lack of political commitment. It is essential that this problem, which pervades all of the more specific land use problems, be resolved if any substantive progress is to be made.

Another pervasive problem is the failure of governmental agencies, including the IJC, to adequately communicate ideas, concerns and information to the public. The general public and specific publics, must be better informed if we expect of them the kind of individual and group action required to resolve some of the Great Lakes problems. For example, improved agricultural technology is available to overcome specific agricultural land use practices. The technology, however, must be communicated to the farmer and as well, governmental encouragement may be necessary, including possible financial assistance, to achieve the changes which society as a whole sees as being desirable. The IJC can play an important role in monitoring the success in achieving this kind of action and add its own weight to the communication process and the support of other necessary action.

If we do no more than enlist support to deal with these two problem areas, our discussions will have been successful. However, it is also useful to repeat that in our collective review of natural resource-related land use issues, we reconfirmed the validity of many problems and recommendations raised by the PLUARG. As well, we identified some areas that seemed not to have been previously identified or adequately addressed.

III. PROBLEMS NOT CURRENTLY BEING ADEQUATELY ADDRESSED AND/OR EMERGING.
The following provides a brief listing of those identified as major problems - starred items are priority issues.

1. Conservation of Agricultural Land - Agricultural Land Use

* Land use change, eg. agriculture
  - urban
  - industry

* Erosion of agricultural land
  - row crop tillage
  - low quality land
  - required attention to erosion changes

Pollution from agriculture
  - chemical
  - sediment

* Land drainage
  - adverse impacts on water quality & quantity
  - wetland loss, i.e. habitat & source areas

* Removal of vegetation (erosion, field consolidation, water quality)
  - woodlots
  - fence rows
  - stream verge enlargement
  - present governmental policies related to removal of vegetation

2. Waste Management

* Airborne emissions - SO2, NO3, acid rain
  - Loss of biological productivity - land and water
  - Water quality effects
  (Identified by PLUARG but rejected - we disagree re: other synergistic effects, e.g. precipitation of mercury, Implement at source)

Industrial and domestic waste disposal - where and how
  - land use conflicts
  - land & water pollution - toxicity

* Mine tailings
  - responsibility for abandoned mine tailings areas, pollution control and reclamation

* New uses of common chemicals, e.g. NaCl for heavy metal removal

* Oil and gas wells
  - brine
  - salinization of water
  - oil spills
3. Lack of Comprehensive Land & Water Planning

- multiplicity and levels of planning agencies - institutional problems
- need for ecosystem planning - (current lack of it)
- lack of comprehensive planning re conflicting land uses
- tendency to neglect water in land use & resource planning
- public good vs. individual land rights - re land use controls
- planning is often suspect to politicians - seen to reduce flexibility
- background research needs
- plan implementation problem
  - institutional (who?)
  - budget
  - ability of population to pay (population shifts)

- Canadian counterpart to the Great Lakes Basin Commission

4. Management Problems re Critical Shore Areas

- inappropriate shoreline uses - lack of environmental sensitivity
- dredging and infilling of shore areas - habitat destruction or deterioration
- drainage of shore wetlands - habitat loss
- thermal generating developments
  - siting
  - heat pollution
  - fish & other aquatic life kill
- impacts of water level regulation
- public access - not enough - insensitive location
- lack of funds for dealing with emerging problems
- shore areas are the critical environmental interface

5. Development on Hazard Lands (steep slopes, flood plains, karstic topography, unstable soils)

Urban development on hazard lands

- structural damage
- loss of life
- erosion
- habitat destruction
- demand for protective measures

Great Lakes shoreline erosion problems (also hazard lands)

- accelerated erosion
- demand for protective measures - funds

Institutional & political problems related to hazard lands.
6. Water Diversions and Consumptive Uses, Water Transportation Impacts

- habitat loss
- winter navigation
- property loss
- associated land use impacts
- harbour development
- lake level regulation

7. Information and Education - The Gap

- agency understanding of externalities (institutional)
- individual landowner or user appreciation of environmental impacts and imperatives
- need to inform legislators and support staff

IV. HIGH PRIORITY PROBLEMS

The following problem statements represent the findings and recommendations of the Land Use - Natural Resources Work Group regarding priority problems. These summary statements reflect longer, more detailed presentations developed by the work group members.

A. Conservation of Agricultural Land

Problem: Governments at all levels in both the U.S. and Canada appear unwilling to face the implications of the conversion of agricultural land to urban uses. The loss of agricultural land to urban or industrial uses results in the agricultural uses of poorer land, which is frequently more subject to erosion, thereby impacting adversely on water quality.

Recommendation: The IJC should bring this problem to the attention of Governments as, clearly, firm policies on this subject are sadly lacking.

Problem: Another problem related to agricultural land use practice has been the indiscriminate removal of fence rows and woodlots and the clearing of vegetation along water courses, to increase land in production, thus contributing to both wind and water erosion. The impact of sediment transport, including phosphorus, on water quality in the lakes has been thoroughly discussed in the PLUARG Report, "Environmental Management Strategy for the Great Lakes System", July, 1978.

Recommendation: We believe that this particular problem was not sufficiently addressed and that the IJC should determine the extent of this problem as a post PLUARG activity and actively promote the establishment of ongoing education for individual farmers to correct these practices.
Problem: Present methods of farm tile drainage are inadequate in many places in the Great Lakes Basin. Farmland tile drainage, where required, should be encouraged because it has been observed to achieve better land and water management.

Recommendation: The IJC should encourage research to develop such standards and development of educational programs to assist in their implementation.

B. Waste Management

The management of waste materials continues to be a problem associated with a variety of human activities. Although disposal of wastes has been addressed by numerous study groups and is regulated by laws and governmental agencies, new problems are emerging because of continual technological and societal changes. Recognizing the broad area included within waste management, we have identified the following items where unresolved or emerging problems exist: (1) airborne emissions, particularly PCB's and other chlorinated hydrocarbons, which are released by incineration or volatilization and also oxides of nitrogen and sulfur, which cause "acid rain;" (2) industrial and domestic waste disposal with resulting conflicts over sites for landfills and deep disposal; (3) mine tailings; (4) new uses of common chemicals; and (5) oil and gas wells in the Great Lakes and acid rain. The last four items have not been clearly identified in the PLUARG Report (loc. cit.) and should receive special attention at this time.

1. Mine Tailings

Problem: Much work has been done to improve the impoundment of waste material from mines and to rehabilitate waste areas. Where these tailings deposits have been abandoned due to mine closures, defunct operations and surrender of corporate charter or merely change of property ownership, they create problems. They should be inspected regularly and their effluents monitored.

Recommendation: When problems develop, clean up and rehabilitation should be undertaken by the present owner or by the state or province concerned. The IJC should monitor to determine effects on the Great Lakes ecosystem.

2. New Uses of Common Chemicals

Problem: Increasingly widespread use of sodium chloride in the Great Lakes Basin for road de-icing and treatment of metallic wastes (by US Steel) may result in salinity problems, particularly if its use is expanded to other industries.
Removal of dissolved impurities (mainly base metals) from mining industry effluents by controlled lime treatment is practiced by many operations. This may increase the pH of the receiving waters to the minimum levels allowed and be toxic to aquatic plants and animals.

Recommendation: Research should be undertaken to determine the extent of the problem and to develop recommendations for remedial action.

3. Oil and Gas Wells

Problem: With the need to be less dependent on foreign sources of oil and gas, increased exploration for and subsequent extraction of oil and gas from the Great Lakes Basin may be expected.

Recommendation: The Science Advisory Board should delineate research needed to anticipate possible environmental impacts of this emerging problem.

4. Acid Rain

A problem presently identified by the PLUARG as not being major for Great Lakes water quality, is the acid rain problem. The work group questions the PLUARG's findings relative to future implications of this increasing problem. Data gathered in Ontario and New York indicate major impacts on the alkaline balance in numerous northern lakes and streams within the Great Lakes Basin. We believe that this is an issue of extreme importance for the future of the Great Lakes-St. Lawrence River Basin. It will affect the food production industry and may even eliminate the growing of certain crops.

Recommendation: Additional research should be undertaken by the IJC to determine the extent of the problem and its effect not only on the open waters of the Great Lakes, but on the Great Lakes ecosystem.

C. Lack of Comprehensive Land and Water Resource Planning, Programs

A number of individual problems have been identified by PLUARG which stem from existing problems due to the lack of comprehensive, coordinated planning and policy implementation mechanisms which recognize impacts of resource management or land use decisions on the Great Lakes ecosystem. In many cases the existing "terms of reference", i.e. legislation do not provide or even allow for the process to focus on the effects of land and resource management practices on the Great Lakes Basin, e.g. Conservation Authority Watershed Plans, 208 Wastewater Management Plans, Coastal Zone
Management Plans, key facilities development assessment processes (U.S. Steel in Conneaut). There are presently no effective means for referring major proposals, which might impact the Great Lakes ecosystem, to the IJC for evaluation prior to development or construction. The IJC is without the tools to effectively consider emerging problems, unless they will affect lake levels or some specifically defined diversion of water out of the system. A possible solution for consideration would be: (1) for the Commission to act decisively on the PLUARG recommendations; and (2) for the governments to accept and implement them. This will require extensive education of all affected parties, beginning with those who will be involved in developing this approach to ecosystem problem solving.

D. Coastal Zone/Nearshore Area - Summary Statement

1. Land and Water Planning

Problem: The nearshore zone of the Great Lakes, encompassing both the land and water, is an important natural resource. A major problem in dealing with this region is the lack of coordinated land and water planning among municipalities, states or provincial and federal entities and between countries. There is need for an international consideration of all inshore areas, since pollutants, fish and wildlife traverse the boundary. There is, in addition, a lack of environmental sensitivity in dealing with the shoreline area. Environmental mapping of all the Great Lakes would assist in preventing inappropriate shoreline use. Adequate funds to deal with this present and emerging problem must be made available.

The role of the IJC could be one of bringing together information about the shoreline of the Great Lakes as it now exists and then through both its Boards and the public forum, attempting to point out the problems and problem areas. Further, using existing legislation, both countries should adopt the concept of ecosystem planning to achieve best uses for the various shoreline areas.

2. Destruction of Wetlands

Problem: An existing problem that is expected to continue into the future is the destruction of the wetland environments along the shores of the Great Lakes. In most cases, protection of wetlands lies with the individual (state and provincial) agencies.

Recommendation: The IJC can best act by bringing this increasing problem to the attention of the two Governments. Wetlands, for the most part, are a non-renewable resource. Once
they are drained or filled it is almost impossible to return them to their previous state of use and productivity. Only timely action by the Governments can prevent their further destruction.

3. Development of Hazard Lands

Population pressure has resulted in development on unsuitable land resulting in economic losses and elimination of other resource uses, e.g. wetlands. This results in demands for costly remedial measures from public funds for private benefit.

Problem: When hazard lands are unsuitably developed, flooding and erosion increase. Jurisdictions which permit unwise development are usually not the level of government which is expected to supply the remedy. In the U.S., for example, flood damage losses are covered by a flood damage insurance program. In order to qualify for flood insurance, a community is required to implement flood plain zoning, which is based on a flood plain study funded by the federal government. Flood problems are studied by the Corps of Engineers and Soil Conservation Service, which can ensure federal participation in the cost of providing structural or non-structural solutions to flooding problems. Streambank erosion problems are handled principally at the local level. The responsibility for preventing habitat destruction is largely a state responsibility in the U.S. The U.S. federal government, through the Corps of Engineers, issues permits for filling the waterways consistent with environmental concerns. This helps to limit unwise destruction of wetlands. The states also have various laws which restrict habitat destruction.

Federal financial assistance by the U.S. Corps of Engineers for erosion control projects is available for erosion control projects for shoreline areas in public use or ownership. The major problem in providing erosion control assistance is that at least ninety percent of the U.S. shoreline is not in public ownership or use.

The policy for handling flooding problems in the U.S. seems to be providing adequate protection from flood-related losses. There is no uniform program for preventing loss of habitats and this problem has been largely left to the states, which do not have a consistent policy. The protection of privately used shorelands from erosion is a private responsibility and there seems to be little sentiment for changing the situation.

Recommendation: This issue is closely related to lake levels regulation and to an increase in sedimentation and diffuse source pollution to the lakes. The IJC should examine the effectiveness of existing programs for controlling
uses/development on hazard lands and the impact on the ecosystem of development in hazard areas of coastal zones.

4. Energy Development

Problem: Nuclear and coal thermal generating stations are proliferating in the Great Lakes coastal zones because of possible reduction of oil and gas supplies.

Recommendation: The IJC should evaluate specific problems recommended, which might develop due to cumulative effects of this type of development on the Great Lakes ecosystem.

5. Lake Levels

Problem: The physical and economic impacts of water level fluctuations and attempts at regulation have been studied and discussed, but appropriate action has not been taken.

Recommendation: The IJC should move forward to deal with the institutional arrangements to monitor existing regulatory efforts. It should also involve concerned interests in making its evaluations and suggestions for present and future water level regulations.

E. Water Diversions and Consumptive Uses

Problem: Consumptive uses of water for irrigation, cooling towers, etc., are tending to lower lake levels and river flows, affecting navigation depths, shorelines and hydro-electrical generation. Requirements are expected to increase and to be higher in the U.S. than in Canada, which may result in demands for compensation in terms of dollars, or diversions, or both.

People's needs for food, industry and agriculture have lowered the ground water levels (or contaminated them) so that the Great Lakes become the only available alternative water supply. As populations grow, the demands may come from outside the Great Lakes Basin. At present, the Diversions and Consumptive Uses Study Board of the IJC plays the principal role, with a report expected in 1980.

Recommendation: A uniform accounting system should be established for consumptive users on both sides of the Great Lakes Basin. Arrangement for control should be established for compensation between countries and/or states.

F. Water Transportation Impacts

Problem: The location of harbors has tended to increase the concentration of industry and modes of transportation in areas which
have facilities for deep draft navigation. Harbor development in the past has led to loss of habitat. The increase in vessel size and the length of the navigation season may have impacts on shoreline erosion, ice damage to structures in the waterway, winter recreation and water level fluctuations. There are many major groups interested in water transportation, including various levels of government, industry, conservation groups and the general public.

An important gap is the lack of base data on environmental impacts of transportation. In the U.S., the agencies responsible for the navigation studies have initiated a data-gathering effort to close this gap.

Recommendation: The IJC should be kept informed of the progress of the ongoing studies and stand ready to provide assistance, if necessary. The IJC should identify data/information gaps which impact on its responsibilities under the Boundary Waters Treaty and the Water Quality Agreement and should then initiate efforts to accumulate that information through necessary research activities.

G. Information and Education: The Gap

The work group identified informational and educational problems which affect the identification and resolution of all major problems discussed in this paper. A summary of these problems and some recommended solutions follows:

Problem: The IJC has not been flexible and comprehensive in developing or implementing communications, policies and processes related to its responsibilities under the Treaty. This has caused confusion, resulted in a lack of information regarding problems and remedial solutions available and in a lack of public participation in IJC decisions.

At present, the federal Governments (Departments of External Affairs and State) tend to hinder communication and are a major part of the problem, not the solution to it.

The IJC cannot perform adequately without a mechanism for two-way communication between it and the Governments. It should be able to identify emerging problems. This mechanism is not established.

IJC Boards and committees are presently too technically oriented. There should be a "sprinkling" of generalists and social scientists to ensure that the socio-economic and political implications of problem areas are identified and understood.

There is no effective communication between the IJC and the elected officials who must approve, fund and set in motion many of its recommendations. This should be remedied. There is either no or
inadequate information flow to public interest groups and practitioners (farmers, consultants, engineers, etc.) regarding problems and recommended solutions. This must be remedied under the new Agreement.

Recommendation: There is a need to consult a full range of clients periodically (as in this workshop). It should be done as major issues emerge.

The IJC must be available to participate in meetings of other groups. This should include the possibility of providing speakers who are aware of the political interfaces which must be developed to solve problems, as well as governmental scientific specialists.

We recommend that a major effort be undertaken to identify and develop alternatives for improving the capacity of the IJC to communicate with the public and with governments and for improving the quality of its educational programs.

V. SUMMARY RECOMMENDATION

Problem Statement

The land use-natural resource problems identified above have, in some cases, been recognized and documented for some time. Many of them have been considered in the PLUARG studies and recommendations. However, action by the Commission or by the Governments toward solving those problems is not visible. Problems continue to be exacerbated by overlapping and sometimes conflicting policies. No mechanisms are in operation for the co-ordination of decision-making or program implementation which recognize the ecosystem impacts of those decisions and, therefore, their impact on the Great Lakes' air, water, land and living systems through near, mid and long term spans. In short, there has been no clear assignment of responsibility for action and no binational "management plan" to ensure the implementation for oversight and surveillance of that action.

Options for Resolving the Problems

The Commission should act to forward the PLUARG recommendations to the Governments. The Governments should develop their action plans and report back to the Commission so that implementation can be monitored. As a general principal, we recommend that the Commission take more timely action regarding recommendations placed before it or issues raised for its consideration and that it use its knowledge and powers of persuasion to encourage the Governments to act upon its findings. To assist in increasing the level of public awareness of its activities and problems referred to it for resolution by the Governments, we urge that the Commission take more responsibility for communicating directly with state/provincial/federal legislative and regulatory bodies regarding its findings.
New problems for binational attention/evaluation include those resulting from the use of Great Lakes Basin resources for energy generation or resource development and transfer: the proposed number of power plants and increased pressures on wetlands/shorelands; consumptive use of water in a basin and diversions out of a basin; and the increase of the acid rain problems due to increasing use of coal, as well as potential pollution of the lakes due to accidents related to drilling of wet gas and oil proposed in the near term for Lake Erie and later for other lakes. The potential salinity problem due to new uses of chlorides in steel processing and the use of lime in mining waste processing, will increase the toxicity of effluent to the lakes. Will this have long term effects on the water quality and the lake ecosystem? Finally, the problem of finding a means to provide routine referral to the Commission as a part of the assessment process for binational review of major new development proposals which might impact the ecosystem or place additional stress on a parameter already identified in the Water Quality Agreement as being of concern (extended season navigation, proposed U.S. steel plant at Conneaut, major new power production sites being developed by Hydro) should be addressed and solved.

Recommendation: If the Commission is to anticipate problems and a problem for the future is identified, there must be a process by which the Commission can act to place the Governments on notice that they must consider issues of binational concern.

VI. EVALUATION OF WORKSHOP

Critique of the Workshop process - Land Use - Natural Resource Work Group

The Work Group co-chairmen divided responsibility for chairing the workshop alternately - one recorded while the other chaired the working sessions. Members felt that there was ample opportunity for them to communicate with each other and to discuss problems. They were concerned about the volume of paper they were expected to produce. The co-chairmen's roles were to ensure that questions were raised, clarification achieved and conflicts explored and clarified.

Group members suggested that they should have had at least three months' lead time to prepare for the workshop in terms of providing maximum benefit for the IJC.

A wall chart with the three workshop goals would have been useful in keeping the members' attention regarding their progress toward these goals.

The Work Group had been carefully constructed to provide expertise with our topic definition. Three key people did not arrive and this diluted the group's level of attention to those specific topics.
Suggestions For The Future Use of This Process

(1) Similar meetings should be held in individual basins of the Great Lakes on a binational basis to act as a follow-up. Additional depth of knowledge would be provided on lake basin problems. This should occur within about 2 years' time.

(2) We had trouble living within the time horizons set. (Near term 5-10 years vs. a longer time.) Planners found this a serious limitation.
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<th>Name</th>
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<td>Mary Lee Strang</td>
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LOCAL AND REGIONAL PLANNING

I. INTRODUCTION

II. IMPLEMENTATION OF THE GREAT LAKES WATER QUALITY AGREEMENT

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IV. UNITED STATES The Great Lakes States and the Great Lakes Basin Commission Relationship

   1. The Great Lakes States
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V. PROPOSED IJC INSTITUTIONAL RESPONSE

   1. Water Quality Board
   2. Board on Comprehensive Basin Analysis and Planning

VI. A PROPOSED CONTINUING ROLE FOR THE IJC
I. INTRODUCTION

1. While substantial problems relating to transportation, economic development, energy, etc. are identified in the other work groups, the focus of this group is upon the contribution and institutional arrangements of all planning processes and the response to external influences:

- between each other;
- at the provincial/state level;
- at the international level; and
- in conjunction with existing or modified institutions along the lines of the IJC.

The dominant characteristic of such planning seems to be two dimensional land use planning that attempts to examine only the spatial elements, omitting the comprehensive approach and the principles of resource management wherein strategies for resolving conflicts over development of scarce resources are resolved.

Extending this local/regional planning on the United States side appears to be strongly dominated by the "Home Rule" concept, whereby the local municipalities are influenced only indirectly by more senior levels (regional, state or federal). Suasion or limitations are exercised by grant conditions or review processes associated with senior levels, e.g. Section 701, Section 208 of U.S. Public Law 92-500 or Circular A-95, Coastal Zone Management Act (U.S. Public Law 92-583).

The ability to institute comprehensive planning such as exists in Minnesota with the "critical area planning" designation or Wisconsin's shoreland - floodplain zoning, provides evidence that the planning system is adopting and developing institutional arrangements suited to the task of integrating and prescribing public jurisdictional plans.

On the Canadian side a clear hierarchy exists from the provincial level down through county/regional planning to the local or area basis. Also well established is the approval and appeal process of the provincial governments.

It thus appears that the structure for vertical coordination of planning in Ontario is reasonably well established. Through the existing conservation authorities, small scale basic water resource management is also being practised with emphasis on conservation.
With the recent development of environmental assessment procedures and its addition to the province's arsenal of control mechanisms, the provincial government is in the indisputable position of being able to develop comprehensive planning positions.

Notwithstanding all this planning action, horizontal integration between U.S. and Canadian plans does not occur at the local/regional level nor at the state-provincial level.

2. As a consequence of the level of planning activity on both the U.S. and Canadian sides of the Great Lakes Basin a wealth of data exists including:

- land use data and plans;
- terrain studies incorporating soil capability, forest cover analyses, recreational inventories, geological data;
- population forecasts and allocations;
- water quality and quantity studies; and
- power forecasting.

Much of the data have been analyzed, sometimes on the basis of the whole Great Lakes Basin but more often at the county/regional level. Thus, it can be concluded that the informational base exists for the development of a comprehensive, generalized plan for the entire Basin.

3. The Control Problem

No comprehensive plan or model exists for the entire Great Lakes Basin that can provide any form of guidance for any type of development or conservation policy.

An institutional arrangement does not exist that can effectively translate such a plan through to the local/regional plans where actual implementation occurs.

While the U.S. through the Great Lakes Basin Commission has completed the first round of framework planning for the American side, no such plan exists for the Canadian portion.

Such an exercise could result directly or indirectly from IJC action. The problem lies in achieving the institutional arrangement which transmits this plan on the Canadian side, through the Ontario planning system to the local/regional planning level.

To resolve this, it is recommended that:

i) The Canadian federal government transfer or partially delegate its powers to the Ontario government for the development of the "Canadian half of the Great Lakes Basin Plan." This delegation would include agreement of the involvement both technically and financially of federal agencies;

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ii) The IJC use its influence to persuade the Canadian government to prepare a Great Lakes Basin Plan;

iii) A comprehensive Great Lakes Basin Plan be prepared that would ultimately be adopted by the Canada/U.S. federal governments, Ontario/States, and through the institutional arrangements and powers of the U.S. Federal government and the Ontario government transmitted to local/regional plans.

The formulation of standards and guidelines through a comprehensive planning program based on the Great Lakes Basin would ultimately have advantages for local and regional planning. In particular, the recommendations of the local/regional planning agencies would be reinforced and substantiated through the basin-wide standards.

II. IMPLEMENTATION OF THE GREAT LAKES WATER QUALITY AGREEMENT

The 1978 Great Lakes Water Quality Agreement (WQA) contains specific objectives related to the control and abatement of pollution to the Great Lakes. In order to achieve these objectives, it is necessary that there exist:

- a planning process(es) through which pollution sources can be identified;
- the measures necessary to control these pollution sources; and
- the agencies responsible for implementing these pollution control measures.

Existing planning processes in both the U.S. and Canada are such that the implementation of the WQA objectives cannot be ensured.

Traditionally, plans have been prepared which are nothing more than models of some desired future or merely statements of goals. A plan designed to be implementable, however, will include an implementation strategy as well as the model or goals. Furthermore, an implementable plan should be prepared in a manner different from that of the traditional plan in that all proposed alternative pollution control measures (in the case of a water quality management plan) must be feasible technically, environmentally, economically, politically and socially. This may mean that the alternatives eventually recommended are less than ideal from a technical standpoint, but their chances of being implemented are enhanced.

The implementation strategy of an implementable plan will be based on examination of institutional arrangements. Potential implementing agencies will be identified and their capability and willingness to carry out plan recommendations will be assessed. In some cases, potential implementors will lack the authority, the funds or the support of their constituency necessary to carry out plan recommendations. In other cases no agency will exist with the potential to implement certain plan provisions. In these cases it is the planners' responsibility to recommend the necessary changes in institutional arrangements necessary to ensure plan implementation.
Since the implementable plan must identify those who will carry out plan recommendations, the implementors will be drawn into the planning process. Their participation will not only contribute to the feasibility of plan recommendations but will also facilitate their subsequent acceptance of plan implementation responsibilities. Moreover, since planning and implementation are frequently carried out at different levels of government, the planning process can effectively serve to reduce inter-agency hostilities and "turf-battles".

An additional characteristic of an implementable plan is that it tends to be more comprehensive than traditional plans. The planner, in order to assess the feasibility of plan alternatives, must examine their potential impacts on political, economic, environmental and social systems and be prepared to defend the "trade-offs" implicit in plan implementation. Planning of this sort requires larger and more detailed data bases and more broadly skilled planners than traditional planning. It has been stated that the existing planning processes are insufficient to ensure that the objectives of the WQA will be realized. Among the deficiencies are:

- no existing overall plan for the Great Lakes Basin;
- existing plans lack comprehensiveness;
- the existing institutional arrangement are inadequate for full plan implementation; and
- key agencies, such as major metropolitan regions, are not adequately integrated into the Great Lakes Basin planning process.

It is therefore recommended that the IJC, in carrying out its responsibilities under Article 7 of the WQA, use its influence and authority to:

- assure the development of a plan(s) of sufficient scope and comprehensiveness to ensure the implementation of the WQA objectives;
- assure the examination of the existing institutional arrangement in order to assess their capacity for implementing the WQA objectives.

Other recommendations to remedy planning process deficiencies are addressed in the section of this report dealing with the IJC institutional response, below.

III. CANADIAN/ONTARIO INSTITUTIONAL FRAMEWORK

Although a comprehensive planning effort encompassing the Great Lakes Basin has not emerged within the Canadian jurisdiction, there is reason to be optimistic that progress can be made to assist the effective implementation of the 1978 Agreement. It is important to note that, from the Canadian perspective, all the Great Lakes Basin is contained within the Province of Ontario. Negotiations are proceeding between Canada and
Ontario to give effect to the 1978 International Agreement through some form of federal/provincial subsidiary agreement.

The elements of such an agreement must consider that a well defined planning approach has emerged in the province based upon a hierarchy of planning responsibilities which assigns particular responsibilities to local and regional municipalities as well as to certain special agencies of the province.

As a result, the hierarchy of planning which has emerged continues to be flexible and can incorporate new elements as required. The province and certain of its special purpose agencies exercise an overview and define certain criteria that must be preserved in all planning activities of the local and regional governments. By legislation, regional and local municipalities do have the basic planning powers which affect property rights and the use of land in ways that are critical to controlling the pattern and nature of urban growth. The elements of land use planning exercised at the local/regional level, whether they be development control, zoning or comprehensive planning activities, are open to review by the province and can be influenced through appropriate techniques to reflect new or emerging concerns. The protection of the Great Lakes is such a concern that demands a provincial and international effort to accomplish comprehensive planning based on an ecosystem perspective.

It is important to note that, by agglomerating the local and regional plans in conjunction with the special plans of such bodies as the Conservation Authorities and major provincial utilities, the Province can reorganize the basic data available to it to fit the needs arising in the Great Lakes. Such activity requires that the available material be reviewed for both consistency and suitability for the protection of the lakes. Upon analysis, certain aspects of local, regional or special-purpose planning activities may require discussion and modification, but the process is both in place and familiar to the key institutions.

While the adequacy of existing data and policies can be assured with time, it is essential that the necessary standards which emerge are translated into effective programs and policies. This can be accomplished only by ensuring that the municipalities are kept aware of and committed to the concerns for the Great Lakes. Assuring the municipalities of a role in the definition of goals and objectives will help to maintain commitment, but some retention of influence over the planning decisions of local government by the province may be required to obtain a degree of consistency and compliance to standards established on a cooperative basis.

The process of decentralizing planning jurisdiction for local government has not proceeded as far as in certain states where the "home rule" concept applies. Some efforts are being made to ensure that local government accepts responsibility for planning decisions in Ontario and this decentralization has the valid and appropriate objectives of
increasing participation in the planning process. It is suggested here that the process should not continue to the extent that effective control over broad regional concerns passes entirely from the hands of the province. The preservation of standards adequate to assure improvement in Great Lakes water quality is a significant consideration in determining the extent of decentralization of authority and responsibility.

As well as maintaining a balance of provincial/local interests, consultations between Ontario and the Government of Canada must recognize that standards adopted unilaterally by the senior governments are unlikely to be adequately reflected in the efforts of the municipalities, who have effective control over land uses and urban servicing programs.

If the Government of Canada is to oversee the implementation of programs designed to meet the objectives of the 1978 Great Lakes Water Quality Agreement, both authority and resources must be conveyed to Ontario within the terms of the Agreement to ensure that prevailing planning practices can be adopted to reinforce achievement of the objectives.

It is concluded that this approach would be superior to the designation of new agencies at the federal level to implement the agreement. Significant experience exists with present programs to encourage municipalities to adapt to provincial standards through such means as special components of grant programs to local government, and the withholding of specific approvals until standards are achieved.

Within this planning framework, the Province of Ontario is urged to implement a special effort to accumulate statistical and other planning information on a basis consistent with the evolution of a comprehensive plan for the Great Lakes. This planning effort should be matched by activities within the U.S. jurisdiction, as described elsewhere in this report. Ultimately, the International Joint Commission should be the repository of all such information, to advance their monitoring and alerting responsibilities under the Agreement. While a clear focus upon provincial responsibility is maintained in the above recommendations, objectives are also pursued to expand a municipal role and to maintain consistency with efforts within U.S. jurisdictions.

IV. UNITED STATES

The Great Lakes States and the Great Lakes Basin Commission Relationships

1. The Great Lakes States

The states are sovereign units of general purpose government capable of exercising all powers not directly assigned to the United States. As such, the states have the fundamental responsibility to execute water quality programs or delegate these responsibilities. The states exercise their own sovereign powers and as the executive agents for the United States under the provisions of the Clean Water Act, the Clean Air Act, and the Resource Conservation and Recovery Act.
While the local levels of government carry the "laboring oar" for much of the federally-directed environmental plans and programs as planned and co-ordinated by regional planning commissions and councils of governments, the states, nonetheless, have accepted and must perform a series of major responsibilities in support of field programs.

For example, Annex 12 of the 1978 Great Lakes Water Quality Agreement dealing with persistent toxic substances, recognizes the need for close co-ordination between air, water and solid waste programs and the need for programs insuring the proper transport and disposition of persistent toxic substances.

Although the basic program is in the interest of water quality, it is obvious that a disposal program will have severe impact on land use. The states will be obliged to cope with this most difficult matter, if the water quality objectives are to be met by the early 1980's.

Planning and program co-ordination of the water quality program has evolved as a joint state-regional enterprise. Sec. 208 of the Clean Water Act recognized the need for management of point and non-point sources of water pollution. The major urban-industrial Regional Planning Commissions or Councils of Governments were designated to perform this mission. The regional construction of major urban places and adjacent hinterlands were acknowledged as having the spatial scale and corresponding institutional arrangements appropriate to the task.

We believe that this joint state-regional association for the water quality programs should be maintained through implementation of the planning programs.

2. Great Lakes Basin Commission (GLBC)

The GLBC, organized under the provisions of the Water Resources Planning Act of 1965, has member representatives from concerned federal agencies and the eight states.

Pursuant to its planning responsibilities, the Commission has prepared a general framework plan which is updated periodically. In addition, problem watersheds are assessed more intensively, e.g. the Maumee River Basin Plan and special problem sectors such as toxic substances, are dealt with.

The Commission is in a position to share these data assessments and plans with the IJC. This input to the IJC would be a counterpart contribution to the proposed technical input from the Province of Ontario.

In our judgement, the states should provide active participation and support to the GLBC, if this multistate-federal instrumentality is to
perform effectively. To this end, the state representatives to the GLBC should enjoy a policy-formulating relationship to the Governor and should be centrally-cognizant of the states' water-related policies and programs.

This knowledge should include an understanding of the water quality problems of the major urban and industrial regions, coastal zone matters, and the other traditional water resource-related activities of the state: recreation, fisheries, water supply, power and flood control.

V. PROPOSED IJC INSTITUTIONAL RESPONSE

1. Water Quality Board

A Water Quality Board which serves as the principal advisor to the IJC, is provided for in the 1978 Great Lakes Water Quality Agreement. It assists the IJC with the execution of the Agreement. Among other duties, the Water Quality Board undertakes liaison and co-ordination among institutions and jurisdictions which may address concerns relevant to the Great Lakes ecosystem. We suggest that the Water Quality Board would be strengthened and the institutional co-ordination mission enhanced, by adding U.S. and Canadian members representative of the shoreland urban regions. These regions contain the greater part of the Great Lakes Basin's population and pollution-generating activities. These regions are the focal points of the water quality problem, then the bulk of the remedial action is concentrated in these areas.

We suggest that the additional members of the Water Quality Board be drawn from Regional Planning Commissions or Councils of Government from U.S. regions such as greater Chicago, Detroit or Cleveland and from Ontario regions such as Metro Toronto or the Sarnia-Windsor complex.

2. Board on Comprehensive Basin Analysis and Planning

In the interest of fostering and developing a pro-active role for the IJC, it is proposed that the Commission establish a standing Board on Comprehensive Basin Analysis and Planning. Such a Board would advise and assist the IJC with the proposed new mission of comprehensive anticipatory planning under the ecosystem approach. The new Board's membership should include representatives from all levels of government and sophisticated generalists. We further suggest that the Board have a core staff associated with it who would be qualified to integrate, synthesize and interpret the information provided to the Commission through the Great Lakes Basin Commission and the Province of Ontario. Such a staff would be essential for the evaluative work of the Commission and its advisory board.
If the proposal for a new advisory board and supporting core staff are not deemed acceptable at this juncture, we suggest that a special panel on Comprehensive Basin Analysis and Planning be established as a part of the Science Advisory Board. Such a panel could be assigned interim responsibility for developing in detail the process and institutional relationships required for the Commission's proposed pro-active role.

VI. A PROPOSED CONTINUING ROLE FOR THE IJC

The workshop group accepted the present role of the IJC, particularly as it pertains to the monitoring of water quality conditions in the Great Lakes. A responsibility to alert the senior Governments in both the U.S. and Canada of any deterioration in water quality and of failures to achieve standards set out in the 1978 International Great Lakes Water Quality Agreement, is seen as appropriate. To accomplish these responsibilities, recommendations have been advanced already that would enhance the capacity of the IJC to review timely reports and planning observations prepared under the aegis of the Province of Ontario and the Great Lakes Basin Commission.

In some circumstances, the IJC should assume a forward looking role and consider the adoption of initiatives to seek to have the parties to the International Agreement refer special critical areas for intensive investigation by the IJC. In addition, the mandate of the IJC should be broadly interpreted to include the identification of any substantial institutional deficiencies hampering achievement of the objectives of the Agreement. Such a responsibility would be accomplished as part of its monitoring function under the Water Quality Agreement and would be exercised through its periodic reports.

To supplement information made available to the IJC through the mechanisms described in this workshop report, it is also regarded as advisable that the IJC expand and develop appropriate links with other bodies concerned with Great Lakes issues, eg. the Great Lakes Fisheries Commission.
Leonard Crook (Co-Chairman) - Natural Resources Management Consultant
Glen Norcliffe (Co-Chairman) - Department of Geography, York University
George Ryan - Great Lakes Regional Director, U.S Maritime Administration
Dave Buchanan - Lake Carriers Association
Al Behm - Chief of Planning, North Central Division, U.S. Army Corps of Engineers
Jim Fish - Executive Secretary, Great Lakes Commission
Philip Hurcomb - Canada Marine Association
Douglas Hearnshaw - Marine Transport Technology R & D Centre (Canada)
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Leo Moarse - Chief Planner, Toronto Harbour Commission
Arlene Dietz - Study Manager National Waterways Study, U.S. Army Corps of Engineers
Jim Cowden - Great Lakes Tomorrow
John Bruce - House Committee on Merchant Marine and Fisheries, U.S. House of Representatives
Graham Day - Director, Canadian Marine Transportation Centre, Dalhousie University
S.T. Byerley - Senior Economic Advisor, Marine Services Policy Branch, Transport Canada
Walter Webb - St. Lawrence Seaway Authority (Canada)
# TRANSPORTATION

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The Work Group Activity

The Work Group on Transportation addressed matters concerning water, rail, pipeline, air and road transportation, ports and associated back-up facilities and recreational transportation and their potential in relation to the Great Lakes.

The Participants

The participants, evidenced a broad spectrum of experience in Great Lakes transportation, particularly commercial and recreational navigation and national water policy. Invitees not able to attend were particularly knowledgeable in the fields of U.S. national transportation policy, rail, and rail-water interchanges affecting Great Lakes coal transportation, intermodal and urban transportation interfaces and U.S. and Canadian shippers' objectives and probably requirements. The viewpoints of labor, pilots and consumers were expressed but not directly represented. Intermodal issues concerning navigation and rail, truck and pipeline were explored.

General Problem Areas

In the introduction, comments to the IJC, which forwards this workshop report to governments, include this statement:

"Although it is not a problem area which appears to be under the jurisdiction of the IJC, the Commissioners should be aware that the identification of suitable sites for major investments in heavy industry and new port complexes is a significant problem for industry. Industry is desirous of selecting sites which have the least adverse impact on the environment. Frequently, after site selection, there is public and local governmental opposition to the plant or port location. State, provincial and other local governmental bodies could assist economic growth of their areas by prior identification and approval of sites suitable for new facilities development."

Great Lakes Role in The Canadian Transportation System

Canada has an immature industrial economy, characterized by a strong emphasis on agriculture and primary resource industries, which account for
a large proportion of Canadian exports. The manufacturing sector is even less well developed and many production units are branch plants of American corporations, which serve the Canadian regional market. In consequence, the major freight flows within Canada and exports from Canada involve the movement of bulk and neo-bulk freight.

Simplifying a great deal, the major flows within the Canadian transportation system that actually or potentially involve the Great Lakes can be summarized as follows.

(1) Flows from Western Canada

Canada is roughly self-sufficient in oil, but operates a system whereby western Canada exports oil to the northwest United States, while Quebec and the Maritime Provinces import oil (mainly from Venezuela). Oil and gas movements from western Canada to Ontario are by pipeline; very little is moved by ship down the Great Lakes and this is not likely to change in the foreseeable future. However, about 3.7 m tons p.a. of gasoline and fuel oil are distributed around the Great Lakes by ship from the refineries at Sarnia.

Prairie grain, in contrast, is moved in very large quantities on the Great Lakes. In recent years, about 13 m tons of grain have been loaded each year at Thunder Bay, much of it being carried on Seaway-sized ships to Montreal, Quebec City or Baie Comeau for export overseas. A number of smaller ports such as Port McNicoll, Midland, Collingwood, Owen Sound, Goderich, Sarnia, Toronto, Port Colborne, Kingston and Prescott participate in this trade, often as a place of storage during winter.

Close to 1 m tons of Alberta coal are now being shipped through Thunder Bay to ports on the lower lakes each year and this trade is likely to grow in the future.

(2) Movements From Northern Ontario

The two major industries in northern Ontario are mining and wood industries. Over 2.5 m tons of iron ore are loaded annually at Thunder Bay and 0.7 m tons at Depot Harbour (Parry Sound); most of this being destined for the Canadian steel towns of Sault Ste. Marie, Nanticoke and Hamilton and for U.S. steel towns. In contrast, only small quantities of wood and wood products are moved by water; rail and truck transport are preferred.

(3) Movements From the United States

The major imports from the U.S. transported by water are coal and iron ore. Coal from northern Appalachia is used in thermal generating stations and in steel making. Major flows go to Lakeview, near Toronto (2 m tons p.a.), Hamilton (5½ m tons p.a.) and Sault Ste. Marie (2 m tons p.a.). With the development of iron deposits in
Labrador, imports of U.S. iron ore have become less important. However, Hamilton imports about 2.4 m tons of U.S. ore (40% of its needs) and Sault Ste. Marie about 1.4 m tons of U.S. ore (60% of its needs).

(3) 

 Movements From and Within Southern Ontario

A substantial amount of bulk freight is moved within the lower Great Lakes, the major cargoes being salt, limestone, dolomite and stone. About 1.5 m tons of salt is loaded at Goderich on Lake Huron, of which 2/3 is unloaded at Canadian ports (mainly Toronto, Thunder Bay, Windsor, Prescott, Parry Sound and Kingston), the remaining 1/3 being exported to the U.S. This is used mainly as road salt. Some of the vessels carrying coal from U.S. Lake Erie ports to Canada return with cargoes of stone. There is an annual movement by ship of 2.6 m tons of limestone along Lake Ontario from Colborne to Clarkston, where cement is manufactured. Most of this cement is sold in the Toronto area, but .3 m tons is exported to the U.S. by water. About .3 m tons of cement are also shipped from both Bath and Picton westwards along Lake Ontario to Toronto. Finally, a certain amount of plate and sheet steel is delivered by ship from Hamilton and Sault Ste. Marie to markets around the Great Lakes.

(5) 

 Movements up the St. Lawrence Seaway

Currently the U.S. imports close to 20 m tons of Canadian iron ore p.a. through Great Lakes ports - mainly Buffalo, Toledo, Cleveland, Detroit and Gary. The great majority of this is Labrador iron ore, loaded at Sept Iles in the Gulf of St. Lawrence. This is the single greatest commodity movement in the Great Lakes, exceeding even the grain shipments from Thunder Bay. This trade is of great strategic importance, taking place in protected waters and it is likely to grow in volume in years to come.

From the Canadian viewpoint, only a small amount of container traffic and general cargo moves up the St. Lawrence Seaway. Most of southern Ontario's container trade is moved by rail to Montreal, Quebec City, St. John and Halifax (which is now Canada's leading container port).

II. GENERAL CONCLUSIONS

(1) The Great Lakes are of importance to the Canadian transportation system only as a mover of bulk cargoes. They are of minor importance to the movement of container traffic, general cargo and even neo-bulk. Passenger and ferry traffic is insignificant. Moreover, the present movement of containers and general cargo could probably be switched to road and/or rail at no great cost penalty.

(2) The two major bulk cargoes that are moved by ship, Labrador iron ore and Prairie grain, are key Canadian exports. In the case of grain, lack of rail capacity and a shortage of rolling stock makes the
waterborne movement down the Great Lakes crucial to the overall delivery system. In the case of the iron ore trade, the alternative to movement by ship would be very expensive. However, it is not inconceivable that a more interventionist government in either Quebec City or Ottawa would insist on retaining greater value added in Canada, in which case some of the iron ore shipments from Sept Iles might be converted to steel at, say Sorel, before being exported to the U.S.

(3) The only major general cargo port on the Canadian side of the Great Lakes is Toronto. Given the relative unimportance of container and general cargo traffic, the future of Toronto as a major port is open to question. Intervention by the government could drastically affect the composition, quantity and types of commerce at various ports.

(4) Cargo flows on the Great Lakes are unbalanced so that many vessels make return trips in ballast. There is some backhauling - for instance grain to the St. Lawrence, returning with Labrador iron ore; or grain from Thunder Bay to a lower lake port, returning with coal. Many of the flows, however, remain unbalanced.

(5) Given the small size of the deep sea merchant fleet, the Great Lakes merchant fleet (1.5 m gross registered tones - 142 vessels in 1975) accounts for a substantial proportion of the Canadian fleet. For similar reasons, the Collingwood shipyard on Georgian Bay and Port Waller dry docks on Lake Ontario are two of a handful of shipbuilding yards in Canada.

(6) Flows on the Canadian side are becoming increasingly concentrated in a few major ports. Many minor ports have completely lost their commercial role over the last half century, although their use for recreational boating has often grown substantially.

(7) Port facilities are becoming increasingly specialized for handling particular cargoes. The merchant fleet has also become more specialized, for instance bulkers have largely been replaced by self-unloaders (coal, ore and stone is unloaded quickly without any shore equipment). This has created a more efficient, but less flexible transport system.

(8) The Canadian Great Lakes fleet is an efficient mover of bulk cargo. In 1973, average revenue per ton mile for dry bulk cargoes was 24 cents, compared with $1.35 for C.P. rail, and $1.61 for C.N. rail.

Canadian National Transportation policy is in a state of transition from a concept based on "an economic efficient and adequate transportation system making best use of all available modes of transportation at the lowest total cost"* to one which uses "transportation as an instrument of national policy, rather than as a passive support service, states that the

*Section 3 of existing Canadian National Transportation Act.
transportation system should be accessible, equitable and efficient, ... The notion of efficiency is not lost but the emphasis is on service to Canadians"**; U.S. Transportation policy as enunciated by Secretary of Transportation, Coleman, is a 53-page document whose stated goals are: "We would see a more safe, efficient, accessible, diverse, competitive transportation system, mainly in the private sector which would enhance the nation's environment, economy, and quality of life by providing:

**Water Transportation**

- "For coordinated activities among federal, state, and local governmental authorities and comprehensive coastal zone planning essential for port development.

- "National inland waterway policies compatible with national transportation policies.

- "That the identifiable beneficiaries of federally improved and maintained waterways should bear some share of development and operation costs through a system of user charges.

- "For allocation of federal resources more fairly among the modes.

Direct and indirect subsidies only when a clearly defined national interest requires the development, modernization, or maintenance of essential transportation service.

- "For reform of the regulatory structure to remove outmoded constraints on competition among carriers and modes.

- "Incentives for more efficient intermodal services through research, development, and demonstration programs.

- "For elimination of unreasonable barriers to intermodal cooperation - encouraging cross-modal terminals through ticketing multi-modal ownership, and container shipping where efficiency, lower prices, and convenience to shippers and consumers are the consequence.

- "Recognition of the deed for a fair return on capital by private provider of transportation services and the need for sound fiscal responsibility in the provision of transportation services supported by public funds.

**Railroad Transportation**

- "Federal assistance to the railroad industry in restructuring its system along more rational and efficient lines, reducing excess duplicative capacity and eliminating non-essential routes from the

**Statement by Transport Minister Jean Marchand, on Transportation Policy, June 1975**
national interstate network, while rehabilitating and modernizing those facilities remaining in the rationalized interstate system.

- "Modernized federal regulatory policies that have prevented the railroads from being efficient competitors among themselves and with other modes.

- "Remedies for the inequitable federal government subsidy to the railroad's major competitors - water carriers and elements of the motor carrier industry.

- "Encouragement for the continued development of more efficient labor and management practices in the railroad industry.

Highway Transportation

- "That a high level of performance be maintained on our nation's major highway systems.

- "That federal, state, and local groups cooperate in their highway programs to enable each level of government, within its sphere of interests, to best determine priorities and improve its transportation systems in the most cost effective manner.

- "That the interstate highway system be completed and maintained especially where intercity links are concerned.

- "That the special problems and needs of rural America be separately addressed and met with specified programs.

- "Elimination of archaic and energy inefficient constraints on the trucking industry.

- "Privately owned, financially healthy and competitive, high-performance national networks of marine, rail, truck, bus, pipeline, and air freight and passenger service;

- "A system of feeder lines and links that provides access to the nationwide interstate systems and effectively meets the transportation needs of urban, suburban, and rural areas, privately maintained where possible, and supported, on a fiscally responsible basis, primarily by states and local governments with federal financial participation where necessary;

- "A modern highway system which serves the needs of the future, consistent with our environmental and new energy concerns;

- "Progress each year in safety performance, environmental protection, energy conservation, and transportation crime prevention;
- "Comprehensive urban transportation systems, involving efficient mass
  transit and a mix of modes that are consistent with broader
  metropolitan goals;
- "Safe and modern rural transportation facilities, providing access to
  the Interstate network and creating an infrastructure that enhances
  rural living and development;
- "A strong international transportation system with the participation
  of privately owned, financially healthy, unsubsidized U.S. flag
  carriers;
- "More equal competition between firms and among modes, freed from the
  encumbrance of outmoded regulatory restraints;
- "New, more cost-effective, energy-efficient, and intermodal
  technology;
- "Accessible transportation for the poor, the minorities, the
  handicapped and the elderly;
- "Opportunities for employment and advancement for all citizens,
  particularly women, minorities, and the disadvantaged;
- "An economy conducive to adequate capital formation, enabling private
  firms to earn a reasonable return on investment and keep facilities
  and equipment modern, safe, and environmentally sound.

"A more perfect transportation system will evolve primarily through the
efforts of an innovative, competitive, and forward looking private
sector. The Federal Government must support this evolution, reinforcing
the strengths of our system and shoring up its weaknesses ...."

III. FUTURE DEMANDS ON THE GREAT LAKES

Introduction

It will be recognized that transportation demand on the Great Lakes
manifests itself as a complex set of origin-destination movements by
vessels, both lakers and ocean-going vessels, between the various Great
Lakes ports. Within the scope of this brief review, we summarize
transportation demand by focussing on the marine traffic flowing through
three constrictions in the lake system:

- the Sault Ste. Marie locks joining Lakes Superior and Huron;
- the Welland Canal joining Lakes Erie and Ontario; and
- the St. Lawrence Seaway Locks between Lake Ontario and Montreal.

While there are, of course, other points in the system for which traffic
levels could be quoted, information is readily available for these points and they provide a representative indication of past and expected demand levels.

For brevity, the information is summarized here:

**Recent Trends**

- **Welland Canal and Lake Ontario-Montreal traffic** has been relatively stable during the past 10 years, ranging between a low of about 52 m tons (1974) and a high of about 72 m tons (1977) on the Welland Canal. Upbound traffic on the Welland Canal has averaged about 21 m tons per year and downbound traffic about 40 m tons per year. Major traffic components are: iron ore (upbound from Labrador to U.S. midwest ports); grain (downbound from Thunder Bay and Duluth to Lower St. Lawrence ports); and coal (downbound from Lake Erie ports to Lake Ontario ports). In 1977, the Welland Canal carried 24 m tons of grain, 22 m tons of iron ore, 7 m tons of coal, 12 m tons of other bulk and 6 m tons of general cargo. Volumes on the Lake Ontario-Montreal section were similar with the exception that negligible coal traffic was carried. The grain and iron ore traffic volumes are complementary as backhaul traffic, which is therefore carried very efficiently.

- **The Sault Ste. Marie ("Soo") Locks** have also shown relatively static traffic levels during the past 10-15 years, ranging from a low of 78 m tons (1977) to a high of 110 m tons (1973). Eastbound traffic is predominant, ranging from 69 m tons (1977) to a high of 101 m tons (1973); major components in 1978 were grain (20 m tons), iron ore (43 m tons) and coal (4 m tons). Westbound traffic has been stable at about 10 m tons, with major components being coal (5 m tons) and stone (2 m tons). The eastbound iron ore is bound mainly for midwest U.S. ports and the westbound coal is mainly for the Algoma Steel Company in northern Ontario*.

In summary, traffic levels have not been dynamic in recent years. Their relationship to general economic activity is apparent from the substantial drop experienced between 1973 and 1974, reflecting the impact of the oil crisis at that time and the relatively depressed levels in 1977 and 1978 through the "Soo" Locks.

**Estimates of Future Demand**

A sample of long range traffic estimates made during the past few years:

- One estimate places Welland Canal traffic at about 76 m tons by 1990 and traffic on the Montreal-Lake Ontario section at 65 m tons in that year. The same source suggests that these levels will rise to about 87 m tons and 74 m tons, respectively, by 2000. It suggests that

*"Soo" Locks Traffic (received by telephone March 1 and 2, 1979, from the U.S. Corps of Engineers).
these levels might be up to 10% higher by 2000 if winter navigation steps were taken to increase the shipping season to 11 months*.

- Extremely rough order of magnitude estimates received by telephone on March 2, 1979, indicate that "500" Locks traffic might rise to about 160 m tons by 1990 and 185 tons by 2000, although it was recognized that the traffic levels could be substantially less than this. The major impetus for this growth would come from very substantial increases in U.S. grain traffic and significant increases in Canadian grain traffic, expected annual increases of about 1½% per year in iron ore traffic, and significant increases in coal traffic occurring about 1990.

- A recent report prepared for the Dominion Marine Association, estimates that between 16 m and 24 m tons of grain will be carried on the Great Lakes by the Canadian laker fleet by 1990**.

- Approximately 15 m tons of Canadian grain, 58 m tons of Canadian iron ore upbound, 17 m tons of Canadian iron ore downbound, 10 m tons of Canadian coal downbound and about 100,000 tons of Canadian potash downbound, are anticipated by the year 1990***.

In summary, marine traffic on the Great Lakes is expected to increase by a factor of 1.5 to 2.0 during the next 20-30 years.

** Implications
The Canadian estimates of traffic growth may be summarized as follows:

- With marginal improvements, costing approximately $50 - $60 m, the expected capacity of the Welland Canal and the Lake Ontario-Montreal Locks can be raised to about 90 m tons per year, possibly sufficient to carry anticipated traffic loads to about 1990. Should traffic levels continue to rise beyond 90 m tons, major expenditures in the order of $1 - $5 billion would be implied to expand capacity significantly. Investments of this magnitude would require careful assessment of alternatives such as diverting major traffic segments to unit trains or possibly slurry pipelines.

- Investments in the range of $200 - $300 m are expected to be required for major Canadian Great Lakes and St. Lawrence ports to accommodate the level of traffic expected by 1990.

- Investments in the $3 - $4 billion range are anticipated for replacement/expansion of the laker fleet over the next 15 years.

- Developments which will affect transportation demand estimates include: rates of economic recovery and growth; greater diversion of prairie bulk products (e.g. grain) to west coast ports for export rather than via the Great Lakes; possible diversion of bulk products such as coal and iron ore to other modes (e.g. unit trains, slurry pipelines); the rate of growth of international markets, impacts of oil restrictions and price increases; and capacity limitations which may be imposed by the inability to expand major canals and/or port facilities owing to environmental or economic constraints.

The major capacity bottleneck in the Great Lakes navigation system is the Welland Canal. Mr. Paul D. Normandeau, President, The St. Lawrence Seaway Authority discussed this situation in his statement to the Dominion Marine Association/Lake Carriers Association's 1979 Annual Meeting, Banff, Alberta, February 25-28, quoted in part, as follows:

"The Seaway Authority's capacity study activities are focussed on its bottleneck section, the Welland Canal. Figure (1) shows that Welland Canal cargo demand is projected to increase faster than its capacity. Unless improvements are made to increase capacity, the limit will be exceeded some time soon after 1986 when annual demand is projected to pass 74 m metric tons".

FIGURE 1

WELLAND CANAL
ANNUAL CARGO DEMAND
AND CAPACITY LIMIT

Capacity Limit

Historical
Projected

YEAR

72
"Physical Capacity Limitations"

"Figure 2 which indicates the relationship between the average number of vessels arriving randomly and asking for service on a given day and the average time a complete, one-way, transit would take from calling in for service at one end of the canal to exiting at the other end.

![Figure 2: Welland Canal Lockage Capacities](image)

"Although much more complex than most queuing systems, the Welland Canal's service relationship is typical in that it deteriorates very quickly as demand passes a critical point. As can be seen on the graph, 30 lockages per day is defined as the maximum continued demand.

"We calculate, based on accumulated experience 6,415 lockages, slightly more than 82% of the theoretical number, to be the practical maximum annual demand which the Welland Canal can be expected to handle and we are using this number as our capacity limit for planning purposes. Within this limit, we would operate under a degree of congestion that we would prefer to avoid, because it does not make provision for the possibility of a major accident, for strikes, for pilot shortages, etc.

"The annual physical capacity of the Welland Canal, when stated as 6,415 lockages, can then be viewed as relatively unchanged since the major improvements program of the mid-60's. However, the trend towards larger vessels (illustrated in Figure 3) means that a given number of lockages
handled many more vessels in the mid-60's than the same number of lockages does today. Fortunately, the smaller number of vessels results in a net increase in the amount of cargo that can be moved in the same number of lockages.

"Improvements to the physical capacity of the canal alone will give us at least a 10% improvement. These can be viewed in addition as providing the time required for the fleet to evolve to a still more efficient position. It should be possible also to plan the implementation of all available improvements in a manner that will keep the cargo capacity limit comfortably ahead of cargo demand. We will thus avoid reconstruction or diversion of cargo for many years to come. Such a plan will call, in the case of the near term projection, for the implementation of improvements with sufficient results to avoid the congestion projected for after 1996.

"We feel confident that the potential for significant improvement does exist. We also know that these improvements will be costly enough to warrant a determined scientific comparison of alternatives. At the present time, we are concentrating our efforts on the evaluation of the marine shunter concept since it has the potential for a relatively large improvement in the physical capacity of the Welland Canal, certainly the largest potential of any single idea. A first pair of these odd-looking
vessels has just now been delivered to us. The concept of using specially-designed tugs to assist vessels during their transit of the Welland Canal will be evaluated through full-scale field testing this year and next. The first results should be available later this year and they will greatly influence the pattern of review of all the improvements available to us.

"For example, if the shunter concept's potential is evaluated as significantly greater than 10% it could obviate the need for parallel activity in other areas. If, however, it is evaluated as somewhat less than 10%, the concept might have to be implemented in concert with other physical capacity improvements. Or, should the results be discouraging, a series of other improvements could be packaged to produce an overall 10% improvement. Fortunately, there is such a package which could include, inter alia, the following measures:

a) widening the reach between the Guard Gate at Lock 7 and Port Robinson at the northern end of the By-Pass. We plan to make a start this year on this project.

b) removing Bridge 5 at Glendale Avenue. This bridge interferes to a marked degree and slows down traffic between locks 3 and 4.

c) realigning 10 different lock approach walls and building into these a reverse curve to replace the present straight walls on an angle.

d) providing computer-assisted scheduling. We have already ascertained that the procedure would be of assistance to our controllers.

e) extending the navigation season. To achieve this objective at the Welland Canal would depend on what is decided on the Montreal to lake Ontario section, since extending the season in one section without the other going the same way would not prove beneficial.

"In all three of the above scenarios, the improvements would be ordered as indicated by the cargo demand. We are now operating in a self financing environment. The prospect of needing significant capital intensive improvements to alleviate a coming congestion gives added weight to the importance of closely monitoring the balance between the continued increases in cargo demand and the potential for greater Welland cargo capacity as well as evaluating all eligible improvement options".

IV. LIST OF MAJOR PROBLEMS AND ISSUES

The participants developed and discussed a large number of problems and issues as shown on the following check list. The principal problems are treated more extensively on subsequent pages.
The criteria used to set priorities were:

1) high cost of meeting objective or solving the problem;
2) demand for immediate action;
3) irrevocable nature of commitment;
4) effects on economic and environmental well-being; and
5) binational considerations subject to potential IJC resolution.

The following major problems and issues are discussed in priority order:

1. SYNTHESIS AND ANALYSIS OF ECONOMIC AND ENVIRONMENTAL DATA

a. Problem: Concern for the environment has given rise to intensive demands for very extensive monitoring of the environment throughout the Great Lakes in advance of any demonstration or construction work. If these demands prevail, further improvements may be suspended for indefinite periods or permanently.

b. Background: During the Demonstration Program for extension of the navigation period, objections were raised to operations in advance of acquisition of a Great Lakes-wide acquisition of "baseline data on all aspects of the natural system". Estimates of the suggested cost for such monitoring ranged from a minimum of ($17 m) to a maximum of $70 m). Work on the St. Lawrence section is being suspended pending resolution of the matter.

c. Option: There is a wealth of information available from the agencies and institutions listed in the publication of the Great Lakes Basin Commission's "Great Lakes Directory of Universities, Research Institutes, Libraries and Agencies, Concerned with Water and Land Resources in the Great Lakes Basin." To say that we have no "baseline" data or information available is to suggest that the work of the professionals in the agencies and institutions listed is either valueless or erroneous. It also suggests that the decisions of the federal government, state and local governments and private enterprise in funding the research, demonstration and planning by these agencies were bad, ineffective, or otherwise misplaced public investments. Needless to say these hypotheses can be rejected.

What is not available is a synthesis of the research and information which has been collected by the many competent, committed researchers, planners and managers over many years of Great Lakes involvement. Those committed to improvements in the
Great Lakes, whether directed to water quality, fisheries, transportation, recreation, energy production, economic enhancement or any of the other interest areas, should push strongly for the necessary synthesis so that we may truly know what information can be documented about the lakes and determine what must be studied in the future.

Such a synthesis, performed in the near future, could provide the background required to establish new research and study strategies for the Great Lakes. The synthesis, whether done on a "Lake-by-Lake" basis or on a system wide basis, should provide us with the basis for determining the necessary public investment level in research and data gathering to meet our future needs.

Without some efforts to synthesize the existing information, it is questionable whether we will be able to move forward in the transportation area (winter navigation) without extraordinary expenditures and extended time frames, both of which can adversely impact the Great Lakes area's ability to contribute to the national economy.

The U.S. Water Resources Council is now completing the Second National Water Assessment. This federal study (for which the Great Lakes Basin Commission was the regional sponsor) contains many current data on the Great Lakes which could be incorporated into a meaningful synthesis.

2. DREDGING AND DISPOSAL OF DREDGED MATERIALS

a. Problem: A major problem related to port and channel development and maintenance concerns dredging and the disposal of dredged materials.

b. Background: Most ports and many waterways require periodic dredging of sediments that are carried and deposited by rivers, streams, sewers, currents and littoral processes. In the past few years the disposal of dredged materials has become increasingly costly and difficult because in many cases the sediments have been classified as "polluted" by the various environmental control agencies. This has meant that the dredged material can no longer be disposed of in deep areas of the lakes and that instead it has to be confined in diked areas. This has created problems in:

i) finding a suitable site for endiked disposal; and
ii) financing the considerable additional cost of endiked disposal.

Since the source of the polluted material usually does not lie within the port itself, a situation has arisen where the water
mode of transportation (personified by the Port Authority of the private owner or operator of a wharf) is burdened by the cost of controlling pollution it did not cause.

c. Option: The former Great Lakes Research Advisory Board of the IJC made certain recommendations in its Annual Report dated July 1978, which were directed at improving the methods of assessing the environmental impact of dredged material disposal. The report states that: "There is increasing evidence that the so-called 'confined disposal' of dredged sediments currently practiced in the Great Lakes area may have greater adverse environmental impact than originally perceived and possibly this impact may be as significant as, or more significant than, the less expensive open water disposal." It furthermore states that: "In view of the recent research results, it is possible that disposal practices in the Great Lakes Basin may have cost both Governments considerably more than necessary because of the criteria used in classifying dredged materials and that there may be significant potential impacts from 'confined disposal' sites."

Under the new Great Lakes Water Quality Agreement of 1978, the IJC has been assigned responsibility for development of criteria for classification of polluted sediment and compatible guidelines and criteria for dredging activities. In view of the seriousness of the dredge disposal problem in a number of ports and waterways in the Great Lakes System and the large costs involved in dredged material disposal, the IJC is urged to give a high priority to the tasks outlined in Annex 7 of the Water Quality Agreement of 1978.

3. RATES AND REGULATORY POLICY

Several examples of differences in the U.S. and Canadian national rate and regulatory policies are given to indicate the problems which exist and will arise.

1a. Problem: Proposals exist to change the U.S. open conference system to a closed one, which shippers expect will direct cargoes from this midwestern region to take advantage of deferred rebates, with an adverse impact on U.S. and Canadian Seaway and port investments.

1b. Background: Conferences, meaning associations of common carriers by water in which members may discuss and agree upon rates or practices offered, may be "open" to all operators agreeing to conference rules or "closed", whereby a conference can limit its membership. They do not exist on the Great Lakes but they do in other coastal regions.
1c. Option: The formation of "shippers' councils" would provide an essential balancing of interests.

The IJC, however, might consider action in an advisory capacity to alert the Governments to the impact of conference changes.

2a. Problem: Shipping rates or tariffs out of U.S. ports must be filed by common carriers by water with the U.S. Federal Maritime Commission to guard against discriminating practices; not so in Canada even with respect to cargo that originates in, or is destined for, the U.S. but is moved through Canadian ports.

2b. Background: The U.S. Federal Maritime Administration took action to alter this but was found to lack statutory authority, so bills were introduced in the 95th Congress. Some operators still view this situation as an unfair diversion of U.S. cargo.

2c. Option: The matter appears to deserve a review.

3a. The basis for cost recovery items is different in the U.S. and in Canada, as shown in the following background statements i) through vi).

3b. Background: i) Tolls

Proposals for additional cost-sharing or user charges on a partial or full cost recovery basis exist in both countries. They presently apply to the Welland Canal - St. Lawrence Seaway but not to the St. Mary's Falls Canal. Seaway tolls have been increased to achieve commercial viability on operations (self-sustaining) with an ad infinitum 1% return to Canada on its original capital investment and with U.S. Seaway revenues applied both to the cost of operations and to a scheduled liquidation of its bonded indebtedness, without interest.

Canada, concerned about the fair distribution of wealth and income to all regions of its country and confronted with the apparently contradictory provision of free government services which do not promote rational or conservative consumption and may result in economic misallocation or inefficiency, is embarked on a policy of full cost recovery from users of government provided transportation services. The Great Lakes are not exempt from this policy.

ii) Marine Services

In addition to pilotage, port and Seaway tolls now recovered, charges would be levied for all other marine services such as navigation aids, channel dredging, icebreaking, search and rescue, traffic information and weather reports. This faces up to the 1979/80 operating costs of $50 m for these services.
iii) Improvements

The capacity of the Seaway will be reached by about 1986. Capital expenditures of approximately $100 m by way of improvements such as 24-hour navigation aids, lock improvements, marine shunters, etc., will extend the capacity to the year 2000. Seaway tolls will be expected to recover these costs as though they were operating costs.

iv) User Charges - IJC

U.S. policy at present differs in that only selected inland waterways will be subjected to a nominal user charge through a fuel tax - deepwater port areas and the Great Lakes are exempted. Planning now calls for the States to share in the costs of a waterway capital improvement project, not for services except for the fuel tax. These policies are under study by at least three governmental bodies.

v) Operating Differential Subsidies

An apparent anomaly is seen for the U.S. user charge policy with respect to U.S. ocean carriers who also receive operating differential subsidies (ODS) for whom tolls or charges, payable to the government, will increase operating costs and ODS payments from the government. It is noted that Canada does not have or support any Canadian flag liner or oceangoing carriers.

vi) Loss of Governmental Control

The government might also do well to foresee changes in the Public Participatory roles and an evolving "user pay-user say" policy or philosophy.

3c. Options: The effects of these evolving policies on the Great Lakes, mindful of all the local and regional equities involved, warrant study and a clear identification of their impact. Can carriers, especially foreign and U.S. ocean operators, absorb any of these costs? (Presumably costs will be passed on to the ultimate consumers). Will costs of entry into the Lakes render them uncompetitive with intermodal connections for cargo delivery to and overseas shipment out of, other coastal regions? What is the ultimate effect upon the Great Lakes maritime industry and most importantly, upon domestic carriers if ocean commerce disappears in a full cost recovery regime?

It would appear that the U.S. and Canada are embarked on different, yet possibly collision, courses in the Lakes that governments might do well to examine.

4. Compulsory Pilotage
4a. Problem: Regulations requiring that Canadian and U.S. ships must take licensed pilots in the Great Lakes appears to impose an unnecessary cost burden on Canadian and U.S. shipowners.

4b. Background: At the moment exemptions from compulsory pilotage are accorded these domestic ships, on proof of the Master's experience in the area, but this is a temporary exemption only and may be withdrawn at any time.

4c. Option: There are strong arguments in favour of statutory exemption for domestic ships, the Masters of which are experienced in navigating the area.

5. Effects of Rate Equalization Transportation and Intermodal Policies on Great Lakes Ports.

5a. Problem: The ability of Great Lakes ports to attract cargo is affected by the policies and procedures of U.S. and Canadian transportation regulatory agencies to the extent that it may be more economical to use ports other than those on the Great Lakes.

5b. Background: Prior to the development of the Great Lakes St. Lawrence Seaway, ports on the North Atlantic, South Atlantic, and Gulf coasts competed for the cargo that originated from or was destined for the Great Lakes region. The Interstate Commerce Commission, in an effort to stimulate competition, authorized the railroads to establish "port equalization rates" on specific import or export cargo from a specified, equalized territory. This, in effect, enabled the ports to compete on the basis of ocean rates and services offered for the cargo from within the territory since the inland rates were "equalized" or comparable. These rates were established as long haul rail rates which, in most cases, required distances of greater than 440 or 500 miles. Anything less than this must use published general commodity rates. The "equalized territory" applicable for these rates is the Great Lakes region.

This places the Great Lakes ports at a disadvantage since the cargo origin or destination is usually within this distance and thus the rates for a short haul must be used. While this rate is not higher than the long haul rates in absolute terms, when it is combined with the ocean rates from the Great Lakes, the total transportation cost via Great Lakes ports is often not competitive with the combined costs from the other seacoast ports.

This aspect becomes further aggravated with the advent of containerization and the subsequent development of "land bridge and mini-bridge" rates. In this case, intermodal rates and through rates from inland destinations to the final destination
via a combined rail/water or truck/water mode, are established and offered to the shippers. The advent of the larger container ships and vessels of the LASHSEABEE design, to handle large numbers of containers, again places Great Lakes ports at a disadvantage due to the restrictive draft of the Seaway. Canadian regulations and policies relating to ownership of multi-modal transportation companies also add to this situation, especially when it is considered that Montreal qualifies as a major deep water port. Through favorable inland rail rates, containers can move to Montreal at less cost than they can via the Lakes and the Seaway.

All of these factors plus diversion of U.S. bulk tonnage on Canadian vessels, severely hinder the competitive posture of Great Lakes ports and hamper their ability to offer service to the customers; especially in terms of lower costs, use of advanced technology and frequency of service.

5c. Option: (1) Application of port equalization type rates to ports on the Great Lakes or, conversely, elimination of those rates on other seacoast ports. (2) Standardization of the U.S. and Canadian through or intermodal rates. (3) Establishment of regional ports based on a "load center" concept enabling ports to possibly specialize in certain commodities most appropriate to their immediate geographic area. (4) Eventual expansion of the Great Lakes St. Lawrence Seaway system to allow larger, more modern, container vessels to operate.

4. LENGTH OF THE NAVIGATION SEASON

Problem: The extension of the navigation season involves problems in at least three areas: (1) technical, including environmental protection, (2) jurisdictional, and (3) political, including economic effect and cost sharing, where applicable.

(1) Technical, including environmental protection.

a. Problem: The major impediment to growth of the public port industry serving shippers in international trade is the requirement to close operations for 3½ months each year because the St. Lawrence Seaway is closed due to winter freeze up. The inability to schedule Great Lakes shipping services on a year round basis leads shippers to seek alternative service from other coasts. Much of this traffic is routed to other coasts even when the Seaway is open. This factor has lead to under-utilization of capital plant, underemployment and unemployment of port personnel.

b. Background: The Great Lakes Seaway system is subject to freeze up from December 15 through April 1. Since 1970, the U.S. Government has funded a Navigation Season
Extension Program. The technical and economic feasibility has been determined for the entire system. The environmental feasibility has been determined, in part, for the Upper Lakes. Because of serious concerns expressed by the power interests and environmentalists in New York State, the demonstration activities in the St. Lawrence River have been halted. While it is expected that extended season navigation will continue to expand in the Upper Lakes, this will no be of benefit to the public user terminals.

c. Options: (1) Accept a no-growth condition for some ports and a closing of other ports. Continue to support the land movement of cargo to East and Gulf coast ports by rail and truck. (2) Fund sufficient environmental studies to determine the feasibility of some seasonal extension in the St. Lawrence. (3) Synthesize and analyze existing data and knowledge as stated in the first priority problems to ensure that studies funded are in fact needed. (4) Find solutions to the legal and technical concerns expressed by power authorities.

b. Background: The existing season on the Montreal - Lake Ontario section is about April 1 to December 15 (8½ months), but it requires improvements to "firm up" the dates and to achieve 24-hour navigation during the opening and closing period. The Montreal to Lake Ontario section of the St. Lawrence River is normally the first area of the Great Lakes system to freeze up in December and where flow regulation is very sensitive to ice conditions throughout the winter.

c. Option: The improvements necessary to achieve a firm 8½ months would be entirely within Canada and would only require Canadian approvals, including those of Environment Canada.

Any extended season on the St. Lawrence River beyond 8½ months involves the international section of the river and hence both the U.S. and Canada, as outlined below:

(2) Jurisdictional

a. The Problem: An extended season requires joint U.S./Canadian approval and a review of the responsibilities of the navigation and power entities.

b. Background: At present, the Power Authority, State of New York and Ontario Hydro are charged with control of the river and are responsible for any damages or flooding that
might occur as a result of their operation. Navigation during an extended season was not foreseen when the responsibility was given to the power authorities. However, when permission was granted to install ice booms, it was stipulated that they not hinder navigation.

c. Option: To obtain international agreement, a feasibility report should be submitted to the U.S. State Department and/or the Canadian Department of External Affairs with a view to the proposals being referred to the IJC for approval and recommendations for action.

This report should include technical, economic and environmental factors and would require approval and/or permits by appropriate U.S. and Canadian authorities.

Reconsideration of the present responsibility of the power authorities for control of the St. Lawrence River may remove their objections to an extended season.

(3) Political - Including Economic Effects and Cost Sharing, Where Applicable

This item is considered among other similar topics under Rates and Regulatory Policies (see IV.3., above)

5. INSTITUTIONAL AND JURISDICTIONAL PROBLEMS

1a. Problem: As capacity is approached, which is near at hand in terms of planning cycles in every 10 - 20 years, and as management becomes even more interdependent in matters relating to rates, traffic control, season extension, pilotage, reconstruction and the environment (natural and social/human), continued close consultation will be essential.

1b. Background: Action by one authority or corporation cannot reasonably be taken without argument and comparable action by the other. And yet the viability of the Seaway transportation arteries and indeed, the economic well-being of the maritime hinterlands of the Great Lakes, are dependent to a large degree upon the Seaway system.

1c. Option: If it appears that concurrent with present Seaway Authorities' efforts to improve the system to meet demands for transits, a review should be made of the regulatory regime and applicable international agreements that will consider:

- greater consolidation of sources;
- revision of governing agreements;
- debt reduction alternatives; and
- future financing options.
2a. Problem: Policies adopted in one country may have unexpected and adverse effects on the other.

2b. (1) Background: There is a user pay conflict to the extent that a policy in either country can adversely affect:
(a) the availability of existing carriers;
(b) the sources of raw material;
(c) the economics of a receiver of such materials; and
(d) the status of existing U.S. and Canadian fleets.

(2) Another general area of conflict affects Operational Services, that is matters involving the standardization of services and assessment of fees with respect to:
(a) icebreaking;
(b) search-and-Rescue;
(c) weather;
(d) vessel traffic services (including aids to navigation); and
(e) implementation of the Water Quality Agreement.
- all of which are now subject to informal and prospective formal agreements under which each country may provide services within the jurisdictional area of the other, but at present with questionable legal authority.

2c. Option: The IJC is a mechanism that could provide an umbrella for all these activities and which, through some expansion of its charter, might better identify such conflicts and coordinate plans for their resolution.

3a. Problem: There appears evident a lack of reasonable uniformity with respect to standards of conduct or technical constraints between states and provinces affecting shipping, which is likely to increase as formalization of port authorities progresses. This is most apropos to vessel wastes, dredging, dredged material disposal and foreign vessels which might be trading with one country but, of necessity, transit the water of another. Discouragement of trade is a likely result.

3b. Background: A need is foreseen for a forum that might resolve issues or make recommendations to our respective countries for the ultimate resolution of a problem.

3c. Option: State Department of Transportation Authorities and Divisions indicate the lack of uniformity in basic authorities. A review of the standards of conduct and technical constraints among the states and provinces could be desirable.
INTERMODALITY AND INTERSYSTEM WATERWAY CONSIDERATIONS

There is, or should be, an interdependent relationship between heretofore competing transportation modes and waterway systems. The resolution of problems has been left to marketplace determinants but with all systems so dependent on governmental largesse and regulation, the efficiency and economics attendant on such matters come into focus and are of short term (5-10 years) as well as of long term significance.

Intersystem Relations

1a. Problem: The Great Lakes Basin is served by two waterway systems, the Great Lakes and the U.S. Inland waterways. Severe constraints on one need not result in a worsening of the Great Lakes Basin's economic slowdown. However, if both systems are overloaded, it would be in the U.S.-Canadian interest if the U.S. were to seek resolution of both system problems. Capacity constraints within the next decade on waterway systems serving the Great Lakes region are expected on the Welland Canal and on alternative systems in the Illinois waterway, the middle Mississippi River and the middle Ohio River. The constraints on both the Great Lakes and the Mississippi River and its tributaries may present a combined constraint for regional flows greater than that of any one of the systems.

1b. Background: Water transportation is generally the most energy-efficient mode. Increase in energy costs coupled with national policies of conservation will cause an increase in waterborne traffic at the expense of less efficient modes. Bulk cargo movements have demonstrated the efficiency of waterways traffic. With rising energy costs a point is foreseen at which non-bulk or general cargoes, presently handled by truck and rail, may be captured by specially developed and economically efficient vessels. Such a transfer of trade may be encouraged by Acts of Government influenced by energy conservation programs. Re-routing of cargoes may generate increased activity in the land areas surrounding ports, so that land transport patterns would change accordingly and new port facilities may be needed to effect the cargo transfer.

Solutions to the Welland problem cannot be implemented within the decade, given the present stage of planning. The Lock and Dam 26 problem on the Mississippi is still held up in court on the environmental impact statement, therefore, it cannot be completed within the decade. The Illinois waterway project to expand lock capacity is also held up. Its solutions are well out of the 10-year time period.

1c. Options: The IJC represents the combined U.S.-Canadian Great Lakes Basin interests. In reviewing and prioritizing basin
problems it can effectively highlight the combined impacts resulting from constraints on complementary and/or substitute systems.

2b. Background: Changing patterns in the methods of transportation and in the routing of energy products are foreseen. Water transportation is seen to benefit by the increased trade. Thus, increased use of coal which is particularly appropriate for water transportation, will increase waterborne traffic in the Great Lakes Region; feeding newly developed or converted plants adapted to utilizing coal as fuel because of its promise of better price stability and availability. As a potential challenge or supplement to the transport of coal by water, consideration must still be given to coal slurry pipeline developments.

The labour component is a factor in competing forms of transport. All modes are vulnerable to rising labour costs. Thus, future inflationary spirals would appear to demand a more efficient mix/interdependence of transportation modes and favour water transportation.

Environmental concerns also will inevitably influence shippers' choices and options. Water transportation may be favoured over other, newer, or untried methods. Cargo shipments by commercial navigation are less disturbing to the environment than are other modes.

2c. Options: To meet the transportation objectives of both nations for a more energy-efficient, environmentally sound and economical system, the IJC should complement navigation with compatible actions on water levels and flows, power development on production, access, and other matters impinging on the navigation system and its operations.

The IJC provides the best overview of combined U.S.-Canadian Great Lakes Basin interests. In reviewing and prioritizing basin problems, it can effectively highlight the combined impacts resulting from constraints on complementary and/or substitute systems. The Great Lakes Basin - U.S. is served by two waterway systems, the Great Lakes and the Inland waterways and by alternate and competing modes of transportation. Severe constraints on one may significantly impact on the other. It would be in the U.S.-Canadian interests to seek resolution of systems problems through an IJC forum.

7. FUTURES

A. Future Trends Affecting Transportation
1. Technology Related
   
a. Mine Mouth Generation of Electrical Power. Technological improvements in stack emission control and long line transmission efficiency, coupled with a demand for a greater share of the economic benefit in coal producing areas of the West, could reduce the demand for 1000 foot bulk carriers and attendant lock and channel improvements.

b. Slurry Transport of Coal. Due to the high capital costs of the single purpose nature of slurry pipelines (nonconvertible to other uses), the policy of both Governments to maintain and further develop railroad systems and the social and environmental problems associated with pipelines, widespread development is not anticipated. Factors that include inflexibility, legal problems, low employment and problems associated with cleaning or returning the medium to the source, plus the uncertainties of economic growth make it unlikely that the pipeline will successfully compete with the unit train/ship transport systems.

c. Lighter-Than-Air Transport. The continual search for low energy, high capacity, cargo transport systems with low capital and maintenance costs may lead shippers to consider uses of the blimp combined with helicopter-type propulsion now under development by Goodyear. Adaptable for heavy load lifting applications, they may be used not only for transport but for port applications.

Nuclear Power. The projected development of nuclear power parks in the Great Lakes is stalled by uncertainties of electrical power demand and the seemingly intractible problem of nuclear waste disposal. The long lead time for construction, even after authorization, suggests that this technology will have little effect on the development and transport of western coal during the next decade.

2. Market Related Trends
   
a. Steel Related Transport Demand. The sale of steel plants to developing countries in the 50's and 60's has severely limited this market for western and European steel production. Western European steel production is down by 40% and the several governments are allegedly dumping steel in these countries to maintain their industry. The aging of steel plants in the Great Lakes area and the mid-term depletion of economic ore reserves could lead to a reduced demand for taconite and the associated limestone and coal. The weight reductions program of the auto industry is cutting into this major market. These trends could well
reduce the need for duplicate locks and major channel modifications for bulk carriers within the time frame in which construction is anticipated.

b. Decentralization of Canadian Provincial Authorities. Recognizing the demands by certain eastern and western Canadian provinces for greater local autonomy and/or control over their coal, oil, gas and iron ore reserves, there may well be shifts in current consumption patterns for these commodities. Any change would have an impact on the Great Lakes transportation picture. Grain and coal could move west instead of east. Iron ore could move south and east. Political changes are not predictable but it is certain that change would have a significant impact on the current pattern.

c. Budgetary Factors. The Brookings Institute analysis of the recent U.S. federal budget stated that it establishes a "central theme of scarcity and its problems and values." A similar situation exists in Canada. The issues become not how to use resources efficiently but how to allocate scarce resources among competing programs. Since the federal share of the Gross National Product (GNP) seems at its political limit, this condition is not likely to reverse in the foreseeable future. Since defense spending will maintain if not increase its portion, any expansion in domestic programs must come through efficiencies and harder choices among options. Evidence from the Canadian side indicates a comparable situation in Canada. These comments apply to the decline of the respective federal budgets and therefore Governments must create conditions under which private industry can generate growth as it did in the past. Commercial navigation in the Great Lakes, anticipating major continued expenditure for the Great Lakes Basin (as opposed to specific navigation objectives) do not exist. Plans are fragmented and the basis for evaluation of proposed changes in relation to regional benefits, is not in evidence. Transportation policy has developed in a very piecemeal fashion. Without a coherent policy tied to a set of prioritized goals, there is only a de facto policy which is the net sum of a number of different programs, each developed in response to specific concerns. In an era of resource scarcity, such a scenario will have problems winning adherance.

B. Future Equipment Technology and Its Effects on the Great Lakes

As a basic premise, it is assumed that any views of transportation in relation to the Great Lakes Basin must, of necessity, deal primarily with water transportation. Hence, it
is to this mode that the forecast has been directed of the possible future developments in technology and some predictions made regarding their effects on the Great Lakes ecosystem.

Firstly, it must be observed that historically the rate of change of technology in marine activity is not high. Improvements in efficiency arise generally from an accumulation of many small technology-based increments, some transposed from one region of shipping activity to another and spread over long intervals of time. Broad innovation and experimentation are not generally applied to existing marine systems. Frequency of capital equipment replacement has some bearing on this and it must be noted that ships on the Great Lakes usually last about twice as long as their oceangoing counterparts. Technological change usually develops as a result of economic impetus, an example being the opening of the St. Lawrence Seaway in 1959. This event quickly led to the creation of an entirely new breed of lakes vessel and the eventual evolution of the highly efficient transportation units we see today. One can conclude that, in order to search for possible technological changes in the future, one must first identify possible economic stimulae brought about, in turn, by market influences or, alternatively related to changing government policy.

Casting an eye to the future and particularly to the next five to ten years, it is unlikely that any dramatic economic changes will arise. Rather, we will experience a continuation of the trends experienced over the past ten years, embodied in incremental improvements and encouraged by such economic factors as:

- extended shipping season;
- fleet replacements and updates;
- changes in port and harbour operating and management techniques; and
- changing patterns in energy availability and utilization.

The following notes relate to the above economic factors and expand the technological changes to marine transportation that could arise. The effects of these technological changes are also briefly discussed.

1. Extended Shipping Season Possibilities

Awareness of the potential economic benefits of a longer Great Lakes shipping season is growing, especially above the Welland Canal, and the feasibility of ice management techniques to shorten or entirely eliminate the traditional winter shut down of Great Lakes marine activity is now being seriously considered. Technology development will find expression in new
classes of ice strengthened cargo carriers on the Great Lakes, capable of independent operation in ice or in conjunction with icebreaker support. It is possible that "use pay" policies applied to traditionally free government icebreaking services may lead to commercially based services becoming available, or operating companies generating their own fleet of dedicated icebreaking vessels. The use of air cushion vehicles in Great Lakes harbour ice clearing or channel breaking operations has already been successfully demonstrated on the Great Lakes and has much future promise. The difficulty of maintaining traditional forms of floating navigating aids in ice-covered waters has already encouraged research into new types of ship-mounted navigating equipment utilizing shore-based aids which, with greater potential accuracy, could also permit navigation to continue safely under reduced visibility at any time of the year.

Winter navigation can permit a reduction in dedicated commodity storage areas ashore, due to opportunities for more frequent replenishment.

Effects of winter navigation on the ecosystem include:
- continuing activity in ports traditionally closed in winter months;
- increased demands on other forms of transport serving increased port activity;
- increased employment in shipyards by modifying existing vessels to ice navigation capability;
- pressure on the St. Lawrence Seaway Authority and its American counterpart to extend locking facilities through a longer operating season. Unless a dramatic technological breakthrough occurs and this is not foreseen during the period under consideration, it is considered unlikely that any appreciable extension of the shipping season will occur below the Welland Canal; and
- public opinion and reaction will arise concerning winter navigation.

2. Fleet Replacement and Update (Conversions)

Fleet replacement due to age or reduced economic viability offers opportunities for introducing technological change (cumulative over earlier operating periods) and response to economic pressures or opportunities, noting:
- the current trend towards the increased use of shipmounted, self-unloading facilities, providing greater versatility in cargo, delivery points and shorter turn around time;
the current trend towards increased deadweight carrying capability of ships by maximizing dimensions for existing lock sizes and the use of lighter materials, e.g. special steels; the search for fuel economy, a return to coal burning; and the continued consideration of barge-tug operations for the Great Lakes and the utilization of more sophisticated latching arrangements.

3. Improvement and Changes in Government-Provided Facilities and Services

These include:
- pressure on the St. Lawrence Seaway Authority to extend the season by improvements in ice management, keeping locks and channels open, air cushion vehicles;
- pressure on Transport Canada to extend icebreaking services and the provision and maintenance of shore-based navigation aids to facilitate winter navigation;
- the St. Lawrence Seaway Authority's response to a demand for greater tonnage transfer, shunters;
- need for improved dredging techniques and spoil disposal practice, and
- improved weather forecasting.

4. Changes in Port and Harbour Operating and Management Techniques

The new Canadian Government's ports policy will affect the operation and management techniques in certain Great Lakes ports previously administered under the National Harbours Board jurisdiction. Regional and local control will introduce changes in operational efficiency, improvements in financing, upkeep costs and fee structures. Public participation will also increase in land use decisions.

5. Changing Patterns in Energy Availability and Utilization

It is foreseen that:
- the flow of western coal through the new facilities at Thunder Bay to Nanticoke will continue and that coal fired electrical generating stations may proliferate in the Great Lakes Basin with increased electrical power demand for growing industries, causing increased transfer of coal by water; and
- water transportation will continue to offer maximum efficiency in bulk transfer and maximum energy consumption efficiency. Even so, higher energy costs will encourage alternative propulsion equipment in Great Lakes vessels, or fuels offering lower consumption.
8. PUBLIC INVOLVEMENT

a. Problem: Transportation planning in the Great Lakes Basin suffers from the lack of identifiable goals and objectives and the absence of a comprehensive planning framework to constrain and guide individual development programs. Transportation policy has developed in a very piecemeal fashion. There is no coherent policy tied to a set of prioritized goals, but rather a de facto policy which is the net sum of a number of different programs, each developed as a response to specific concerns. The net result is that the system perspective, the integration and balancing of competing demands and uses for the benefit of the Great Lakes community in the interest of long term maintenance of the resource, is lost.

Public policy emerges best from a process in which the generation of relevant data is maximized, basic assumptions are questioned, expert witnesses are cross-examined and a broad spectrum of values is advanced. Public participation can contribute substantially to sound decision making by exposing administrators to the broadest range of facts and viewpoints relevant to their deliberations.

b. Background: Public involvement in planning and policy determination, whether of transportation, water resources related to planning or other sectors, is based on several factors. The right of citizens to a voice in the plans and decisions affecting their lives is a principle inherent in our democratic heritage. This right has been confirmed and defined in a series of federal court decisions (U.S.) since 1966, and spelled out in U.S. federal law in over a dozen programs. The legitimacy can scarcely be questioned. Public participation is an issue. Whether it also constitutes a problem, depends on the skills and attitudes of the planner and administrator.

A recent report of the National Research Council "Public Involvement in Maritime Facility Development", states that public participation should be viewed "as a necessary part of orderly democracy as well as a means of assuring comprehensive consideration of all significant costs and benefits." As a fundamental part of the decision making process, it also serves as a process for resolution of conflict among competing interests.

Given a willingness on the part of the decision maker, public participation will constitute a resource of major value. The planner is not omniscient and the planning process, however scientific, is neither value free nor totally objective. The planner necessarily brings personal perspectives and conceptual
limitations to the planning process. Public involvement, appropriately conducted, will add to the range and richness of issues brought to consideration in the planning or policy process. Public policy has all too often tended to follow similar paths of least resistance. These have embodied the fragmented policies of sub-optimization and the values and perceptions that guide them. It is the development by competing sub-systems that has produced stress and crisis in the social and ecological contexts.

Choices for new directions in the Great Lakes Basin, involving technological options, place a high premium on an informed and educated citizenry. The development of such publics will be more effectively performed by an agency without vested interest in particular programs and with the interest of the entire Great Lakes ecosystem as a primary concern. The IJC is the obvious, if not the only choice.

IJC Functions

Article VII of the 1978 Water Quality Agreement assigns responsibility to the Commission for providing advice and recommendations to the Parties and state and provincial governments on a variety of issues and problems and for providing assistance and advice on research, including identification of objectives for research activities. It allows the publication of reports and documents under this Reference at its discretion. Finally, Annex II requires surveillance and monitoring activities on such things as compliance, the assessment of management strategies and the identification of emerging problems.

These provisions allow adequate scope for IJC involvement in transportation related planning activities should it so desire. There is an additional qualification. The IJC is the only organization responsible, in effect, for the entire Great Lakes and therefore uniquely qualified to serve as a focus for system related concerns. These are not currently being addressed.

Water resources planning, for instance, sometimes has been less a rational process than a method for representing and adjusting local group and Congressional sentiments on proposed U.S. water projects. Individual projects, such as those under study by the Corps of Engineers, are frequently considered in isolation from one another. Concentration generally has been focused on solving engineering and economic problems associated with specific projects and little attention has been given to the cumulative effect of individual works on large areas or the whole Great Lakes Basin. Planning has proceeded on the bi-national waterway without U.S. - Canadian agreement on
consistent policy, disregarding the fact that implementation cannot proceed efficiently without it. Such an approach has allowed the freedom to evaluate or respond to proposals for particular projects without the constraints imposed by a comprehensive water development plan into which individual projects would have to fit or perish. This prevents the obvious conflicts which would ensue if Congressionally authorized projects had to be rejected on the grounds that they violate good planning principles.

Alternatives

Given the essential bi-national interest and the political and conceptual constraints that inhibit systems planning in the U.S. sector, a way of bringing these factors into consideration is essential. Conventional public involvement in the fragmented planning process has consistently identified concerns for the integration of all factors and studies, particularly those that bear on the projected demand for increased capacity in the system. Basic assumptions and projections are repeatedly questioned, yet the options presented do not reflect this. Public participation is not meaningful when the only choices presented are among alternatives which others have designed and presented.

c. Options: 1. That the IJC establish a monitoring system for ongoing transportation related, water resources planning in the Great Lakes Basin, using techniques that bring together interested publics and the planning agencies in a continuing neutral examination of system related concerns, publishing the findings as a point of reference. Similar techniques will be useful in the monitoring of Pollution from Land Use Activities Reference Group recommendations and implementation and other IJC responsibilities.

2. That the IJC initiate, through a public involvement process, a discussion of the transportation goals and objectives to be sought in the Great Lakes Basin as well as the objectives of interrelated sectors. Such an effort should be directed towards identifying a preferred future and should provide the conceptual basis for reaching it.

Detailed planning is not an objective but rather the development of criteria by which detailed planning could be guided.

9. ENERGY TRANSPORTATION AND CONSUMPTION

a. Problem: Energy shortages, increased prices and environmental considerations impose certain changes on Great Lakes navigation. There are two principal propositions.
(1) The energy shortage has resulted and will continue to result, in increased demands in the Great Lakes Basin for shipment of energy producing fuels, principally coal.

(2) The fact that the marine mode consumes less energy per ton mile than any known alternative shipping mode will be a factor and as time goes on, becomes a more and more significant factor in the selection of the marine mode for carriage of the increased tonnage mentioned in (1), above, as well as for other traditional dry bulk cargoes such as grain and iron ore.

b. Background: Studies indicate that the ton miles of cargo which can be carried by various transportation modes per unit of fuel oil are:

- 600 - by lake carriers
- 300 - by pipe line
- 250 - by railroad
- 70 - by truck

c. Options: Opportunities should be sought to minimize energy consumption and promote efficient transportation by increasing shipments by water.

10. LOCKS AND CHANNELS

1a. Problem: There are two primary constraints on the capacity of the Great Lakes navigation system.

(1) the size and number of locks; and
(2) the size and alignment of channels.

1b. Background - Locks: A principal aspect of shipping on the Great Lakes relates to the handling of bulk cargoes such as grain, iron ore and pellets, stone, coal, etc., by U.S. and Canadian domestic fleets.

The U.S. and Canadian Great Lakes fleets represent by far the most efficient bulk cargo carrying operation in the world, bearing in mind the physical limitations of the system. The ships have been specially designed for the service and no ocean-going ship can be designed which will carry as much cargo at 26' draft in fresh water as a full size Seaway Laker or with as small a crew. The history of the canal system has been that when lock sizes were increased, the size and carrying capacity of the ships were to match by new building and conversion. It was recently said by a member of the U.S. Army Corps of Engineers, that 10 years ago it took a 14-year gestation period for an acceptable idea to go from conception to fruition but
that it now takes 18. This means that we must immediately plan
to maximize the short term capacity of the system and to
commence the processes for a dramatic increase in capacity of
the system by providing new locks which probably would not be
available till the year 2000.

1c. Option: Locks of perhaps 1500' length and 140' width,
accommodating a ship of 1200' length and 130' beam, should be
considered for the Welland area; to be followed immediately for
the same in the lower Seaway and then by further works at Sault
Ste. Marie. The draft of 26' would be available in wide rivers,
channels and harbours, but the locks would probably be built
with 35' or more of water over the sills instead of the present
30', because this would provide less hydraulic resistance to a
vessel entering or exiting from a lock.

It has been generally accepted that transportation of bulk cargo
by water is the most economical method per ton mile and is also
the most efficient in fuel consumption per ton mile. We
recommend, therefore, that the discussions now center on the
details of what might be done to increase the short and long
range capacity of the Seaway, including channel improvements.
We have a proven system of great efficiency - we must initiate
action to preserve its efficiency.

2a. Problem - Channels: Most of the cargo tonnage transits both
sections of the Seaway. However, some tonnage both upbound and
downbound terminates on Lake Ontario, the principal commodity
being coal downbound through the Welland. The result is that
the Welland Canal averages some 9 m metric tons annually more
than the Montreal to Lake Ontario section. This extra tonnage,
coupled with a more complex lock configuration, makes the
Welland the bottleneck in the system as regards capacity.

2b. Background: The St. Lawrence Seaway Authority exercises
jurisdiction over the Canadian portion of the locks and channels
which comprise part of the inland water route from Montreal to
Lake Erie. Specifically, this involves the operation and
maintenance of the section from Montreal to Lake Ontario (MoLO)
and the Welland Canal section. The former was completed in
1958, while the Welland was completed in 1932 but transferred to
the Authority in 1958.

Over the 20 years since the Seaway was opened, traffic has grown
from some 18 m to 57 m metric tons on the St. Lawrence and from
some 25 m to 66 m metric tons on the Welland.

The navigation season on the MoLO is approximately April 1 to
December 15, while that on the Welland is approximately April 1
to December 30.
Improvements have been made on both sections of the Seaway, particularly the Welland, to increase capacity. Also, the navigation season on the Montreal-Lake Ontario section has been extended from about 7\% to 8\% months while that for the Welland has been extended from about 8\% to 9 months.

However, if further improvements are not implemented, the Welland is expected to reach capacity soon after 1986.

2c. Options: Various means of increasing the Welland capacity are being studied and evaluated. These include, but are not limited to:

- the introduction of marine shunters (special tugs) to assist in the passage of ships. Prototype testing of this project will start in 1979;
- widening the reach between Lock 7 and Port Robinson;
- removing Bridge 5 at Glendale Avenue;
- realigning lock approach walls;
- providing computer-assisted scheduling and an electronic guidance system; and
- extending the navigation season and to be effective, the season would also have to be extended on the MoLO section.

Periodically, traffic forecasts are updated and the projected vessel fleet size and mix is assessed to estimate future capacity.

This information forms the basis for planning with the objective of providing sufficient capacity to accommodate projected demand to the extent that it is economically justified. Present indications are that various improvements (including changes in the composition of the fleet) could be justified that would increase capacity of the existing facilities by some 40% and thus accommodate the expected growth in traffic without building a new system until perhaps 2000 or beyond.

11. PORT PLANNING

a. Problem: Key port issues are areas affected by environmental regulations: (1) maintenance dredging of navigational channels; (2) the availability and cost of establishing dredge disposal sites; (3) coastal zone planning of land and water uses are also areas of concern; and (4) availability of pumpout facilities.

b. Background: The port operator, whether it be a public oriented facility maintained for the good of the community, or a privately owned and operated commercial business venture, generally does not have an education in or professional
experience of short or long range environmental, socio-economic planning. The port operator's prime mandate is the economic viability of the port operation serving as a link between transportation modes in both domestic and international commerce. In many instances, the realm of environmental regulations and land/water use planning is pictured as a constraint to economic operation of the port facility.

(1) In the area of dredging, the port must be capable of serving vessels with maximum waterway cargo capacity. In the case of the Great Lakes ports and Seaway trade, the overall navigational draft is restricted to 26', as controlled by the St. Lawrence Seaway locks. Ports serving maximum size Seaway vessels must maintain the dock-side draft conforming to the vessel service and navigation channel capability. Those ports offering full navigational draft definitely have a competitive advantage over ports unable to provide a maximum draft for commercial vessels.

(2) The related issue of dredge spoil disposal areas and environmental quality regulations are equally important to the port operator. The overall concept of dredge spoil disposal must be a project that is both economically feasible and environmentally sound. At one time, port operators looked upon the dredge spoil as a valuable resource for commercial land fill purposes. Today, dredge spoils are considered, in most cases, to be highly contaminated and suitable only for land reclamation generally for public recreational uses. The environmental constraints of dredge spoil uses may often cause the dredging project to show a substandard cost/benefit ratio. Today, the cost/benefit ratio is measured more broadly in social benefits than in economic benefits to the community.

(3) The issue of port involvement in coastal zone planning of land and water uses varies from state to state, depending upon the state planning agency and its knowledge of or interest in commercial port development. In some states, where there has been a good cross section of federal, state and public input, the public port complex has been recognized as an important state resource in economic development and international trade. In other states, where the planning agency is oriented toward environmental affairs such as the Department of Natural Resources, the public port complex tends to be barely recognized on the list of planning priorities. In some coastal zone planning activities, the public authority has had a clear voice in the planning for both the public port facility and the privately owned port facilities, there has been little, if
any, input into the planning strategy. The port community does have an opportunity to present its case at public hearings during the planning process, but few private port operators are aware of the coastal zone planning program and benefits or conflicts. Coastal zone planning in most cases becomes a tool of the administering state agency. The outcome of the state program plan depends heavily upon the interest areas of the state planners versus the input from the public and private port sectors.

c. Options: (1) Maintenance Dredging

Benefit Analysis
- Social - environmental - economic development, long range channel sediment improvement.

Uses
- Recreational vs. commercial port development;
- Maintain for maximum navigational benefits or lose the economic viability of the port complex.

(2) Dredge Spoil Disposal
- Environmental regulations;
- Uniform, state-by-state, federal regulations of quality analysis vs. individual state regulations.

Site Location
- High environmental location vs. high cost of spoil retainment;
- Do nothing - no growth - no improvement.

Uses
- Marketable use;
- Land reclamation - improvement;
- Commercial vs. recreational.

(3) Coastal Zone Planning
- Ports may develop a planning strategy with the U.S. Office of Coastal Zone program grants. Port authorities need to interact with private terminal and vessel operators for an increased recognition in the state program.
- The Coastal Zone Management planning mechanism needs more input from private industry, including the financial community.
Program evaluation must consider both micro and macro effects upon the community.

More emphasis is needed upon the economic soundness of projects for short and long run effects. Improving the economic soundness will assist in future project development through increased revenue to the governmental area.

Continue the Coastal Zone Management programs with heavy environmental planning input through public awareness and political support.

Current Planning Studies are summarized below:

i) Improving Productivity for Bulk Commodity Transfer Facilities in the Great Lakes Trade Area, by Ernst & Ernst.

Scheduled completion date April 1979.

The purpose of the study is to improve the productivity of bulk commodity transfer facilities between ship and shore in the Great Lakes trade area. Objectives of the study include:

- quantify the nature and extent of the productivity problems associated with bulk transfer on the Great Lakes;
- isolate and assess alternative types of facility improvements which will increase productivity; and
- determine the appropriate actions which can be taken by the government and various affected parties to lead to productivity improvements.

The study contents include bulk commodity movements, inventory and classification of transfer facilities by technology, technological advancements, operating costs, facility ownership and recommendations for improving productivity. This study will provide input for the Great Lakes Cooperative Port Planning Study.


The purpose of this study is to create an informational base and action program for use in stimulating growth in the Great Lakes St. Lawrence Seaway System.

The conduct of a study will identify and quantify the traffic flow of commodities into, out of and within the Great Lakes region as well as...
analyze the competitive factors which determine the transport modes and routings used. The assessment will also analyze recent trends and evaluate the potential impacts of changes in marketing strategies along lines developed in a number of recent studies. The principal aim of the study is to develop information on the basis of which the Maritime Administration, other federal agencies and the Great Lakes interests, both public and private, can formulate a long range program dedicated to the greater development of the cargo-moving capability and performance of the Great Lakes Waterway system.

Cargo analysis will include domestic, Canadian and international traffic flows and forecasts to the year 2000.


This study will describe a path to a program for realizing the Great Lakes true cargo-moving capability and includes two essentials: drawing a picture of that capability and producing an implementable strategy which blends resources of the ports with the needs of the users. Prime importance is directed toward identifying and planning for the port user group. The "Cooperative" study will blend the outputs of the "Bulk Facility" and "Traffic and Competition" studies into a final analysis and development plan.

A number of deliverables will be provided to the cofunding Great Lakes State Department of Transportation and individual Great Lakes ports. A list of importers and exporters will be developed, showing the least-cost routing to U.S. ports. A printout of port facility-throughout capabilities will be available. Other topics, such as institutional constraints, vessel service constraints, regulatory and legislative constraints, will be explained. Projections of cargo flow and port facility capacities will be developed through the year 2000.

The study is cofunded by the eight Great Lakes State Departments of Transportation and has technical assistance through input from an industry ad hoc committee and a state and industry steering committee.

a. Problem: Vessel Pumpout Facilities at Great Lakes Ports. The availability of pumpout facilities at Great Lakes ports to handle vessel discharges is not adequate to meet the needs of vessel operators in terms of current vessel discharge regulations.

b. Changing U.S. federal regulations to control pollution of the lakes regarding the discharge of vessel waste into the open waters of the Great Lakes, has resulted in increasingly stringent requirements being placed on vessel operators. These requirements have reached the point where vessels will be
required in the future to have installed on board some type of Marine Sanitation Device (MSD) which will treat the vessel waste prior to discharge or retain the waste on board the vessel until discharge at a shore-based pumpout facility can be effected. These requirements and standards are published by the U.S. Environmental Protection Agency and enforced by the U.S. Coast Guard under provisions of the Water Quality Control Act.

Compounding this problem are the requirements and standards currently being proposed by several of the Great Lakes states requiring a "no discharge" policy and the regulations concerning vessel wastes enforced by Canada, governing its territorial waters. Enforcement of any of the federal (U.S. or Canada) or state proposed regulations is virtually impossible due to the current lack of adequate facilities at shoreside locations. Vessel operators reject a "no discharge" regulation unless there are adequate facilities. Further, the disparity in U.S., Canadian and individual state regulations makes it difficult for vessel operators to comply.

c. Options: (1) Adoption of a joint regulation or standard by the U.S. and Canada to cover all the Great Lakes St. Lawrence Seaway. This joint regulation would override individual country and state regulations. (2) Adoption of methods to facilitate development of port facilities to accommodate vessel waste discharge. This should include providing the ports with the means (funds) for this development.

12. TRANSPORTATION-ENVIRONMENTAL PROBLEMS AND CONSIDERATIONS

a. Problem: The most immediate problem with regard to environmental issues as they relate to transportation, whether at current or higher levels of activity, is that these issues are not being adequately considered. The problem becomes quite evident with the survey studies being done by the U.S. Army Corps of Engineers that address the engineering and economic feasibility of an extended season for the Great Lakes St. Lawrence Seaway to a far greater degree than they do the environmental impacts. The feasibility of an extended season may well hinge on environmental parameters.

b. Lacking comprehensive, current baseline data, it is difficult to measure all the possible environmental impacts. Some possible environmental ramifications of an extended season are: shoreline erosion and dock damage; disturbance of fish spawning areas; drowning or freezing of fur bearing animals; freezing of much of the lower food chain; disruption of wetlands habitats and species; and increased problems with the recovery of hazardous materials from spills. The lack of environmental baseline data relates to all activities of the IJC, therefore,
recommendations to Governments seem very appropriate, particularly at this time. Energy, water quality and transportation tradeoffs could be better analyzed if a common, binational, environmental baseline were available.

c. Options: Alternative options remain the piecemeal collection of data by a multiple of federal, state or provincial and local agencies, and universities. These data often lack consistency and are subject to criticism. The funding requirements for adequate environmental baseline data collection and generalized analysis may approach $300 M for the Great Lakes St. Lawrence Seaway system. Expenditures of this magnitude must be undertaken systematically. Careful planning, with the agreement of all parties, will be essential to assure credible results.

13. RECREATION

Recreational uses interface with the transportation system in the following major ways.

1. In Ports: - many small ports, formerly commercial, are now used purely for recreational purposes. This conversion of small ports to recreational uses is likely to continue. No serious problems are foreseen.

- water quality problems in some harbours conflict with some recreational uses, e.g. swimming. The main sources of pollution are land sources. Hence, this problem is to be solved mainly by raising municipal waste disposal and treatment standards.

- there is land use competition between transportation uses and recreation uses in port areas. On the whole recreational uses are winning out, as transportation activities move to deeper water berths, often remote from the older port area. Solutions to this conflict tend to be very political (at least in Canada).

2. In Channels: - pleasure craft pose navigational hazards in busy shipping lanes. The U.S. Coast Guard provides educational programs for small boat owners. These types of programs are valuable.

- short wave communication channels (VHF) have become overloaded in places where many pleasure craft use VHF transmitters. At times, commercial shipping has difficulties.

- winter navigation would create some conflicts with some recreational uses, especially ice fishing, and to
required in the future to have installed on board some type of Marine Sanitation Device (MSD) which will treat the vessel waste prior to discharge or retain the waste on board the vessel until discharge at a shore-based pumpout facility can be effected. These requirements and standards are published by the U.S. Environmental Protection Agency and enforced by the U.S. Coast Guard under provisions of the Water Quality Control Act.

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   - short wave communication channels (VHF) have become overloaded in places where many pleasure craft use VHF transmitters. At times, commercial shipping has difficulties.

   - winter navigation would create some conflicts with some recreational uses, especially ice fishing, and to
a lesser extent snowmobiles and cross-country skiing. Ice fishing is a popular sport and a vocal lobby would be anticipated. One solution to this problem is to segregate these two activities, in instances where there are options.

- small craft mix with commercial traffic when in transit through locks. If commercial traffic grows to capacity on the Welland Canal, pleasure craft may have long delays: a travel lift (marine railway) is one fairly inexpensive solution.

14. GREAT LAKES TRANSPORTATION SYSTEMS IN RELATION TO THE NATIONS' WATERWAY NEEDS.

1. Capacity of major waterway arteries.

Constraints on the Great Lakes St. Lawrence Seaway may well impact the region and may also result in diversion of this traffic to the Mississippi River and tributaries as well as to the railroad-east coast port alternatives. Similarly, restraints on these alternatives may necessitate the Great Lakes increasing their share of the total flows.

2. Capacity of complementary modes and terminal facilities may serve to restrain the potential for Great Lakes waterway growth. The health of feeder rail lines may well curtail several lake links.

3. Competition for water use, hydro power demand and shore erosion reduction, are examples of areas where water use conflicts with navigation.

4. Multiple-purpose water use complementarity: There is a problem of inadequately communicating the benefits of a "navigation" project, for example the potential for hydro power benefits from season extension.

5. Investment policy conflicts and priorities include modal subsidies, multiple water resource use project funding and regional equity issues. Future and existing policy continues to oscillate, favoring one water use over another, one region over another and one mode of transportation over another. The lack of a water transportation policy is the result.

6. Environmental policy. This continues to develop nationally and locally and consequently, creates problems in water transportation system planning. The Clean Water and Clean Air Acts both provide uncertainties to the planner.
15. OTHER FACTORS

In the introduction, comments to the IJC which forwards this workshop report, include this statement:

"Although it is not a problem area which appears to be under the jurisdiction of the IJC, the Commissioners should be aware that the identification of suitable sites for major investments in heavy industry and new port complexes is a significant problem for industry. Industry is desirous of selection sites which have the least adverse impact on the environment. Frequently, after site selection, there is public and local government opposition to the plant or port location. State, provincial and other local governmental bodies could assist economic growth of their areas by prior identification and approval of sites suitable for new facility development".

16. SIGNIFICANT U.S. ARMY CORPS OF ENGINEERS' STUDIES WITH POTENTIAL FOR IJC INVOLVEMENT

1. Objective

- recommend degree of federal participation in plans to extend the shipping season on the system.

Status


Documents

- interim Survey Report submitted March 1976 to the U.S. Office of Management and Budget;
- final Demonstration Report scheduled for September 1979; and
- final Survey Report scheduled for December 1979. (Draft Report scheduled for mid-March to be followed by a series of public meetings).

Costs

- about $25 M will have been spent on all these study efforts with $16 M on demonstration activities and $5½ M on environmental work.

Probable Conclusions

- anticipate incremental implementation up to 12 months on the Great Lakes and 11 months on the St. Lawrence River over 20 years, with average annual benefits of $400 M and average annual costs of $100 M; or a benefit to cost ratio of 4 to 1.
2. Great Lakes Connecting Channels and Harbors

Objective
- analysis of future traffic and fleet with a recommended degree of federal participation in modifications to Great Lakes channels, locks and harbors.

Status

Preliminary Findings
- an analysis of vessel size indicates that a bulk vessel of 1,200 feet length, 130 feet beam and drafting about 26 feet, to be the cost efficient vessel of the future and the basis for future lock and channels designs.

Next Document
- a preliminary survey report is scheduled for August 1980.

3. St. Lawrence Seaway Additional Locks

Objective
- analyze the federal interest in providing additional lock(s) in the U.S. section of the Seaway.

Status

Preliminary Findings
- interim report completed on flow conditions at Polly's Cut in 1976 - recommended extension of rubble mound to improve flows.

Next Document
- a preliminary survey report scheduled for August 1980.
V. CONTACT ORGANIZATIONS

The St. Lawrence Seaway Authority
The St. Lawrence Seaway Development Corporation
U.S. Army Corps of Engineers - North Central Division
Canadian Marine Transportation Administration
Lake Carriers Association
Dominion Marine Association
Shipping Federation of Canada
U.S. Shipping Association - (Chicago - John Childs)
U.S. Maritime Administration - Cleveland
American Association of Port Authorities
Canadian Coastguard
U.S. Coast Guard
State and Provincial Transportation Ministries
Federal Maritime Commission
U.S. Department of Transportation
Interstate Commerce Commission
Canadian Transportation Commission
Great Lakes Tomorrow
St. Lawrence Parks Commission
Environmental Protection Agency - Chicago
National Harbours Board - Ottawa
Great Lakes Commission (Jim Fish)
Sierra Club - Mid West Section
Great Lakes Basin Commission
Ontario Ministry of the Environment
Canadian Sailing Association
Ontario Sailing Association
Great Lakes Cruising Club
Ontario Conservation Foundation
Association of Great Lakes Ports
Great Lakes Sea Grant Consortium (Dr. A.L. Beeton - University of Michigan Marine Waters Center)

Centre for Great Lakes Studies
Canada Centre for Inland Waters - Burlington
Shipbuilders Association of Canada - United States
1976 Great Lakes Directory - (Great Lakes Basin Commission, Ann Arbor, Mi.)
National Wildlife Federation
Canada Ports and Harbours Association
American Association of Railroads
Harbour Commission:
- Thunder Bay;
- Hamilton;
- Toronto;
- Montreal.
VI. REFERENCES


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Frederick R. Harris, Inc. "Great Lakes Cooperative Port Planning Study", for Maritime Administration (not yet published).


Maritime Administration. "Great Lakes Region Port Development Studies" (ongoing).


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U.S. Department of Commerce, Maritime Administration, Great Lakes Region. "U.S. Exports Transshipped Via Canadian Ports, Position Paper on Canadian Diversion, H.R. 6034".


GREAT LAKES REGION COMPARISON
WORK GROUP ON GREAT LAKES REGION COMPARISON

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John Carroll (Co-Chairman) - Institute of Natural and Environmental Resources, University of New Hampshire
Paul Nickel - Great Lakes Basin Commission
Edward Miles - Department of Canadian Studies, University of Vermont
John Moore - The Academy for Contemporary Problems (U.S.)
Hubert Hinote - Project Manager Regional Economic Projects, Tennessee Valley Authority
Peter Gusen - Conference Board of Canada
Don Caveen - Director, Northeastern Ontario Department of Regional Economic Expansion
Roger Hinterlighter - Senior Economist, Federal Reserve Bank (U.S.)
Wayne Crosly - Economic Development, Ontario Ministry of Treasury, Economic and Intergovernmental Affairs
## GREAT LAKES REGION COMPARISON

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### II. ECONOMIC INTERRELATIONSHIPS

### III. ENERGY INTERRELATIONSHIPS

A. The Inter-regionally Cost Competitive Energy Issue

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### IV. ENVIRONMENTAL RELATIONSHIPS

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B. Increasing Effect of Regulatory Activities on Growth in the Regional Economies

C. Acidic Precipitation and General Air Quality Issue, with the Great Lakes Basin as a Point of Origin

D. Chicago Diversion Canal Issue

E. Impact of Canadian and U.S. Upper Atmospheric and Acidic Precipitation in the Great Lakes

F. Diverting Hudson Bay and James Bay Water into the Great Lakes

### V. INTERNATIONAL INSTITUTIONAL MODELS

A. The International Model Aspects

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I. INTRODUCTION

The Great Lakes Basin is not an island unto itself. By definition a physical unit, its location in the heart of the North American continent ties it to the other regions of the continent. Of particular significance is the relationship to the valley of the St. Lawrence, the connection between the Great Lakes Basin and the oceans.

Superimposed on this physical unit are political boundaries that create two national and nine subnational units. Political boundaries, rarely rationally drawn, tend to become permanent features of the physical landscape. To ignore the political entities of the Great Lakes Basin is to invite disaster for any future planning.

Canada and the U.S. are both federal countries, yet the distribution of powers between federal and state/provincial units is quite distinct.

In the Great Lakes Basin there are eight states (Minnesota, Wisconsin, Illinois, Indiana, Michigan, Ohio, Pennsylvania and New York) involved but only one Canadian province (Ontario). While foreign affairs are the prerogative of the federal government in both countries, there is some evidence that direct state-provincial relations are tolerated today more than in the past, i.e. British Columbia - Washington arrangements and the annual meeting of New England Governors and Eastern Canadian Premiers. An association between Ontario and the eight states focusing on problems of the Great Lakes could lead to a greater appreciation of common problems and to steps to solve them. Of course, the jurisdictions are in some degree competitors for business, as the Ford and Volkswagon plant cases illustrate quite clearly. Closer cooperation among them would have to take account of the economic realities facing the individual members and these realities could be a source of conflict. However, such an association would be more efficient and less costly to alternative bilateral arrangements between Ontario and each of the states.

In fact, Ontario and the eight states have sufficient economic and political clout within their respective countries to be able to persuade the larger entities to act on an issue of common interest.

Laws regarding pollution, land use and many other topics are frequently state-provincial in origin. The political situation in each unit determines the ability to pass such laws.

The Quebec Issue

Touchy, embarrassing or speculative though it may be, it is essential that all the possible options regarding Quebec be anticipated. It is not impossible that a third international entity will emerge upon the scene. While Quebec is
not directly within the Great Lakes Basin as narrowly defined, its control over much of the St. Lawrence River, the outlet for the lakes, makes it an entity of some significance.

The possible effects, especially economic, of a change in status for Quebec, must be considered. The impact on Canadian and especially Ontarian, economic policies and planning, could have profound effects on the Great Lakes Basin.

The interrelationships discussed below must be perceived in the context of these physical and political realities.

II. ECONOMIC INTERRELATIONSHIPS

Two major economic developments forseen for the next 5-10 years which will have a distinct impact on the Great Lakes region are:

a) a slower rate of growth, relative to national averages, than that to which the region has become accustomed; and

b) changes in the age structure of the population.

A discussion of the nature of these developments and the problems and opportunities which these developments present to the region follows.

a) Slower economic growth

Economic change within the U.S. portion of the region has generally been characterized by slow industrial growth relative to that of the nation since World War II. In Ontario too, growth has fallen from above the Canadian average in the 1950's, to average growth in the 1960's, to below average growth in the 1970's. By and large, the historical development of the region has produced specialization - production in excess of regional requirements - in heavy manufacturing (primarily metals, transportation equipment, machinery, metal fabrication) and these industries have been slow in growing relative to overall national growth. Structural shifts away from manufacturing have produced slow growths in these industries in North America relative to all other industries. At the same time, regional firms in these industries have been growing slowly relative to firms in other regions. Competitive effects have thus resulted in yet slower growth in this region of the U.S., though not perhaps in Canada, where Ontario so predominates in national production in heavy manufacturing industries that provincial and national growth rates have never differed substantially.

In a sense, the growth patterns emerging in the post war period represent a convergence among regions within the national economies. Over a long period, this balancing out is expected and does not in any way suggest the region is "declining" as a base of economic activity. However, there are likely to be a variety of adjustments arising from this convergence which can be affected by policies. Examples of such adjustments include the following:

i) The effects of slower growth are not uniformly distributed across the population. Those marginal workers who are employed during
prosperous times lose their jobs when the economy decelerates, whereas the bulk of the labour force will feel the slowdown less directly. The least efficient plants will close while production at the remainder will continue to expand at the previous pace.

ii) As employment, production, investment and associated tax base gains diminish, competition among different governments within the region for acquiring and retaining industrial activity may intensify. This competition could manifest itself in "beggar your neighbour" tax cuts, subsidies, liberalization of safety or pollution standards, or, in the case of the two national jurisdictions in the region, trade policy adjustments.

iii) In periods of less than anticipated income growth, people may display a shifting preference from "quality of life" considerations to more traditional employment and individual consumption concerns. This may lead to pressures to roll back environmental standards.

iv) To a large extent, the capital stock of the large industries, where the highest specialization exists, is aging and not being replaced. This marginal stock results in a weaker economic structure and among other implications, suggests that the impact of exogenous events including environmental policies, might be magnified in the region. In some cases, the impact is disadvantageous to economic activity in the region. For example, cyclical impact on the region is often more severe than for the nations as a whole. The business cycle though is usually deeper in states like Ohio, Pennsylvania, Michigan and in Ontario. This results in larger rates of unemployment, more idle capacity and a generally more severe contraction.

One factor in the slowdown in some Great Lakes region industries has been foreign competition, e.g. in steel and electrical equipment. The decline in the international value of North American currencies may slow down or reverse the trend.

b) Population age structure

The post World War II "baby boom" members have and are passing through the period of their lives when they first enter the labour force. As this bulge in the population passes through subsequent life cycle phases, it will have major ramifications for the region, such as:

i) The significant reduction in the rate of the labour force growth expected during the 1980's. Initially, this reduction may ameliorate the problem of high levels of unemployment which have beset both Canada and the U.S. during the 1970's. Later, a labour shortage may emerge. Certainly the structure of the labour force will change to one of relative abundance of middle-aged, highly skilled and experienced workers and a relative scarcity of new entrants. The slower economic growth
expected for the Great Lakes region during this period will limit labour demands and place the region at an advantage relative to other faster growing areas. The more experienced labour force may be more important to the region than to other locations as a result of its industrial structure.

ii) The changes in financial capital availability due to personal savings adjustment. Although personal savings habits in Canada and the U.S. differ considerably at present (10-11% vs. 5-6% of personal income, respectively) similar trends are envisioned for both countries. As the population ages, particularly as the proportion in the post-retirement age group increases, the personal savings rate is expected to drop as those in retirement deplete their wealth. This will limit funds available for investment, necessitating a higher "cut-off" rate of return for those projects that justify financing. The Great Lakes region may be relatively severely affected by the capital rationing, in that the rate of return on replacement or repair of the older facilities, characteristic of the region, may fall below that expected from new investments started elsewhere. However, the earlier start made by the firms in the region in adapting to environmental standards may place them at an advantage in the coming era of capital costs.

An Economic Atlas of the Great Lakes Drainage Basin Region

A useful device to show the relationship of a region to other regions is the economic atlas. The IJC should compile from statistical sources already available the following informational maps, likely printed through computer capability: the flow of materials into the drainage basin; the flow of materials out; and the production of materials within the Great Lakes Basin, that are also used within the basin.

Key commodities, for which information is available, are:

- Coal;
- Petroleum and petroleum products;
- Natural gas;
- Uranium and nuclear fuel;
- Electrical energy;
- Iron ore;
- Key non-ferrous minerals: copper, lead, zinc, alloys with metals such as tungsten, molybdenum, chromium, nickel, and "precious" metals. Non-metallics such as clay, sand, gravel, building stone, limestone;
- Fertilizers;
- Paper products;
- Lumber;
- Wheat;
Corn; Soy beans; Fresh fruits and vegetables; Processed food: canned, dried, frozen; 
Livestock; Meat: beef, pork, mutton, poultry; Dairy products; Eggs; 
Steel: automobiles and automotive vehicles; Heavy manufacturing machinery; 
Machine tools; Chemical industry products; Electronics: computers, television, telecommunication equipment; Textile industry raw materials and products.

Such an atlas, compiled easily with computer capability from available data, would be useful in understanding the Great Lakes region (Canada and the U.S.), its mutual dependence on other regions and their dependence on it.

Planning From a Surplus Position of Basic Production Elements

An interesting comment was made several times during the discussion on regional comparisons. We in the Great Lakes region are planning from a surplus position in both water and energy at the present time. Very few, if any, other regions in the world are in a similar position. Other regions must plan from a scarcity position of water or energy or perhaps both.

The Ability for the Regional Economy to Expand Rapidly to an Upward Swing

The present slowing of the regional rate of growth, both absolutely and comparatively, was the backdrop against which most of the discussion took place. However, several times the comment was made that a good look should be taken at the rate at which the region could respond to a sharp upswing in the national economy in the event of a global war challenge or a rapid rearmament program.

A "High Risk" Region

Maps and information, readily available from the responsible sources, show that much of the Great Lakes region falls into the "high risk" category in terms of national defence and civilian protection. This factor must be considered, as an important footnote in any short term planning (the five year span suggested by the organizing group) of the Great Lakes drainage basin region.

The Tourist Industry and the Recreational Use of Lands

An important aspect of the Great Lakes regional environment is related to the recreational use of lands and waters and to the tourist or visitor industry. In the event of less availability of gasoline for travel, the pressure on these uses will increase. The resident population (in the basin) will use nearby resources more fully.
III. ENERGY INTERRELATIONSHIPS

A. The Inter-Regionally Cost Competitive Energy Issue

The basin's economy and its growth, which must and will occur, will require the development of new energy centres which can provide guaranteed energy on a cost competitive basis. The problems which emanate from development and use of these inter-regionally cost competitive developments over the next 10 years, which will impact the water and other resources of the Great Lakes, include:

- using lowest cost (dirty) fuels with higher environmental impact; and
- developing large plants to achieve economics of scale which have high point environmental impact.

B. Ontario Hydro and Eastern Coal

A major forthcoming Great Lakes energy and environmental issue is Ontario Hydro's decision to contract for western Canadian coal to be transported across the Great Lakes to the metropolitan centres.

The problem is whether and how to use western Canadian coal. The coal belongs to the provinces. The provinces, led by Alberta, wish a much greater share of the industry that runs on coal and of the value added made possible by energy sources at site. There must be a quid pro quo before the coal will move, whether it be a high price paid by the east, government installations placed in the west, or industry located in the west where coal is produced. Another question is whether trains from the west can travel on existing roadbeds without damage problems. If coal is moved - if the quid pro quo is enough or the Crows Nest Law is changed to favor the west and if coal is favored over nuclear energy for the near term future, then a problem could emerge for ambient air and water quality standards for the Great Lakes.

The answers are to be found in Ontario Hydro, the Province of Alberta Department of Resources, Canadian Pacific and Canadian National Railroads and the Province of Saskatchewan's Department of Resources.

Problem:

Major industrial developments at the source of resource extraction could severely impact the Great Lakes for a variety of reasons. Industrial production establishes air pollution that becomes water pollution. Another problem arises if "pollution" is a severe or significant problem, i.e. genetically harmful or necessary to deal with politically. Both Canadian provinces and U.S. states wish to retain the value added resulting from their energy or mineral reserves. So, great pressure has been brought to develop and use coal, minerals, petroleum and gas at the site of extraction. This is
particularly true for Saskatchewan and Alberta and they have the power to do this in the federal-provincial governmental context. Indeed, Alberta has offered to engage in block trading with any U.S. state which will accept Alberta's entry into their market as well. What does this mean? If industrial production occurs more heavily in the west at the site of extraction, then more air pollution will occur and will affect downwind water quality such as the Great Lakes. To this extent western industrialization will affect water quality and if those effects are judged harmful (heavy metals, PCBs etc.), a new problem will have emerged and will have to be dealt with. There is an offset to this situation in that decisions have been made that western coal will have to be "scrubbed" as well as eastern U.S. coal, which is "dirtier". Thus, it is said that clean western coal no longer is at an advantage. What kind of network would be needed to develop these aspects into issues useful for IJC consideration and review? U.S. presidential directives, industry in both U.S. and Canadian locations, data from appropriate states and more importantly provinces, will be necessary.

A final note relates to the intrusion of air and water quality into the ambient standards of each country. To the extent that these externalities from each nation's industry are not internalized, they emerge as a problem for the recipient nation. In the U.S., as a "recipient", air quality reductions reduce the waste loading factors allowed by the U.S. EPA in Minnesota, etc. Whether the same problems exist in externalities intruding into Canadian water and air, must be considered relative to federal-provincial rights and duties outlined in the British North America Act and need to be explored in that context.

IV. ENVIRONMENTAL RELATIONSHIPS

A. Introduction

Environmental transfers into and out of the Great Lakes drainage basin may affect the physical balance of the measurable aspects of the ecosystem.

Examples:

1. Diversion of water into the system, such as the Ogoki and Long Lac diversions.

2. Diversion of water out of the system, such as the Chicago diversion.

3. The atmospheric loading generated by emissions from motor vehicles, manufacturing industries, extractive processes, refining operations, and space heating emanating from sources outside the region but affecting the region through fallout.
4. The atmospheric loading generated within the basin from indigenous sources or from fossil fuels transported into the region by rail, road, boat, or pipeline and concerted to industrial, residential, generating, and transportation uses with attendant emissions, which impact regions to the East.

5. The volume of recognized pollutants discharged into the environmental system from point and nonpoint sources. These pollutants may emanate from materials both indigenous to the region or transported into the region, such as fertilizers, industrial raw materials, fuels and agricultural products.

The IJC has had a successful performance record in dealing with water diversions and atmospheric emissions that have transboundary implications. These inquiries and the resultant recommendations resulted from referrals. The IJC, as it fulfills the implications of the ecosystem approach to drainage basin management, must have strengthened powers to monitor environmental levels, to initiate appropriate inquiries, and to recommend necessary actions to the Governments of Canada and the U.S. Ontario is able to carry out whatever recommendations Canada and the U.S. may direct through the PLUARG* experience and the Water Quality Agreement, by using the Conservation Authorities' framework which is organized on drainage basins. The conservation authorities have had thirty years' experience in using the "watershed" legislation of the Conservation Authorities Act and would be able to use the authorities to carry out any drainage basin recommendations made by the IJC and agreed upon by Canada and the U.S.

Some Ontario drainage basins within the Great Lakes system are not organized as conservation authorities. The unorganized basins are too sparsely populated and unorganized for local government. These basins may be administered by the province to conform with any programs being carried out by Ontario, as ordered by the Governments of Canada and the U.S. in carrying out the recommendations of the IJC.

B. Increasing Effect of Regulatory Activities on Growth in the Regional Economies

(a) The Problem

During the last decade or more, legislative response to a variety of environmental problems has resulted in increasing regulation of the private sector. Major areas include air and water quality and worker safety. Because of the age and industrial mix of the Great Lakes regional economy, response to regulatory programs has added significant capital and operating costs to many regional industries which are already suffering secularly declining rates of return on investment. In addition, inevitable uncertainty and delay have complicated any response to legitimate needs to improve environmental quality. The work group identified the differential cost burden of

* PLUARG - The Pollution from Land Use Activities Reference Group
the level and methods of current regulatory practices as a continuing problem not adequately being considered in the region.

(b) Background

The issue of regulatory burdens is naturally pervasive. From a purely policy perspective, the issue is less one of the level of specific objectives inundated by the regulatory process, e.g. water quality goals for specific water bodies, ambient air quality standards, etc., than one of how standards are to be achieved. Specifically, the present approach involves establishment of both ambient and effluent standards with implementation through "best available technology" approaches. Little or no attempt has been made to use economic incentives to provide polluters with flexibility in meeting the broader environmental standards.

This issue has been treated extensively in the economic literature. Essentially, it says that an effluent charge levied on a polluter gives him the option of reducing pollution or paying the charge. Some polluters will find it cheaper to clean up (by any legitimate means) where others will find it more economical to continue to discharge and pay the effluent charge. The level of total pollution reduction will be determined by the level of the effluent charge. Clearly, some types of pollutants may not be appropriate for this kind of approach - toxics for example - and will require direct control.

The bottom line on the effluent charge approach is that it allows response to pollution at a lower total cost (because of increased flexibility and discretion) to the economy than does the traditional engineering/effluent standards approach. Movement towards an incentive system of pollution abatement would require federal legislative standards on both sides of the border. Given the major economic readjustment problems occurring in the Great Lakes region, more economically efficient national approaches to environmental management would appear to be in the direct interests of the region.

(c) Alternative Options

Options on this issue are limited to policy or position statements concerning this need to consider effluent charges as an alternative to the present national regulatory approach. Other options may include studies on the institutional ramifications for Great Lakes water quality (or air quality management) of effluent charges. For example, how would they work given the present institutional setting?

(d) Changes in Policies

An IJC statement on the need to consider economic probabilities (effluent charges) as a needed change in Great Lakes environmental quality management.
C. Acidic Precipitation and the General Air Quality Issue, with the Great Lakes Basin as a Point of Origin

Problem:

Concentrated industrialization in the Great Lakes Basin of both the U.S. and Canada, along with electrical power generation especially through the combustion of coal, is emitting great quantities of sulphates and other toxic pollutants into the regional atmosphere. Prevailing winds blow west to east in all seasons, and the northeastern U.S., Quebec and the Maritime Provinces are downwind.

These toxic pollutants have a generally adverse impact on general air quality to the east, with all the human health and property damage aspects associated with air pollution. Particular problems arise with the occurrence of acidic precipitation at points east, particularly on coniferous vegetation, oligotrophic lakes and acidic soils. These impacts are particularly felt at higher elevations which break the path of the wind. The Adirondack Mountains of New York, the Green Mountains of Vermont and the White Mountains of New Hampshire will be especially adversely affected. Damage to commercially and aesthetically valuable timber, general forest ecosystems (especially coniferous species), aquatic life in high mountain lakes and the recreational fisheries dependent on these aquatic systems will be especially severe, as will impact on fresh drinking water supplies, many of which originate in high mountain lakes. Specific impact on the Buffalo and Rochester, New York, areas will be experienced by significant air quality deterioration caused by Ontario Hydro's Nanticoke coal-fired generating station; the largest thermal electrical power plant in Canada and soon to go on-line.

Suggested IJC Options for Handling the Problem:

Regular IJC consultation with the appropriate officials and all affected interests in New York, New England, Quebec and the Maritime Provinces may be performed by open meetings or public hearings by the IJC in the affected areas.

D. Chicago Diversion Canal Issue

Problem:

A. Concerns of the Chicago and Illinois interests

Chicago needs to flush its treated waste southward. This residual waste load is increasing greatly and water quality downstream is thus decreasing. Downstream communities are suffering from this deteriorating water quality, are contributing ever greater amounts of their own waste and want more water to flush through the system. The problem impacts Des Plaines, Illinois, and ultimately the Mississippi River, downstream dependency developing on Great Lakes water.
Ultimately, downstream consumptive and non-consumptive users may demand (and perhaps become dependent on) greater quantities of water for other purposes (cooling, processing, some navigation, etc.). Downstream demands become particularly critical in dry years, precisely the years when Great Lakes levels are low and the Great Lakes Basin cannot afford to export water to the Mississippi Drainage Basin. Conversely, in wet years when Great Lakes levels are high and at those times when the Lakes can perhaps afford to export, there may be downstream flooding concerns which would demand less diversion.

B. Concerns of the Great Lakes States and Canada

Increased flowage of Great Lakes water through the Chicago Diversion Canal obviously means reduction of water available in the Great Lakes Basin and has positive utility only in years of very high water. Foremost among the interests which suffer with lower levels are hydro-electrical power generation interests in both the U.S. and Canada, but particularly in Canada. Those specifically losing power are Ontario Hydro, Hydro Quebec and the Power Authority of the State of New York. Also losing revenue under such conditions are those U.S. and Canadian interests which always require maximum lake levels. Others adversely affected in varying degrees are property owners (left high and dry), recreational interests (boating, fishing, marinas), commercial fishing, industrial processing, water quality and other interests. Some of these interests may benefit from lower water levels, for example erosion prone shorelines, ecological health of fish species at different life stages at different seasons, etc. A principal concern is, however, that power generation and adverse impacts on Canada are greater in this area than they are on the U.S.

C. Summary of Problems

Ontario and Quebec power generation interests and Canadian and U.S. shipping interests (iron and steel, grain) are thus largely pitched politically against the city and suburbs of Chicago, Joliet and other Illinois cities and their industries and their opportunities to use a public river system to dispose of their effluent and maintain or expand their profits. Politically, the Illinois Congressional delegation (which is generally very powerful and often insensitive to Canadian interests) along with state and municipal officials, is pitched against Ontario's economic development interest and users of the St. Lawrence Seaway and the lake ports, the U.S. and Canadian steel industry and U.S. and Canadian grain shippers and exporters.

D. Suggested IJC Options for Handling the Problem

1. Incorporate into the Great Lakes Water Quality Agreement or into a new, separate, agreement a formula for agreed upon diversion levels which are renewable in terms of years and which are long enough to provide certainty and stability to industries and municipalities dependent upon both the diverted flows and the lake levels.
2. Organize a structure for the IJC to convene regularly with Illinois - Mississippi Basin officials and interests to better understand demands and dependencies on the diverted water and also to bring together the affected interests in the Great Lakes Basin with those in the Illinois - Mississippi Basin to negotiate differences.

E. Impact of Canadian and U.S. Upper Atmospheric Pollution and Acidic Precipitation in the Great Lakes

About 20% of Great Lakes pollution appears to come from atmospheric sources. U.S. and Canadian political institutions are not geared to manage extra-territorial sources of pollution, i.e. the Great Lakes receive acid rain from St. Louis and transmit acid rain to New York State. Airborne particulates from Canadian sources will impact on ambient air quality in Minnesota and Wisconsin and reduce the amount those states can release, thereby adding to their country's total. Previous solutions of burning coal at the mine mouth and transferring power and/or burning coal outside the airsheds of cities in remote places, then transferring power, thus still affect the Great Lakes by transfer of water pollution through the air. Western coal now is reported as having to meet the same standards as eastern "dirty" coal. It is thus not so attractive a substitute for eastern coal as was previously thought, perhaps reducing the high amounts previously reported to be likely for use. Also, more moderate energy needs now may bring fewer coal burning plants on-line in the Great Lakes, thus giving some time to establish how to deal with the problem relative to the Great Lakes.

How much pollution to "allow;" whether a U.S. - Canadian treaty deals with water quality via an air quality treaty and air standards; how such a treaty would be enforced; whether the criteria would be "standards" or if they would be merely objectives; and whether each country would be allowed pollution rights, are all grist for the decision mill.

The IJC needs to determine how much of a problem acid precipitation is and will become and note what precedents are being established presently in the current European Economic Community negotiations and the United Nations negotiations with respect to air quality which have a water quality criterion. These precedents will have a considerable effect on a U.S. - Canadian treaty.

An underlying issue should be noted. Both Montana and Alberta have very strong desires to have the processing value from their coal or other resources and will not merely export the resources they control. This means that to the extent that their resources are used, they will be used in place and be an increasing source of water pollution or, if sold, will continue and increase the preset patterns of air pollution impacting on water quality.

F. Diverting Hudson Bay and James Bay Water into the Great Lakes

The U.S. has become water short in several regions in the context of water
services being distributed as a free good in the U.S. The diversion of Hudson Bay and James Bay waters into the Great Lakes is attractive from an engineering point of view but would be strongly opposed on the basis of political, economic and environmental impacts. The Bays' waters could quantitatively overcome some of the present constraints on the use of Great Lakes waters to flush out Chicago, to irrigate or bring in new farm land in the Great Lakes Plains, and far west and even to relieve water constraints as far away as Los Angeles by releasing other water.

Canadian experience and memory of the Columbia River project and other such projects makes the possibility a very dim prospect. The problems are legion. Firstly, as noted, it is not politically attractive to Canadians. Indeed, it is anathema. Secondly, there is no easily visible way of "selling" such a resource in a way that is attractive to Canadians since the waters are now viewed as a national heritage or birthright. Thirdly, the economics of such major projects as diversion appear less attractive than undertaking other water distribution projects in the U.S. Water conservation in Illinois cities enables dependence on existing supply and disposal methods other than flushing can meet the need for flushing in Chicago. "Rationing" water may be more attractive, given construction cost inflation, rather than adding to quantities from the north.

Environmental backlashes are not overly common in northern climates, at least not of the magnitude of the Congo in African diversions and impoundment schemes that have debilitated or lead to earlier deaths of hundreds of thousands. But major engineering works can have such problems and the heightened awareness of the need to look for them slows or stops such projects now on very refined grounds compared with only 30 years ago. Doubtless, the introduction of the lamprey into the Great Lakes could not have been anticipated as a result of the Welland Canal's construction, but such possibilities now receive careful scrutiny.

These two Bays' diversions could occur if there were significant economic indicators, or if political incentives were attractive, or if there were elements of environmental improvement possible. The questions that would have to be overcome are:

1) Will water-short U.S. regions "buy" water to continue its distribution as a free good?

2) Will the U.S. pay in exported jobs or dollars a price that would be attractive to the Canadian federal government and to provinces to purchase that water, including money to reward the federal government, the provinces and overcome environmental problems?

3) What is the mechanism by which the dollar transfer could occur? What safeguards would be needed in a Canadian view?

Finally, a fearsome spectre would be raised for Canadians by this sort of effort - the fear of being integrated in a continental water policy, then
a continental energy policy, then into a common market and then to being finally restricted practically in the choice possible through Canadian political institutions. In short, if water is a constraint to be relieved via diversions to the U.S. it would be a long, expensive process to relieve a short run problem that might use other, easier, means to solve weather constraints.

**V. INTERNATIONAL INSTITUTIONAL MODELS**

**A. The International Model Aspects**

The experiences and accomplishments of Canada and the U.S. in sharing a common drainage basin (the Great Lakes Basin) may serve as a model useful for other nations in developing a strategy and program for sharing international drainage basins. The United Nations and the World Bank have stated on many occasions the value of effective working models. Of the one hundred or more major shared drainage basins, the Great Lakes Basin is probably the most advanced in treaty commitments, agreements, programs and operations. Hence, whatever success Canada and the U.S. may achieve in satisfying their own goals and objectives, may have great usefulness to other nations as well.

The experiences and accomplishments of the Great Lakes Basin programs may assist in working out shared management programs in such drainage basins as the Yukon, the Columbia, the Red River of the North and the St. John's.*

Only one example, probably far in the future, may be sufficient to emphasize the model function on the global scale. The Mekong River today is in conflict, but eventually it and its basin must be used by man for the beneficial purposes of navigation, water for agriculture, electrical power generation and for industrial and domestic needs.

**B. Transfer of the Model**

The problem is in finding a means of joint management of an economic resource that is mutually advantageous and that reduces potential for conflict in favor of cooperation. Several points have to be made about the Great Lakes water quality model as a model. The points have to do mainly with defined need and context and criteria. The criteria include: will the experience in cooperating in the use, management, and maintenance of a crucial resource provide useful experience in cooperation that leads to greater or more mutually-advantageous cooperation? There is now enormous economic integration between the U.S. and Canada. Perhaps a rationale for both countries, but primarily for Canada, is the enormous market found in the U.S. for manufactured goods.

Other criteria by which the Water Quality Agreement would have to be assessed for use as a model include:

*Network Contacts for IJC Intergovernmental Council

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(a) Can it be expanded to include unanticipated problems?
(b) Is it formally effective in doing the job set forth?
(c) Does it provide an informal means for cooperation and/or coordination to achieve the goal?
(d) Does it effectively formulate the questions so they may be technically assessed for political resolution?
(e) Does the staff backing for the Water Quality Agreement adequately provide for the function of the agreement?
(f) Do the appointments to the political leadership of the element provide a sufficiently high level of representation to be effective?

These criteria could be expanded and doubtless should be, as well as analyzed to assess how or whether to adapt the form of the Water Quality Agreement to different modes. Applications for managing a shared resource obviously include a "network" to assess the appropriate use and should include people skilled in such analysis.

It is suggested that the IJC look at the model of the Northeast International Committee on Energy, organized by the New England Regional Commission and the Council of Maritime Premiers and representing the six New England states and five Canadian provinces (Quebec, the Maritimes and Newfoundland-Labrador), as possibly applicable to some of its work which has regional rather than national orientation. This includes, obviously, work in the Great Lakes Basin.

VI. CONCLUDING COMMENT

Implementation of the Water Quality Agreement and other IJC objectives in the Great Lakes Basin will rest on the recognition and solution of problems arising from economic/energy/environmental interrelationships. The 3-e's are themselves overlapping and must be viewed in terms of a political context where jurisdictional cooperation is necessary but competition is, in some areas, an increasing possibility. Nevertheless, the 3-e's are likely to present a variety of challenges in the future and a broad perspective and understanding of emerging problems is the key to development in the Great Lakes Basin.
The problem of the development of the new social order is of fundamental importance. It should be noted that the new social order will not be established by means of a revolution or a gradual process. The development of the new social order will be achieved through a planned and systematic process of social transformation. The new social order will be characterized by the following features:

1. Social justice: The new social order will be characterized by the principle of social justice, which means that all members of society will have equal opportunities and access to resources.

2. Economic equality: The new social order will be characterized by economic equality, which means that all members of society will have equal access to economic resources and opportunities.

3. Political participation: The new social order will be characterized by political participation, which means that all members of society will have the right to participate in the political process.

4. Cultural diversity: The new social order will be characterized by cultural diversity, which means that all members of society will have the right to express their cultural identity.

The establishment of the new social order will require a comprehensive and coordinated approach. It will require a commitment from all members of society to work together for a better future. The new social order will be built on a foundation of cooperation, understanding, and mutual respect.

Only when we recognize the value of cooperation can we achieve the goals of the new social order. The new social order will not be achieved without cooperation among all members of society. It will require a shared commitment to the development of a new social order that is based on justice, equality, participation, and diversity. The new social order will be a reflection of the values that we hold dear and the principles that we believe in. It will be a society that is built on the foundation of cooperation, understanding, and respect.
WORK GROUP ON FUTURE TECHNOLOGICAL AND SOCIAL CHANGE

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FUTURE TECHNOLOGICAL AND SOCIAL CHANGE

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TOWARDS A "FUTURES" ORIENTATION

The future is not dictated by any single cause. Rather, it is a combination of events, including those resulting from human decision as well as those which are unexpected, uncontrollable, or occurs as the result of a variety of factors such as technological, social, or environmental changes. The concept of "futures" is used to describe this orientation towards the shaping of the future. In a world of increasing population, resources, and environmental pressures, the need for a systems approach to understanding and addressing the complex interrelationships between these factors becomes apparent. The concept of "futures" is not limited to the problems of industrialized society but includes those of the historical context as well. It is characterized by a proactive approach, i.e., a futures-oriented posture, which involves making decisions and taking actions aimed at shaping future conditions and of limiting the magnitude and number of uncertainties.

The approach is in contrast to that of the short-sighted, reactant, and rarely a winner.
I. INTRODUCTION

The task given to this Work Group was "intended to reflect matters concerning the approaches being taken in anticipating and assessing technological innovations, changing cultural values and social futures, and including the identification of ways in which the IJC might interface with these kinds of activities".

The group perceived its task as one which responded to an interest by the IJC in developing, as a part of its functions, a capability to move from an essentially reactive to a forward looking stance. It was recognized that this shift in orientation will be difficult and time-consuming, but it was the unanimous judgement of the group that it is essential and possible.

The summary of the Work Group's deliberations, presented in this report, attempts to outline what is involved in developing a future-oriented, holistic focus. It offers a variety of actions which might be taken to iteratively move toward developing this new role and it seeks to assure the IJC of the needs for and merits of such a role. Because of the nature of such a transition from topic-specific to an holistic focus it would be both impractical and unwise to attempt too rapid a transition. Rather, the approach should be iterative and experimental -- testing and evaluating in a learning process of development.

II. TOWARDS A "FUTURES" ORIENTATION

The future is not dictated by any single cause. Rather, it is a combination of events, including those resulting from conscious human decision or choice and others which are externally induced. We have elected not to treat the subject of "Future Technology-Social Change" as a listing of emergent socio-cultural trends and possible consequences, that is, as images of the future. In a time of recognized resource limits, increasing population pressures, heightened awareness of serious ecological problems, rapid technological change and its many consequences, communication systems which widely portray the great disparities between rich and poor, and the increase in complexity of institutional forms to cope with the problems of industrialized society -- the projections of the past have little relevance. Nor do many of the assumptions and solutions of the past apply in dealing with this class of problems. The future, in fact, is characterized by only one quality - uncertainty. We see anticipatory planning, i.e. a futures orientation, as a way of reducing uncertainty associated with taking actions directed towards future conditions and of limiting the magnitude and number of surprises. It can be likened to the pugilistic style of a good boxer -- on his toes, alert, and anticipating -- in contrast to that of the flat-footed, reactive fighter (and rarely a winner!).
The nature of the problematique demands new perspectives and approaches in both utilizing and developing knowledge. Functional, single-purpose, linear approaches, with their arbitrary compartmentalization of problems, are inadequate to deal with today's complex issues. Unfortunately, we are at an embryonic stage in the development of approaches to deal with this complexity and uncertainty. The often-heard terms 'ecosystem approaches', 'holistic thinking', 'comprehensiveness', 'interdisciplinarity', etc., stem from perceived inadequacies of present planning and policy formulation modes. Moreover, current attempts at thinking "futuristically" seldom are extended in concept to include the institutional arrangements, which at present foster and support traditional approaches.

It is apparent that forces for change are complex and pervasive. We do not propose to attempt delineation or definition of the full array of socio-cultural forces or conditions for change. Rather, we have elected to illustrate, by way of examples, the nature of a few of these forces and conditions in order to give some sense of their significance and possibly alternative impacts on the Great Lakes Basin.

One example is drawn from our current energy situation. The possibility of foreign oil and gas being unavailable to North American users, as the result of any combination of events, is both an immediate and longer run prospect. The implications of such an event for the Great Lakes region depend on how Canada and the United States respond. Among the possible impacts, each with its own set of implications, are:

- warfare at some scale, which, because of national priorities for production, might result in a lowering of pollution standards in the Great Lakes industrial complex;
- sharply increased nuclear generation, with attendant water quality and other impacts;
- increased use of coal, with associated transportation and pollution problems; or
- increased use of renewable energy resources, technologies, and conservation.

Any of these illustrative possible consequences of a petroleum shortage have major ramifications for land and water management in the Basin, and hence fall within the purview of the IJC.

Another example can be drawn from the impact of technological innovations. In recent years, there has been a quantum jump ahead in telecommunications. Experts differ, however, with respect to their views on the effects of the widespread use of telecommunications technologies - on transportation, settlement patterns, economic activity, etc. What is certain, though, is that there will be dramatic impacts from this single technological 'future'.

Within any number of sectoral or functional areas -- health care, environment, labor force expectations, citizen alienation with regard to
government -- experts and others recognize significant socio-economic transition and changes. This has been recognized in the topical sessions of this workshop. It is also clearly reflected in such significant phenomena as population and economic growth in the U.S. sunbelt, the aging character of the population in the Great Lakes Basin, increased leisure time and recreational demand, etc. When one views these forces and manifestations of change synoptically and collectively, they are suggestive of a period of major transformation, perhaps comparable in scale to major historical shifts, such as the Industrial Revolution, but squeezed into a shorter time frame and with global dimensions.

Thus, we are dealing with a complex of forces and conditions in which change occurs pervasively in a highly interactive system. Coping with this change means planning for uncertainty. It is our consensus that the framework for planning must be indicative as opposed to imperative. In other words, planning, policymaking, implementation and information transfer can be accomplished in a polynucleated, decentralized system, with a dispersed mix of public and private decision-making. Such a framework will respect Canadian and American political systems and cultural traditions.

In the following paragraphs, we will suggest some alternative steps that the IJC might take in looking at technological and social changes as they relate to the IJC's mission.

III. NEXT STEPS

Given an interest in developing a "futures orientation" on the part of the IJC, there are a number of alternative steps which can be taken, but there are some considerations that should be understood.

1. Development of a futures orientation is an experimental process; you learn as you go, and therefore should proceed incrementally.

2. The institutional and resource commitment by the IJC must be sufficient and sufficiently sustained to accomplish the task undertaken; in the absence of this commitment, the effort does not deserve to be mounted at all.

3. The activities undertaken must be relevant to the IJC, i.e. build on legitimate IJC concerns; additionally they should involve IJC Commissioners, staff, Board members, and key cooperators to the point that these people learn and gain new capabilities and perspectives.

4. Futures orientation developmental activities should relate to critical publics and policymakers -- to catch their interests and to thereby draw on their resources and/or competence.

The primary elements of an anticipatory planning framework are:

(a) the network of interested/affected/knowledgeable parties; and
(b) the strategies and mechanisms (processes) which link the network together.

(a) The Network

The network can be defined as having two different sets of actors. The first set is composed of people who are knowledgeable or working professionally in some facet of "futures" work. They can be located in a variety of work settings, including:

- business and industry;
- universities;
- labour unions;
- government (both in legislative and executive branches; in policy and operational roles; and at all levels);
- think tanks/institutes;
- consulting firms;
- public interest/adversary groups;
- professional societies;
- media/journals.

In attempting to identify specific individuals/groups for this network of future oriented professionals and policy influentials, several characteristics might be employed as screening guidelines (recognizing that these characteristics require judgment by the person(s) identifying the network):

a. with established networks or networking capacity of their own;

b. with political/policy influence;

c. with demonstrated analytical capacity; or people with demonstrated synthetic, holistic-thinking capacity;

d. with a demonstrated capacity to intervene and initiate and develop ideas and concepts; and

e. who are open to change and/or committed to consideration of "futures".

Special note should be made regarding building the network so as to incorporate individuals who are active participants in governmental policy developmental processes, given the future impacts of these policy decisions.

The second set of people who should be part of the network are members of the "impacted publics". These are individuals and groups affected by particular site specific events at the local level, and who are concerned about problem solving and change in that context. They are people who do not meet the guidelines as experts or "knowledgeables" (although in time
they might). Additionally, they tend to be action focussed and are concerned about "the future" largely as it relates to their specific situation. This second set of people in the anticipatory planning network is very important because they bring a very tangible perception of their concerns about the future to the table — a perspective that likely is quite different from that of the professional futurists and related specialists. Additionally, these same local people and groups represent potential constituencies in support of IJC activities and possible new initiatives. To meaningfully engage this second set of actors, the IJC would have to identify them (via governments and existing networks), and track and report on site specific matters of interest. Reaching out, exchanging information with, and interacting with both the "professional future-oriented" and "impacted publics" parts of the network require linkage strategies and mechanisms tailored for these clients.

b. Strategies and Mechanisms

Various alternatives, which can be implemented individually or in concert, are available to the IJC in order to develop a forward looking stance. These range from the sponsorship of occasional workshops or conferences (with some interpretive and informative capacity involving a relatively small commitment of resources) to the development of a fully fledged futures research and attendant network support capacity (involving major commitments). The various action possibilities are enumerated below in an order which is in keeping with the iterative, experimental approach suggested earlier. Notes are included where pertinent to describe the actions with regard to planning and implementation, and where possible, to requisite resources. Two basic requirements are seen as imperative to effective action for all alternatives. These are:

(a) an informational capacity that would include a newsletter devoted to 'network' development and maintenance and a related editorial capacity for publication of reports, books, etc.; and

(b) a research requirement which might be met by encouragement of relevant university research through involvement of individuals and/or groups in IJC activities, or by arranging financial support.

In the following list, it should be noted that some of the suggested actions might be co-sponsored by the IJC in cooperation with other organizations, contracted out or organized unilaterally. Also, IJC staff should be encouraged to participate in selected pertinent activities sponsored by other organizations.

1. Professional Futures-Oriented Workshops

Professional futures-oriented workshops should be held to identify major technological, economic and social trends and their implications for the
IJC. Such workshops might involve 6-10 capable professionals and include some IJC Commissioners and staff. It is important that such workshops be held in an appropriate setting and be removed from the temptations of the daily business and personal interests of participants.

Planning for such workshops would include:

- careful selection and full briefing of contributors on the nature and needs of the IJC;
- commissioning of papers by selected participants 3-4 months in advance of the workshop; and
- review and synthesis of papers prior to the workshop and perhaps prior meetings of participants with staff.

Costs associated with a workshop of this nature would include approximately $2,000 each for paper preparation, an honorarium for 3-4 days plus travel and living expenses.

2. Conference on "The Future of the Great Lakes Basin"

This is visualized as a fairly large binational conference held occasionally to increase awareness of trends, both sectoral and 'holistic interpretive', affecting the Great Lakes Basin and to facilitate the sharing of information by concerned groups. Participants would include a cross section of people including politicians, government officials, researchers and representatives of concerned groups. Subject matter might range from broad subject area reviews to site-specific problems and include interpretations drawn from futures-oriented workshops (above).

3. Scenarios of the future of the IJC

The transfer of a person or persons to work with the IJC staff and committees to prepare 2 or 3 scenarios of the future of the IJC, would be useful as a means of exploring how the IJC might most effectively carry out its responsibilities. This self-inspection could also be accomplished via a small workshop of individuals knowledgeable about the IJC.

4. Open Hearings

Open hearings can serve two purposes in an anticipatory planning approach. The holding of hearings on specific local problems can serve to strengthen advocate support of citizens and communities as well as provide insights about community problems to broaden the understanding of the IJC Commissioners and staff.

The resource requirements necessary to support the foregoing activities and attendant information and editing responsibilities would include one full-time professional staff member with the following skills:

- process and group dynamic skills;
5. Possible Activities in the Longer Term

Two other activities may warrant consideration at some future date. They are described here as longer term because of the substantial resources and sophisticated capacity needed to successfully undertake them.

The first is an extension of the conference mechanism, but employing telecommunications. For example, teleconferencing could be coupled with an interactive review process of some type. Typically this mechanism would be used to deal with a relatively narrow topic, and to ensure an impartial review of suggested problem solutions by other experts.

The second longer term activity would involve the in-house development of a "futures" research/modelling capacity within the IJC. This could only be conducted with a significant commitment of resources and capabilities extant in the U.S. and Canada at present. Such a step seems at best a distant one in the development of a "futures orientation" in the IJC.

IV. RESOURCES FOR ASSISTANCE

We assume that implementation of all or any of our proposals will require the assistance of at least some persons who have already developed a futures orientation. Although such skills are not yet commonplace, there are more than enough such persons in both Canada and the United States to meet the needs of the IJC. In the start-up phases, the specialized skills needed to conduct any of the alternatives described herein should be contracted.
The future may miss
Through ignorant bliss
Through linear thought
Reductionist fraught.

We gathered this week
Solutions to seek
New ways of doing
New thoughts pursuing.

Mindboggling discussion
Verbal percussion
Several conclusions
Many delusions.

Ecologicosystematics
What do they say
The language of tomorrow
Seems of little today.

Uncertainty pending
Surprises not shock
Suggests we'd be wise
To stop and take stock.

We'd welcome the chance
The future to enhance
So carry the ball
It's up to you all.

H. F. Fletcher
APPENDICES

1. Workshop Participants
2. Terms of Reference, Societal Aspects Expert Committee
3. Membership, Societal Aspects Expert Committee
4. Terms of Reference, Science Advisory Board
5. Membership, Science Advisory Board
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TERMS OF REFERENCE,
SOCIA LETAL ASPECTS EXPERT COMMITTEE

1. Scope of Activities

The Science Advisory Board appoints three expert committees, including the Societal Aspects, to consider all matters pertaining to Great Lakes water quality, especially those relevant to the interests of the Water Quality Agreement.

The Expert Committee on Societal Aspects of Great Lakes Water Quality, encompassing the jurisdictional, political, institutional, legal, educational and other nonmaterial measures influencing the effects of man's activities on receiving waters, includes expertise representative of economics, planning, citizen/public interest, political science, human behaviour, legal aspects, resource conservation and attitude change, and regulatory activities.

2. Responsibilities

The Expert Committees shall consider the full scope of matters pertaining to Great Lakes water quality with emphasis on those relevant to the intent of the Water Quality Agreement and shall:

A. On their own initiative:

1. provide continuing independent advice and synthesis of expert opinion on new and continuing problems based on their own personal expertise and familiarity with problematic issues raised in IJC generated reports;

2. identify oversights, weaknesses, and opportunities in research activities in Canada and the United States;

3. solicit additional expertise in specific areas as necessary, but with approval of the SAB Co-Chairmen if this involves expense to the Board;

4. function as a committee not less than twice a year;

5. assist the Science Advisory Board in advising the IJC by recommending specific activities, such as Task Forces and workshops, their nature, scope and organization.

B. At the request of the Science Advisory Board through its Co-Chairmen:

1. provide advice and synthesis of expert opinion on specific issues;

2. comment on the charges and recommend appointments to task forces or other special purpose bodies under consideration by the Science Advisory Board.
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1. As used herein, "research" includes development, demonstration and research activities, but does not include regular monitoring and surveillance of water quality.

2. The functions and responsibilities of the Science Advisory Board relating to research activities in Canada and the United States concerning the quality of the waters of the Great Lakes System shall be as follows:

(a) to review at regular intervals these research activities in order to:

(i) examine the adequacy and reliability of research results, their dissemination, and the effectiveness of their application;
(ii) identify deficiencies in their scope, and inadequacies in their funding and in completing schedules;
(iii) identify additional research projects that should be undertaken;
(iv) identify specific research programs for which international cooperation will be productive;

(b) to provide advice and consolidations of scientific opinion to the Commission and its boards on particular problems referred to the Advisory Board by the Commission or its boards;

(c) to facilitate both formal and informal international cooperation and coordination of research; and

(d) to make recommendations to the Commission.

3. The Science Advisory Board on its own authority may seek analyses, assessments and recommendations from other professional, academic, governmental or intergovernmental groups about the problems of Great Lakes water quality research and related research activities.

4. The IJC shall determine the size and composition of the Science Advisory Board. The Commission should appoint members to the Advisory Board from appropriate Federal, State and Provincial Government agencies and from other agencies, organizations and institutions involved in Great Lakes research activities. In making these appointments the Commission should consider individuals from the academic, scientific and industrial communities and the general public. Membership should be based primarily upon an individual's qualifications and potential contribution to the work of the Advisory Board.

5. The Science Advisory Board should work at all times in close cooperation with the Great Lakes Water Quality Board.
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