The **IJC** and the 21st Century

International Joint Commission
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Response of the IJC to a Request by the
Governments of Canada and the United States
for Proposals on How To Best
Assist Them to Meet the Environmental
Challenges of the 21st Century.

"In recent years, in region after region, we have found that our diplomacy has been influenced by success or failure in managing the environment. This shouldn't surprise us. After all, competition for scarce resources is an ancient source of human conflict. In our day, it can still elevate tensions among countries or cause ruinous violence within them.... By definition the global environment deeply affects our own people."

Madeleine Albright
Press Remarks on Earth Day
April 22, 1997

"Environmental degradation and resource scarcity are the underside of globalization. They are threats to human security that respect no boundaries. Faced with this kind of threat, the old approaches will not be sufficient. And finding new approaches will not be easy or non-controversial. But we have substantial assets and skills to bring to bear on the problems.... And we have the strongest reasons possible to get our answers right: the future of our children, and of our children's children."

Lloyd Axworthy
Address on Sustainable
Development
April 17, 1997

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Executive Summary

The International Joint Commission presents this report in response to a charge received from the Canadian and United States governments on April 16, 1997 (attached as Annex A), which asked the Commission to provide proposals on how it might best assist the parties to meet the environmental challenges of the 21st century.

Canada and the United States enjoy the closest and most cordial relations of any two countries in the world. They have the same basic values but remain very different countries in some important respects. The hallmark of the relationship is asymmetry — asymmetry of power, of economic development, of population and of resources. These differences can enrich the relationship, but they can also contribute to the potential for conflict.

The Commission's fundamental role of preventing and resolving disputes has contributed to a successful transboundary environmental relationship throughout most of the 20th century. The 1909 Boundary Waters Treaty established a framework for the Commission's role. Within this framework, the IJC has developed a process that has provided the basis for much of the success of the bilateral environmental relationship. This process is characterized by six main elements: consultation and consensus building; providing a forum for public participation; engagement of local governments; joint fact-finding; objectivity and independence; and flexibility.

After consulting broadly in both countries, the Commission has identified a number of forces of change as well as specific transboundary challenges that could trouble the transboundary area in the 21st century. Among the key forces of change that may affect the transboundary relationship are the following:

- Population growth and urbanization;
- Climate change;
- Economic expansion, energy demands, and waste generation;
- Technological development; and
- Environmental awareness.

These fundamental forces could have significant social and environmental effects in the two nations and along their common border. As a result of these and other forces, the U.S. and Canada may also have to deal with the following transboundary environmental challenges in the 21st century:

- Water supply and demand;
- Air pollution;
- Toxic chemical use and release;
- Habitat loss and biological diversity;
- Exotic species;
- Waste management; and
- Infrastructure needs.

Also of note are information challenges which could affect the transboundary relationship in the 21st century. These are increasing demands for public participation, the need for social capacity, and the scientific basis needed for decision-making.

Furthermore, the Commission recognizes that Canada and the U.S. will face a variety of institutional challenges in the 21st century, including:

- The downsizing of governments and loss of environmental monitoring capacity;
- The fragmentation of governmental jurisdictions; and
- The roles of various international bodies.

In a time of limited governmental resources, agencies and institutions must concentrate on their core mission and capitalize on their historic strengths and potential. They must also coordinate with other institutions to prevent duplication of effort. In developing its response to the charge, the IJC has carefully reviewed its treaty responsibilities and the basis of its environmental achievements and has consulted with other transboundary institutions.

No other institution has the IJC's broad mandate or its successful track record in preventing and resolving transboundary disputes around environmental and water-resource issues, and no other institution provides the opportunities for officials from all levels of government, scientists, stakeholders and interested citizens to work together on these issues. The Commission's flexibility and historic emphasis on consultation, joint fact-finding, objectivity and independence, and its ability to engage local governments and serve as a public forum are important assets to the parties in meeting the challenges of the 21st century.

The Commission makes the following proposals to the Parties:

- **Proposal One:** A reference from the parties to authorize the Commission to establish ecosystem-based international watershed boards from coast to coast to prevent and resolve transboundary environmental disputes. These boards would be available for monitoring, alerting, studying, advising, facilitating and reporting on a range of transboundary environmental and water-related issues. They could also serve an ombudsman-like role by receiving, considering and investigating comments and complaints from the public about transboundary watershed environmental issues. Anticipating and responding to the growing public demand for decision-making that begins in communities and builds upward, these watershed boards would also assure coordination with the increasing number of local and regional transboundary relationships and institutions. The Commission would establish the boards at appropriate times, on a staged basis, following consultations with relevant federal, state, provincial, and other authorities as well as bilateral inter-governmental organizations, and after taking steps to identify relevant interests and issues in the watershed.

- **Proposal Two:** The initiation of broad studies of:

(i) transboundary water quantity and quality,

(ii) air quality, and

(iii) the data required to keep the foregoing matters under review.

These studies are designed to build the capacity of the governments, the IJC and its proposed international watershed boards to address the issues in question.

- **Proposal Three:** The review of existing IJC orders governing levels and flows of transboundary water resources to determine whether amendments are required in the light of changed circumstances in the watersheds concerned.

- **Proposal Four:** A reference from the parties asking the Commission to examine and make recommendations with respect to the decommissioning of nuclear reactors, interactions of toxic chemicals and radiation in the ecosystem, and the extent to which using western low-sulfur coals in electric power generation could increase the dispersion of nuclear materials.

- **Proposal Five:** Biennial reports on the state of the transboundary environment, based on advice received from Commission institutions, through public consultation, including public meetings along the border, and from other sources, with the report to be submitted in person by Commissioners to the appropriate cabinet-level officials of the two countries. It will also be presented or otherwise made available to provincial and state governments and to the public in an appropriate form.

The Parties "being equally desirous to prevent disputes regarding the use of boundary waters and to settle all questions which are now pending between the United States and the Dominion of Canada involving the rights, obligations, or interests of either in relation to the other or to the inhabitants of the other, along their common frontier, and to make provision for the adjustment and settlement of all such questions as may hereafter arise, have resolved to conclude a treaty in furtherance of these ends..."

– Boundary Waters Treaty of 1909

Introduction

It is a tribute to the wisdom and foresight of the framers of the Boundary Waters Treaty that it may be even more critical to the U.S. and Canada in its second century than it was in its first.

On April 16, 1997 the Canadian and U.S. governments asked the International Joint Commission to "examine its important mission in the light of relevant agreements and references, and to provide to the parties, within the next six months, proposals on how the Commission might best assist the parties to meet the environmental challenges of the 21st century within the framework of their treaty responsibilities." (See Annex A for the full text of this request.)

In responding to the charge from the governments, the Commission has reviewed its origins in the 1909 treaty, and the core mission outlined for the IJC in that document. The Commission has reviewed the work which it has done under the treaty and subsequent agreements, including the Great Lakes Water Quality Agreement and the U.S.-Canada Air Quality Agreement. It has, in particular, examined the potential of the Commission to serve the two governments in the coming century.

The Commission notes the importance of increasing coordination with national and international governmental bodies at all levels, whose work in some way influences or is influenced by the boundary area. Finally, as citizens in both Canada and the United States seek opportunities to petition and participate in the decision-making processes of government, the Commission finds that it must establish new mechanisms to solicit the advice and strengthen the participation of the public at the community and local levels.

According to many government officials, academic experts, scientists and non-governmental organizations the Commission has consulted, the 21st century will bring potentially disruptive change in the environmental conditions of the U.S.-Canada boundary area. Old problems will intensify and new problems will appear. The Commission can best assist the parties in meeting the new transboundary challenges that will inevitably arise by concentrating on its core mission under the treaty: preventing and resolving disputes and addressing issues of common concern along the border.

In preparing its response to the charge from the governments, the Commission has consulted with federal, provincial and state officials. It has obtained the views of individual scientists, academics and members of non-governmental organizations. Furthermore, it has held meetings with and commissioned papers from experts in both countries on the environment and the work of the International Joint Commission. (A list of those consulted is given in Annex B.)

The proposals are based in part on ideas and suggestions raised by former Commissioners and outside commentators, as well as suggestions from the many persons who have been consulted in responding to the charge from the parties. The proposals build on the Commission's present responsibilities, which have evolved from their early focus on water levels and flows to a growing emphasis on binational environmental protection. They represent a logical next step in that evolution and another manifestation of the flexibility so wisely incorporated in the Commission's mandate from the beginning. They also build on the Commission's demonstrated ability to assist the parties by promoting consensus at federal, provincial, state, local and community levels so as to achieve the essential objective of the Boundary Waters Treaty: the prevention and resolution of disputes between Canada and the United States in the common interest of both countries.

The response offers specific proposals outlining how the Commission may best assist the parties in meeting future environmental challenges. The proposals require no change to any relevant agreement and they fall squarely within the framework of the parties' treaty responsibilities. They are directed to adapting and extending the Commission's structures and processes with a view to making this unique binational institution of still greater relevance to the two governments in the environmental field.

It is important to view this response in the context of the Commission's ongoing work. The Commission particularly notes its role under and commitment to the Great Lakes Water Quality Agreement, and will continue to give vigorous oversight to its full implementation.

SECTION ONE:

National Differences and Binational Successes

A. National Differences

Canada and the United States enjoy the closest and most cordial relations of any two countries in the world. They have the same basic values but remain very different countries in some important respects. These differences can enrich the relationship, but they can also contribute to the potential for conflict on occasion.

The hallmark of the bilateral relationship is *asymmetry* — of power, of economic development and of population size and distribution. While relations between the two countries are generally harmonious, this asymmetry can lead to differences and misunderstandings on environmental and other matters. The vast length and variety of their shared boundaries adds a further complicating factor. When boundary irritants do arise, they often become national issues in Canada, while being regarded as regional problems in the U.S. Their resolution is all the more difficult for that reason.

Asymmetry of population and economic development in particular boundary areas can, for example, contribute to conflict over water supplies and water pollution. So can competing interests on transboundary rivers and streams, where upstream economic and urban development may have negative implications for downstream fisheries and agricultural and recreational interests. Of course, even when adjacent boundary regions have a similar level of population distribution and development, as in parts of the Great Plains/Prairie region, competing water demands can still be sources of dispute.

The two countries' different political systems — Canada with its parliamentary system and the U.S. with its separation of executive and legislative branches of government — can also create difficulties in the relationship. These differences are often poorly understood and can lead to frustration in the efforts of one country to have its concerns addressed by the other.

Another complicating factor is the two countries' different federal systems. While both countries are undergoing a process of greater devolution of responsibilities to state or provincial governments, this is not necessarily taking place in the same way in Canada and the United States. Environmental responsibilities that may be dealt with at the federal level in one country may be a state or provincial matter in the other country. This lack of symmetry adds to the complexity of coordinating programs.

Differences in constitutional systems, and their potential for sparking misunderstandings, are not confined to the distribution of powers. For example, the U.S. system provides a protection for property rights not found in the Canadian system, and this factor can make it more difficult to deal with certain environmental and resource issues along the boundary.

Despite many similarities, there are also some substantial differences in the legal and regulatory regimes of the two countries with respect to environmental matters. These can have a bearing on perceptions and on efforts to resolve disputes. In the field of environmental protection, for example, there has traditionally been a greater reliance on binding regulations in the U.S. and on guidelines in Canada. Similarly, there has generally been greater recourse to litigation in the U.S. than in Canada.

Although both countries are highly industrialized, differences in climate, resource endowment, manufacturing sectors, and domestic market size have made the Canadian economy more dependent, historically, than that of the U.S. on exports of raw materials (such as metal ores and wood), energy resources, grains and fish as distinct from the manufacture and export of finished products. This difference has been at the heart of a wide range of trade-related irritants and disagreements over resource management.

For reasons of geography, climate, population, and the location of industries, the two countries in some cases differ in their reliance on navigation and other transportation systems along the border. An example is Canada's greater dependence on the St. Lawrence Seaway for the movement of cargo to and from eastern ports and inland centers. In such instances, the two countries may attach different priorities to the use of waterways along the boundary for shipping.

These and other inherent contributors to conflict between the two countries underlie — and can sometimes undermine — their mutual efforts to resolve issues on their transboundary environmental agendas.

The potential for conflict arising from the environmental challenges confronting Canada and the United States in the next century is for the most part readily apparent, although it is impossible to rule out surprises. For example, the two countries could face widespread, unanticipated hardships triggered by swift global change or environmental disasters. These could include population migrations and rapidly changing climatic conditions. While some conflicts may remain relatively contained and localized, others could become serious irritants. In large part, potential environmental conflicts will stem from the actual or perceived need to redistribute the economic and social benefits of finite and unevenly distributed resources along the boundary, and from differing resource management priorities on the part of governments and private interests on either side of the boundary.

B. The IJC's Role in a Successful Transboundary Environmental Relationship

From the beginning, the Commission's fundamental role has been to prevent and resolve transboundary environmental and water-resource disputes between the U.S. and Canada through processes that seek the common interest of both countries. What has developed over time is a kind of institution that does not exist elsewhere. This institution not only offers the two countries a flexible set of mechanisms to help them manage their relationship in the boundary region, but also provides them with the assurance that it will reflect the shared system of principles and values recognized in the Boundary Waters Treaty.

The Commission has two primary responsibilities under the treaty. First, the IJC acts as a quasi-judicial body to consider applications for approval to build and operate certain works in boundary waters and in rivers that flow across the boundary.

Secondly, at the request of the parties, the Commission examines and provides non-binding recommendations on transboundary issues (the so-called "reference" function).

In its quasi-judicial role, the Commission is responsible for approving projects that affect boundary waters and, in some cases, transboundary rivers, unless the project is authorized by a special agreement between the two countries. The Commission's independent, quasi-judicial decisions must be based on the rules and principles set forth in the treaty. Because the principles are expressed in general terms, the Commission can take account of new values and activities in the management of transboundary waterways, such as the environment and recreational boating, which were not viewed in the same way in 1909. The Commission retains jurisdiction over projects it has approved, so that it can oversee their operation and adapt the terms of its approval to changing circumstances.

Under its reference function and at the request of governments, the Commission investigates and reports on issues of concern along the boundary. These reports are advisory in nature and not binding on the governments. There are few restrictions on the issues or responsibilities that can be given to the IJC in this way. Thus, the Commission has undertaken such diverse roles as investigating and reporting on transboundary water and air pollution or recommending principles for developing resources, all with a view to preventing and resolving transboundary conflicts.

The Commission also has critical duties under the Great Lakes Water Quality Agreement. The parties have made the Commission responsible for the monitoring of progress and coordination of activities associated with the Great Lakes Water Quality Agreement. The agreement authorized the Commission to establish permanent binational advisory boards and a binational regional office in Windsor, Ontario, to support the work of assuring cleanup of the Great Lakes. The Commission's recommendations, including the establishment of areas of concern and remedial action plans, a more vigorous effort to combat toxic contamination, the establishment of a "zero discharge" demonstration project in Lake Superior, and perhaps most important of all, the implementation of an ecosystem approach to stewardship of the resource, have contributed much to the joint mission of Great Lakes restoration.

The Commission's inherent responsibility for preventing and resolving transboundary disputes requires it to alert governments to situations along the border which have the potential for transboundary conflict so that early action can be taken to avoid or resolve such conflict. This is one of the Commission's most valuable functions. It is also an area in which there is opportunity for a more active Commission role.

The Commission is a binational rather than a bilateral institution. There is parity between the U.S. and Canada within the Commission and there is equality between the two countries in the Boundary Waters Treaty. Commissioners do not act as members of national delegations seeking national advantage under instructions from their governments. Instead, they are members of a single body seeking solutions to common problems in the common interest.

The Boundary Waters Treaty established a framework for the Commission's role. Within this framework, the IJC has developed a process that has provided the basis for much of the success of the bilateral environmental relationship. This process is characterized by six main elements.

Consultation and Consensus Building. The treaty and the Commission's Rules of Procedure call for the concurrence of at least four Commissioners to ensure that decisions can be reached only if at least one Commissioner from each country agrees. The Commission and its network of advisory and regulatory boards, in any case, strive for consensus as a means of reflecting the common interest. In practice, most Commission decisions are taken in this way and the Commission requires some key boards to refer matters to the Commission for decision if board members are unable to achieve consensus.

Providing a Forum for Public Participation. Article XII of the Boundary Waters Treaty requires the Commission, in any proceeding, inquiry or matter within its jurisdiction, to assure that "all parties interested therein shall be given convenient opportunity to be heard." In practice, the Commission has always emphasized the importance of public participation and advice.

The Commission provides a forum for the public to participate with governments in developing means of addressing environmental issues. Government officials can meet on neutral ground to discuss and coordinate policies and programs. In much the same way, opportunities are created for exchanges of views, knowledge and information among all those interested in an issue, which again furthers the development of understanding and consensus.

Engagement of Local Governments. The Commission invites and facilitates the engagement of state, provincial and municipal governments and other authorities in transboundary environmental issues. At the same time, the IJC brings binational and national resources and considerations to bear on the resolution of local and regional matters.

Joint Fact-finding. This is a cornerstone of Commission practice. The Commission recognizes that binational joint fact-finding builds an important and often essential foundation for the achievement of consensus on appropriate actions. Joint fact-finding normally takes place within the Commission's advisory and regulatory boards, whose members are drawn equally from both countries and who are recognized as having the range of expertise required to address an issue.

Objectivity and Independence. The authors of the Boundary Waters Treaty built into the Commission an expectation that its members would seek to find solutions in the common interest of the two nations. To that end, Commissioners "make and subscribe a solemn declaration in writing" that they "will faithfully and impartially perform the duties imposed" under the treaty. Similarly, members of IJC boards are expected to serve the Commission in their personal and professional capacities. This allows board members to explore all options, which helps promote the development of novel solutions and consensus.

Flexibility. One of the most important features of the Commission's work has been the flexibility, inherent in its mandate and process, to be able to adapt to the circumstances of particular transboundary issues or conditions. The terms of the Boundary Waters Treaty have allowed the Commission, in practice, to develop innovative mechanisms for soliciting public participation, for problem-solving, and for working with the governments themselves.

The Commission finds that all six of these elements of the Commission's approach have become a fundamental part of the relationship between the parties in boundary areas. They have kept difficult issues from the diplomatic agenda of the governments. They have helped to ensure the continued health of the environmental

relationship. Looking ahead to the unparalleled challenges of the 21st century, the Commission believes these practices will increase in importance as the basis for a successful transboundary relationship.

C. IJC Achievements in Fostering Cooperative Transboundary Environmental Management

Throughout its 86 years of operation, there have been many instances in which the IJC has helped the two countries to avoid or resolve environmental conflicts or to effectively address common environmental concerns along the boundary. Since 1912, the Commission has dealt with well over 100 cases, divided more or less evenly between "applications" for approval of specific projects and "references" from the two governments with respect to air quality and a wide variety of complex water-related issues. In many of these matters, the IJC's work has freed the two governments from having to deal continually with problems that might otherwise have troubled their diplomatic relations. In other cases, the IJC has provided an early warning in respect of issues that might have become sources of environmental conflict. The following examples constitute a representative account of occasions in which the contribution of the IJC has been evident. They also indicate ways in which the Commission can continue to help the two countries avert or resolve conflicts or jointly manage common concerns.

Trail Smelter

The IJC played a key role in the Trail Smelter air pollution controversy in the 1920s. At the request of the two governments, following expressions of concern by the U.S., the Commission recommended remedial measures to reduce emissions from the smelter at Trail, British Columbia, and proposed a formula for the payment of compensation to cover damages suffered in the United States. By offering binational scientific and technical advice, and by acting as an impartial referee, the IJC helped to avert a serious conflict and to establish the precedent-setting principle in international law that activities in one country must not be allowed to cause environmental damage in another.

St. Croix River

IJC activities in respect of the St. Croix River provide an early and continuing example of the Commission's ability not only to prevent disputes but to help the two governments address problems of common concern. Its orders of approval for dams set the terms on which these works could be built and have made it unnecessary for the governments to negotiate these sometimes difficult issues. The Commission has also gone on to establish a binational board to oversee the operation of these structures and, at the request of governments, an advisory board on pollution control to monitor and report on the fulfillment of water quality objectives. At present, both boards are assessing the need to modify the Commission's St. Croix Orders of Approval, in response to new concerns raised by stakeholders.

St. Mary and Milk Rivers

Disputes involving Montana, Alberta and Saskatchewan over sharing the waters of the St. Mary and Milk Rivers were among the factors that led to the conclusion of the 1909 Boundary Waters Treaty. The treaty provided for equal apportionment of these waters, but it was left to the Commission to decide how this would be carried out in practice. Following lengthy and sometimes difficult debate, the Commission issued an order in 1921 which put in place an apportionment regime

that has lasted for over seventy-five years and that continues to be implemented effectively under IJC direction.

Columbia River

Conflicting views on the use and development of the Columbia River provoked much controversy in the 1940s. In 1944, the two governments asked the IJC to investigate the Columbia's potential for greater use and development. In 1959, they asked the Commission to recommend principles for the apportionment of downstream benefits, relating particularly to power generation and flood control. The development of binationally-agreed scientific and technical information, coupled with recommended principles, substantially aided the two governments in the negotiation of the 1961 Columbia River Development Treaty. Differences arising under that treaty may be referred to the Commission for resolution.

Garrison Diversion

In the Garrison Diversion case, Canada opposed a U.S. project to divert waters from the Missouri watershed for irrigation purposes across the divide into the Hudson Bay drainage basin. Canadian concerns related to the project's possible effects on the Souris and Red Rivers, including the potential for the transfer of foreign fish species, parasites and diseases. By developing a common view of the facts and by collegially assessing the risk of potential damage, the Commission produced a binationally credible study of the proposal and a basis for meeting commitments under the Boundary Waters Treaty. In its 1977 report, pursuant to a reference from the two governments, the Commission recommended against building those portions of the project that could affect water flowing into Canada. It also recommended that further construction not be undertaken until the risk of biota transfer was eliminated or until the two countries agreed that this was no longer a matter of concern.

Skagit River

The Skagit River dispute involved a proposal by the City of Seattle to increase the height of the Ross dam, which would have flooded more than 5,000 acres in British Columbia. This sparked widespread public concern about environmental effects in British Columbia. When the province and the city were unable to negotiate a settlement, Commissioners intervened and assisted the two sides to develop a treaty that put an end to a major controversy.

Flathead River

In response to U.S. concerns, the Commission was called upon to investigate and report on the implications for water quality and quantity in the Flathead River arising out of the proposed development of a coal mine on Cabin Creek in British Columbia. Following extensive binational studies and public consultations, the Commission recommended that the development of the mine not be approved until it could be demonstrated that potential transboundary effects had been adequately determined and would constitute a level of risk acceptable to both sides, and until it could be shown that the potential impacts on the sport fishery would not occur or would be fully mitigated. The Commission's report defused a growing conflict and proposed a sustainable development approach for the upper Flathead basin.

Continuing Activities of IJC Control and Pollution Boards

The value of the IJC system cannot be judged solely by its most visible and publicized achievements. The continuing activities of its binational control and

pollution boards along the boundary have, often for many decades, quietly but effectively kept a close, expert and non-adversarial watch on existing and potential environmental questions that might otherwise have become the basis for minor or major transboundary disputes. The IJC's contributions have been particularly critical in promoting an ecosystem approach to one of the world's most sensitive and critical ecosystems, the Great Lakes.

Great Lakes Water Quality

Addressing common concerns about pollution in the Great Lakes and their connecting channels, the IJC made a central contribution to development and implementation of the principles, objectives and programs set out in the Great Lakes Water Quality Agreement. Its independent, biennial reporting on Great Lakes water quality and its emphasis on direct access for and contributions from citizens of both nations have not only helped shape policy recommendations, but also enhanced the credibility of government efforts to restore the Great Lakes ecosystem. The Commission has helped to transform a vast potential source of conflict into a model of binational environmental cooperation.

Air Quality

Since the mid-1960's the IJC has, at the request of the two governments, undertaken various studies and activities to help the governments understand the extent and nature of air pollution along the boundary. In 1972, the Commission confirmed the existence and quantified the extent of the international air pollution problem in the Lake St. Clair-Detroit-Windsor area. From 1966 on, IJC-appointed binational advisory boards have also kept the Commission informed of air pollution problems and related questions in other regions along the boundary. The Commission's International Air Quality Advisory Board has drawn attention to and reported on a range of transboundary air quality issues, including ozone, fine particulates, Canadian and U.S. air monitoring activities, atmospheric deposition of toxic chemicals, government activities in developing emission inventories, climate change, and harmonization of emission release standards. As a result of the Board's work, several submissions have been made to the governments to alert them to emerging transboundary air quality trends and issues.

As required by the 1991 Canada-United States Air Quality Agreement, the Commission has sought and reported on public comments made on the biennial progress reports released by the governments' bilateral Air Quality Committee. The Parties' recent five-year review of the Air Quality Agreement states with respect to the responsibilities of the IJC:

> "Canada would like to see the IJC play a more prominent role, including the conducting of five-year reviews. The United States is satisfied with the current role being played by the IJC in synthesizing and providing public comments."

This brief overview of IJC achievements shows that the Commission has often been able to find fair and impartial approaches to the resolution of environmental and resource-related issues along the boundary. The Commission has been an indispensable and irreplaceable force in the effort to identify and implement solutions that serve the common environmental and social interests of Canada and the United States. This role will be essential, on an even broader scale, to ensure productive, cooperative responses to the environmental challenges that will face the two countries in the 21st century.

Environmental Challenges of the 21st Century

After consulting broadly in both countries, the Commission has identified a number of forces of change as well as specific transboundary challenges that could trouble the boundary area and its inhabitants, and place a strain on its environmental, economic, and social resources. For the purposes of this report, it is useful to distinguish between forces of change and transboundary environmental challenges, although the distinction may, in some cases, be seen as somewhat arbitrary.

A. Forces of Change

Population Growth and Urbanization

The United Nations has projected that the global population will increase from approximately 5.6 billion today to between 7.9 and 12 billion by the year 2050.[1] The U.N. also foresees even faster growth in urban areas, with a rapid expansion in the number of "megacities" with populations of 10 to 20 million or more.

Population growth will not exempt the boundary area. Canada's population of 30 million is expected to grow to 35 to 36 million by the year 2025, and 80 percent of Canadians will continue to live in boundary water basins and coastal zones. The U.S. population is expected to grow from 263 million to 335 million by 2025, and the population of the northernmost tier of states and Alaska will grow from 72.3 million to 81.5 million.[2]

Population pressures of this magnitude will tax the natural and institutional resources of the parties. Growing demands on resources, including water, timber, hydrocarbons, and food will require the anticipation and resolution of conflicts over competing uses and the prevention of harm to people and the environment.

Economic Expansion, Energy Demand, and Waste Generation

The U.S. and Canadian economies are among the largest of any two neighboring countries in the world. With this economic strength come immense demands on resources which are bound to affect the boundary area significantly. Energy resources are in particular demand. North Americans are among the world's largest consumers of materials and energy per capita — and the U.S. and Canada emit far more greenhouse gases per capita than most other countries. This is because 84 per cent of the two nations' energy consumption results from the burning of fossil fuels. The U.S. and Canada are responsible for more than 20 per cent of global carbon dioxide emissions. Without major policy changes, Canada's greenhouse gas emissions are projected to remain eight per cent above the 1990 level by 2000 and to be 36 per cent higher by the year 2020. U.S. emissions of greenhouse gases are expected to increase 26 per cent over current levels by the year 2015.

Fossil fuel combustion in Canada and the U.S. also produces a heavy volume of mercury, sulfur dioxide, nitrogen oxides and hydrocarbons. These are transported across the U.S.-Canada boundary.

[1] United Nations Environmental Programme, "Global Environmental Outlook," Oxford University Press, 1997.
[2] U.S. Bureau of the Census, Resident Population Projections of the United States, 1996-2050, March 1996.

The economies of the two countries continue to generate considerable quantities of both solid and hazardous waste despite an emphasis in the last several decades on their control and reduction. Figures supplied by the U.S. Environmental Protection Agency's Toxic Release Inventory show that on-site emissions of listed toxic substances declined 4.9 per cent between 1994 and 1995, but total production-related waste, including listed substances shipped off-site to cement kilns and incinerators, increased 3 per cent to 19.88 billion pounds.[3]

Individuals also generate significant amounts of waste. Per capita solid waste generation in the U.S. has increased over 60 per cent since 1960 to over 1500 pounds per year, and the 1993 total of 197 million tons is expected to reach 253 million by the year 2010.[4]

These sobering figures, and the experience of the last two decades, offer conflicting lessons. Increases in energy demand and waste have resisted long-term policy solutions. Yet in some cases — as in the case of the petroleum price increases of the 1970s — the economies of the two nations have responded quickly and with efficiency. The task of the 21st century will be to put efficiency to work before emergencies require it.

Climate Change

A result of energy consumption practices and policies, climate change may also sharpen and intensify competition for transboundary resources in the 21st century. This is an issue that reaches beyond the boundary area and the U.S. and Canada. It is a global issue that will have to be addressed by developed countries and those developing countries that are industrializing rapidly.

Although some uncertainty persists, the balance of evidence suggests that human-induced global climate change is underway. The U.N. Intergovernmental Panel on Climate Change (IPCC) concluded in 1995 that global mean surface air temperatures have increased between 0.5 and 1.1 degrees Fahrenheit in the last 100 years, and the panel estimated a further rise of 1.8 to 6.3 degrees during the next century.[5] The IPCC found that sea level has risen an average 4-10 inches during the past 100 years and could rise another 6 inches to 3 feet by the year 2100. After pointing out limitations on the ability to quantify human influence on global climate, the IPCC concluded, "Nevertheless, the balance of evidence suggests that there is a discernible human influence on global climate."

Studies of climate change suggest that there may be dramatic increases in demand for irrigation water in the Great Plains of the U.S. Some climate models predict lower summer and autumn flows in the many transboundary rivers and streams crossing the border between the Great Lakes and the Rockies, with the greatest drying occurring from latitude 45 to 50 degrees north, near the border. This is likely to set off increasing competition for available water and raise serious issues about the economic, social and ecological effects of irrigated agriculture.

Paradoxically, climate change is also expected to increase the frequency of flooding, as long dry periods are interrupted by intense bursts of precipitation. The IPCC has forecast that spring and winter flood events would likely be greater on average, and occur earlier in the year along the border in the Great Plains. Increased

[3] Toxic Release Inventory Data, U.S. Environmental Protection Agency, 1997.
[4] "Characterization of Municipal Solid Waste in the United States: 1996 Update," U.S. Environmental Protection Agency, 1996.
[5] Intergovernmental Panel on Climate Change - Second Assessment Report, Vol. I, II, and III, Cambridge University, 1995.

frequency of high intensity rains in small watersheds will increase soil erosion and sediment transport, and frequently exceed design capacities of culverts and of urban and rural drainage facilities.

Climate change could also increase flooding in coastal regions. Higher sea levels could cause direct flooding and also exacerbate flooding from river systems. Rivers on both the east and west coasts could be affected.

Warming of lakes near the border, which has already been documented, suggests reduced flow and a gradual buildup of some toxic substances and sedimentation, with potentially significant consequences for some transboundary lakes and river systems. Climate change could exacerbate such problems as transport of ozone and toxic pollutants, although these effects have not been studied extensively.

In a 1996 analysis of the report of the U.N. Intergovernmental Panel on Climate Change, Environment Canada detailed potential impacts of a likely climate change scenario. These included increased heat stress and more prolonged and intense smog episodes in large southern urban areas, increased forest fires, increased agricultural production on the Prairies as well as more frequent and serious drought, and a lowering of Great Lakes water levels with adverse impacts on shipping and hydro-power. The melting of large areas of permafrost, reaching across the border to Alaska, could disrupt landscapes and such infrastructures as buildings, pipelines and roads, while releasing methane and gas hydrates from the permafrost. Environment Canada also noted indirect effects such as pressures to accept environmental refugees and conflicts over scarce resources in developing regions which could be produced by increases in sea levels, reduced agricultural production in tropical and sub-tropical regions, reduced water supplies and increases in the spread of vector-borne tropical diseases.

Environmental Awareness

The revolution in public awareness of environmental challenges that dawned in the 1960s and 1970s has been coupled with a growing public demand for the right to know about environmental conditions and the right to participate in environmental decisions. The trend toward direct participation in the processes of government has had significant consequences for the environment. U.S. and Canadian laws that require industries to report toxic material releases have led to public pressures that have often resulted in reduced emissions.

While public attention to environmental issues in the two nations has fluctuated periodically in the last several decades, there has been a clear trend toward greater concern. The Commission has observed this in the increased attendance and participation at its biennial meetings to monitor progress under the Great Lakes Water Quality Agreement. Citizens of the two countries are no longer content to entrust stewardship of the transboundary environment to governments; they insist on public reporting and accountability.

There is nothing to suggest that the growing public voice on environmental issues will suddenly abate in the 21st century. In fact, the devolution of governmental responsibilities to state, provincial and local levels on both sides of the boundary may fuel demands from the public to know about, and to participate in, environmental decision-making.

B. Transboundary Environmental Challenges

While it is difficult, of course, to foresee all of the environmental challenges that will affect the parties in the next century, it appears likely that Canada and the U.S. will have to deal with the following issues, among others.

Water Quality, Supply and Demand

Transboundary water resources will be the subject of ever-increasing concern and demand in the 21st century.

Expanding populations in the boundary area will require more water to serve domestic, commercial, recreational and manufacturing needs. The Commission has already begun to review its existing orders of approval to evaluate the need for adjustments to reflect population growth and other changing circumstances. In 1981, a Commission study board predicted that consumptive uses of Great Lakes water would increase between 326 per cent and 755 per cent from 1975 levels by the year 2035, reaching as much as 37,000 cubic feet per second by the latter year.[6] Increasing demand is already beginning to manifest itself. In recent years there have been proposals from several municipalities in the Great Lakes basin to divert water out of the basin to serve growth. There is every reason to expect further proposals of this kind in the coming decades. Meanwhile, conflicts over withdrawals from transboundary aquifers could increase if planning and conservation measures are not implemented.

Compounding the effect of increasing populations, climate change will boost potential water demand and use conflicts both in the boundary area and far beyond. The possibility of significant drought in the U.S. Great Plains and Southwest during the first half of the century cannot be dismissed, and could result in proposals to transfer water to these areas from other regions. Any fall in the levels of boundary waters in response to climate change could provoke conflict over the allocation of such waters in the region concerned.

The quality of transboundary water resources determines their suitability for many if not most uses. Transboundary surface waters have been polluted by direct discharges, runoff and deposition from the air. Aquifers have not escaped contamination. Diversions and climate change can exacerbate the problem. Important binational efforts are being made in some areas, such as the Great Lakes, to address this issue, which will remain a serious challenge in the 21st century.

Air Pollution

Although the environmental laws and policies of both countries have substantially improved air quality during the last three decades, significant problems persist and could worsen in the next century.

Particulate pollution remains a public health concern. Acting on the finding that up to 45,000 premature deaths each year in the U.S. are attributable to fine particles, the U.S. EPA this year proposed its first protective standards for these materials. Enforcement of the standard, however, is not expected to take place until the year 2004 at the earliest. Transboundary particulate pollution that affects localities within the Great Lakes basin and the eastern border region will have to be addressed.

"Great Lakes Diversions and Consumptive Uses," Report to the International Joint Commission, International Great Lakes Diversions and Consumptive Uses Study Board, September 1981.

A more widespread pollutant is ozone, formed by the interaction of volatile organic compounds and nitrogen oxide with sunlight. About half of Southern Ontario's ozone in high concentration episodes comes from the U.S., and a significant portion of New Hampshire and Vermont's problem comes from Canada. Other areas of transboundary ozone transport include the Vancouver-Seattle region and the region from New England to Southwestern New Brunswick and Nova Scotia.[7]

Controls in both countries on automobile exhaust, industrial use of volatile organic compounds, and nitrogen oxide emissions have helped reduce ozone excursions below standards set in the 1970s. New research, however, supports the hypothesis that ozone poses health risks, especially to vulnerable subpopulations, at levels previously thought acceptable. A new, reduced ozone standard proposed this year by the U.S. EPA responds to this research. As with the particulate standard, enforcement in the U.S. will wait until early in the next decade. Continuing episodes of excessive ozone, combined with increased public awareness of the health risks of ozone exposure, will pose significant challenges to the parties. Because climate change may increase episodes of high summertime temperatures in the border area, it raises the probability of further ozone standard exceedances.

Acid deposition, whose precursors are sulfur dioxide and nitrogen oxides, has been vigorously addressed, but the problem is not solved. Sulfur dioxide emission reductions of 54 per cent were achieved in Eastern Canada between 1980 and 1995, and U.S. utility emissions of SO_2 declined by a similar amount. Nitrogen oxide emissions, however, increased about 10 per cent between the 1980s and the 1990s and only 10 per cent of lakes in Quebec and the Atlantic Provinces showed reduced acidity by 1994.[8]

Toxic Chemical Use and Release

The long-range transport of toxic substances through the air is a continuing difficulty for the two countries. It now appears that persistent and bioaccumulative substances emitted far from the boundary area can ultimately contaminate circumpolar waters. These contaminants are carried through the air, deposited in boundary waters, and then volatilize and move farther north. Cleanup of the boundary waters will depend on pollution prevention and reduction beyond efforts already legislated and in place.

Boundary areas are vulnerable, in many regions, to significant impairment from toxic chemical use. The Great Lakes region, acting as a sink for many persistent, bioaccumulative compounds, is the most prominent example. While there has been progress in curbing use of the most harmful compounds and in restoring contaminated areas since the 1970s, releases persist. A 1995 analysis by Environment Canada showed that Great Lakes basin industries released 173,092 tons of materials listed on the Canadian National Pollutant Release Inventory or the U.S. Toxic Release Inventory in one year. When air releases originating on both sides of the border within the "one-day airshed" of the basin were taken into account, the total nearly doubled to 319,098 tons.[9] The primary pathway for these chemicals to enter the boundary waters is through the atmosphere. Approximately 90 per cent of new loadings of some toxic substances to Lake Superior, for example, reach the lake through the air.

[7] "Environmental Challenges of the 21st Century: Implications for the Canada-U.S.A. Transboundary Issues," James P. Bruce, June 1997.
[8] James P. Bruce, op. Cit.
[9] "Industrial Releases Within the Great Lakes Basin: An Evaluation of NPRI and TRI Data," Environment Canada, November 1995.

There have been encouraging trends in pollution prevention and in the transition to clean production methods in the last decade. Voluntary programs, sometimes coordinated and monitored by governments or third parties, have broadened the implementation of techniques for reducing the use of toxic substances, but there continues to be resistance to proposed new pollution standards in both countries. In a time of government downsizing, it will be difficult for governments to manage and set standards on a chemical-by-chemical basis for the large number of potentially toxic substances which are continuing to enter the market place.

Agricultural production accounts for a significant share of toxic material use and release; approximately 57 million pounds of pesticides are annually used in agriculture in the Great Lakes basin.[10] Other so-called "nonpoint" sources of toxic pollution, such as runoff from city streets and other paved surfaces are responsible for a growing share of toxic loadings and are subject to few controls.

New concerns have emerged about the possible human and ecological health implications of exposure to many compounds legally released into the environment. The Commission has noted in recent years the health effects believed to be associated with environmental estrogens. Its Great Lakes Science Advisory Board has concluded that certain chemicals in the environment may cause a range of effects on the endocrine and endocrine-responsive organ systems in wildlife and humans. The U.S. Agency for Toxic Substances and Disease Registry, summarizing Great Lakes health effects research in 1997, concluded that the weight of evidence based on findings of wildlife biologists, toxicologists, and epidemiologists clearly indicates that both wildlife and human populations in the boundary area are being affected by exposure to persistent toxic substances.

Habitat Loss and Biological Diversity

A variety of interrelated issues, including species preservation, fisheries, wetlands, habitat integrity, and the protection of transboundary migration routes, as well as the effects of human settlement and economic development, are likely to fuel environmental controversy or conflict.

In recent years, public and expert attention has turned to significant losses of habitat occurring in border areas. In 1995, researchers concluded that wetland losses in the Great Lakes region were disproportionately greater than in other U.S. regions.[11] They estimated that the Great Lakes basin states had lost more than 59.7 per cent of their original wetland resources, and pegged wetland losses in southern Ontario at 80 per cent. Despite these losses, an estimated 23.6 million acres of wetland remain in the eight Great Lakes states, which is more than 22 per cent of the wetlands in the lower 48 states.

Federal, state and provincial statutes have curbed the rate of loss of aquatic habitat, but losses continue. Pressures on undeveloped habitat along lakes and streams throughout the boundary area are expected to continue to grow in response to population growth and economic expansion, and losses could accelerate in the 21st century. At the present time, loss of aquatic habitat is inadequately monitored in boundary areas and there is insufficient information about the losses that are taking place.

[10] "Reducing Reliance on Pesticides in the Great Lakes Basin," World Wildlife Fund, 1997.
[11] "Aquatic Habitat and Wetlands of the Great Lakes," 1994 State of the Great Lakes Ecosystem Conference Background Paper, Environment Canada, U.S. Environmental Protection Agency, August 1995.

Terrestrial habitats and irreplaceable land resources are under similar pressure. Private demand and government policies have contributed to ever-expanding urban and suburban areas, consuming large amounts of open space and sensitive lands.

At some point such habitat losses will reach a critical stage, if they have not done so already. Wetlands, for example, provide not only valuable wildlife and aesthetic values, but also protect water quality and reduce the severity and frequency of floods. Continuing losses of these resources, even at the slowed rates that have followed enactment of wetland conservation laws, jeopardize ecosystem health and public safety. At present there are neither targets nor plans to achieve habitat protection and restoration in the boundary area.

The decline of native species will undermine biological diversity in the boundary area. Over 100 species listed as endangered or threatened by the U.S. Fish and Wildlife Service are associated with this area. More than a dozen others are now extinct. These are symptoms of a larger problem spanning both nations. In its 1996 species report card, the U.S. Nature Conservancy found that almost one-third (31.9 per cent) of the 20,439 U.S. species assessed are of conservation concern. One per cent of these plants and animals may be extinct, 6.5 per cent are classified as critically imperiled, 8.8 per cent as imperiled, and 15.4 per cent as vulnerable.[12] Organisms that depend upon freshwater ecosystems are in particularly alarming condition: 67 per cent of freshwater mussels and 65 per cent of crayfish species are rare and imperiled; one in 10 mussels may have become extinct during this century alone; 37 per cent of freshwater fish species are at risk of extinction; and 35 per cent of amphibians that depend on aquatic or wetland habitats are rare or imperiled.[13]

Aggressive protection and restoration programs have reversed population declines for such species as the bald eagle, peregrine falcon, and Kirtland's warbler. It is, however, doubtful that governments and private parties can devote comparable efforts to each of the scores of endangered and threatened species in the 21st century, particularly as population growth and economic expansion continue to intrude on their habitat. Protection of transboundary habitats and sensitive ecosystems offers a better approach.

Several species issues are of current concern in boundary areas. These include migratory caribou herds in Alaska and Yukon, salmon on the West Coast, and other economically valuable or highly endangered species, many of which are highly sensitive to changes in habitat or migration routes. The growing need to preserve biodiversity and the integrity of natural habitats may produce disputes in boundary areas where standards on one side are not considered to be as effective as those on the other, where water and land use and management are not adapted to the interests of both countries, or where there are different degrees of commitment to addressing present and future threats to wildlife.

Exotic Species

The boundary area has been the site of numerous unintentional and intentional introductions of non-native species since the 19th century. Two invaders of the Great Lakes ecosystem, the sea lamprey and the zebra mussel, have cost governments and private interests hundreds of millions of dollars in damage and eradication

[12] "1997 Species Report Card, The State of U.S. Plants and Animals," The Nature of Conservancy, 1997.
[13] "Troubled Waters: Protecting Our Aquatic Heritage," The Nature of Conservancy, 1996.

expenses. About 140 non-native species in all have become established in the Great Lakes. Exotic species have altered aquatic ecosystems in the boundary area in ways that are still not entirely understood. Despite considerable efforts to implement programs to prevent or control the introduction of exotics, new species in recent years have invaded several transboundary waters.

The increasing globalization of trade could exacerbate the introduction of non-native species unless adequate safeguards are implemented and maintained. There is, however, concern that some needed safeguards, such as strict standards for vessel ballast practices, may not be feasible if they are considered trade barriers. In addition to some stocking programs, the growth of commercial aquaculture may also serve as a route for non-native species to enter transboundary waters. As yet, few governmental jurisdictions along the U.S.-Canada border have set standards to prevent the release of non-natives from fish farms. In addition, the issue of genetically-engineered organisms requires attention.

An appropriate level of understanding has not yet been reached on the threat of biota transfers between water basins and ecosystems. This was a central issue in the Garrison Diversion case of the 1970s, when there were fears that the diversion of water from the Missouri watershed across the international boundary into the Hudson Bay drainage system would bring with it alien organisms. Such fears could multiply, should water demands in the next century lead to proposals for inter-basin transfers affecting boundary or transboundary waters. Moreover, the introduction of alien species often leads to a loss of biodiversity in indigenous communities. The potential for conflict will be substantial if, as with other threats to the environment, there is not common agreement on the nature and acceptability of risk and on appropriate preventive measures.

Waste Management

Disparities in disposal costs and management methods have recently spurred proposals to ship solid and hazardous waste across the U.S.-Canada border. For example, Metropolitan Toronto has contracted to send municipal solid waste to a disposal site in Washtenaw County, Michigan, creating local protests. Other cross-boundary shipments include PCBs from cleanup sites and hazardous waste from business and industrial enterprises.

Although not considered a direct threat to ecosystem health, these shipments invariably stir public opinion in communities receiving the waste. As the cross-boundary flow of wastes continues and expands in response to economic growth and changing market conditions, public concern appears likely to increase, with accompanying demands for waste prevention and disposal programs at the source.

Nuclear Issues

Nuclear energy is likely to pose a significant environmental challenge in the next century for two reasons. As aging nuclear facilities are shut down, it will be necessary to decommission them and dispose of large quantities of high-level nuclear waste. These activities can have serious transboundary environmental effects, particularly in areas such as the Great Lakes where nuclear facilities are located on the shores of boundary waters. Moreover, pending arrangements for the permanent disposal of nuclear wastes, several nuclear facilities are storing spent fuel rods in concrete casks within hundreds of yards of the Great Lakes. There is considerable public concern about the threat this storage method poses for people and the environment.

In its consultations in developing this response to the charge from the governments, the Commission has frequently been advised that increased reliance on nuclear energy is an option to help curb the growth of greenhouse gas emissions thought to contribute to climate change. In any event, the possibility of new reactor construction in boundary areas, as well as the continuing operation of existing reactors, suggests the need for a careful review of their ecological effects, including the interaction of radiation with toxic substances at nuclear power plants, and also the need for risk assessment guidelines to assure protection of public health from radioactive hazards.

Infrastructure Needs

As the facilities constructed to comply with national and state or provincial environmental requirements age, significant public investment will be required in upgrading wastewater treatment plants, water works for municipal drinking water systems, and other infrastructure. Indeed, the job of constructing basic facilities in the boundary area has not yet been completed. Nevertheless, governments are seeking to discontinue their financial assistance programs for these facilities in order to reduce expenditures. There are no authoritative figures on the size of the needed investments, but billions of dollars could be required in the Great Lakes basin alone.

C. Information Challenges

Citizen Participation and the Need for Social Capacity

Information is a key element in making decisions and in preventing and resolving disputes. Information issues are thus central to the Commission's work, to meeting public concerns and developing public policy. These issues will present even greater challenges in the 21st century.

U.S. and Canadian citizens have come to expect an opportunity to speak and to be heard by government decision-makers. As the number of people affected by transboundary issues grows and the issues themselves grow more complex, the parties will be challenged to develop and employ mechanisms that provide for meaningful public participation. These challenges will occur at a time when customary environmental management institutions in both countries are losing their capacity to act and effect needed changes owing to the devolution of their powers and their dwindling resources. This creates a need for revitalized or new forms of social capacity for preventing and resolving disputes. The Commission can contribute to that capacity.

With the potential for fragmentation or duplication of effort by different levels of government, there is a need for a strong framework to encourage, focus and bring together the various interests concerned in a continuous, consistent, and integrative way to capitalize on accumulated knowledge, mutual understanding, and trust. Sometimes termed the development of social capital, this investment in working collegially on common issues can help avoid and settle disputes across the lines that separate vested interests in a changing world. The objective is to bring all stakeholders together to share in the policy development process.

Science and Public Policy

The Commission has long noted that valid scientific information is essential to informed policymaking. At the same time, in order to act prudently to protect the public welfare, policymakers must often act in the absence of absolute scientific proof of cause and effect.

In a period of accelerating technological change, new products and processes will provide benefits and pose unexpected risks to human and environmental health. This reinforces the need for monitoring and anticipatory approaches. As the world enters an era of unprecedented environmental change, uncertainties will multiply as fast as challenges are identified. So too, will the risks of inaction. Climate change and ozone depletion are two examples of concerns where awaiting final proof of cause and effect jeopardizes both current and future generations.

Both basic and applied science are needed to anticipate environmental problems and support policy conclusions. The Commission notes the importance of acting on appropriate precautionary principles, which recognize that some threats may call for action before there is absolute certainty and that some activities could have such disastrous results that they should not be allowed until doubts have been removed.

D. Institutional Challenges

An examination of the environmental challenges of the 21st century would not be complete without considering the challenges facing the institutions that will have to deal with these issues.

Down-sizing of Governments and Loss of Environmental Monitoring Capacity

On both sides of the border, there is a clear trend toward a reduction in the size of government, particularly at the national level. Staff and budget cuts in environmental agencies have already undermined basic environmental monitoring and research programs. The number of Canadian observation sites for climate change within 100 miles of the border has slipped from 855 in 1990 to 730 today.[14] Water quality, hydrometric, and air quality monitoring stations have also slipped in number. Similar trends are present in the U.S. Monitoring provides the capacity to identify changes in environmental quality and to measure the effectiveness of control and prevention programs. All along the boundary, this capacity is being lost. One researcher observes, "This loss of essential data will haunt analysts of boundary issues for years to come."

Environmental research funding has also been reduced. A survey by the Commission found a decline of nearly 20 per cent in government-funded Great Lakes research between 1994 and 1996, with further reductions forecast. As the Commission has observed, "Such budget cuts are dramatically reducing the ability to measure the amount and type of pollutants entering Great Lakes waters from various sources, which must be identified in order to determine the most cost-effective cleanup and prevention options."

Fragmentation of Governmental Jurisdictions

Fragmentation of jurisdictions exacerbates the problems resulting from down-sizing, devolution and deregulation. As governments downsize, their ability to cooperate and coordinate to address problems of common interest also shrinks. Reductions in funding have reduced participation by federal and state agencies in regional and collaborative efforts, which were so essential to environmental progress in the 1960s and 1970s. Budget reductions and differences in priorities have also generated conflict between levels of government, forestalling cooperation. This makes it even more essential to have a means of facilitating and fostering cooperation and coordination among the various jurisdictions and levels of government with responsibility for transboundary environmental matters.

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[14] James P. Bruce, op. Cit.

A key to the effective management of transboundary and other environmental issues will be the judicious assignment and coordination of the roles and actions of all levels of government so as to foster greater cooperation and exchange of information between them, and to avoid jurisdictional conflict and needless duplication.

Similarly, it will be necessary to take adequate account of local and regional needs, priorities, programs and management. This challenge is especially important in Canada-U.S. relations given the vast length of the boundary, the wide diversity of boundary regions, and the changing distribution of federal and provincial or state responsibilities and powers.

The Roles of Various International Bodies

The Commission believes that in a time of limited public funding, it is more necessary than ever that governmental institutions cooperate and coordinate their efforts to avoid duplication and to take full advantage of each other's strengths and resources. The Commission has been urged by many it consulted in preparing this response to the charge from the parties to pay particular attention to sorting out the roles of the IJC and the Commission for Environmental Cooperation (CEC). For this reason, and because of the important roles the IJC and the CEC play in environmental affairs, the fundamental differences between them, the potential for overlap, and the opportunities for productive cooperation, the Commission has chosen to highlight here its relation to the Commission for Environmental Cooperation. The Commission, however, also stresses the critical role that other bilateral regional organizations will play in the transboundary relationship of the 21st century and the importance of effective coordination and cooperation between these organizations and the future work of the IJC.

The CEC was established by the 1993 North American Agreement on Environmental Cooperation with a view to ensuring that appropriate and fair environmental regulation applies to trade between Canada, Mexico and the United States. The CEC provides a meeting place and coordinating mechanism to ensure that the three federal governments live up to their national laws, and to assist them in developing and implementing cooperative programs. The Council of the CEC comprises cabinet level or equivalent representatives of the three parties. The CEC's Secretariat has broad authority to prepare reports for the Council on environmental matters unless, in some cases, the Council objects by a two-thirds vote.

The emergence of the Commission on Environmental Cooperation has accentuated the need for innovative approaches to inter-organizational relations. It may also have created new opportunities to address the environmental challenges of the 21st century. The IJC and the CEC are the only international environmental organizations in North America that have broadly defined missions capable of being adjusted to the developing agenda of issues relating to the environment and sustainability. Initiatives to address inter-organizational relations, in effect to render the current structure more efficient, need to be undertaken by these two organizations on a cooperative basis. In addition, the governments must bear in mind the many differences between the two organizations that will influence the future role that each plays in the Canada- U.S. transboundary relationship. A brief description and analysis of the differences between the two organizations follows below.

The IJC is a binational body and the CEC a trilateral one. This simple and obvious distinction has a number of important implications. As a binational organization, the IJC is founded on the principle of equality and parity, which requires Canadian and U.S. Commissioners to agree on any decision. The Commissioners are integrated into a single independent and impartial body dedicated to the common interest of both parties. The members of the CEC Council, on the other hand, who are the counterparts of the IJC Commissioners, represent national governments and national interests. While the CEC Council normally takes decisions and makes recommendations by consensus, it can make certain decisions on the basis of agreement between two of the parties.

The IJC was established by the Boundary Waters Treaty, which has been in force since 1910 and has provided a measure of stability and continuity in transboundary affairs for almost 90 years. The treaty principle that boundary waters and waters flowing across the boundary shall not be polluted on either side of the border to the injury of health or property on the other side has, for example, established a basis for environmental relations between the parties which is reflected in the Great Lakes Water Quality Agreement and elsewhere. These enlightened binational standards have helped the IJC fulfill its essential objective of preventing and resolving disputes. The CEC, on the other hand, was established by a recent agreement intended to complement the North American Free Trade Agreement. Its essential objectives are very different, and, in certain cases, include reviewing enforcement of national environmental legislation upon request by interested persons.

The IJC has developed expertise in addressing complex ecosystem management issues which are likely to increase in importance in all boundary areas, including coastal regions and the Arctic. In particular, the IJC has long experience in handling the full range of water issues, which, when they are international, typically have local roots that are bilateral rather than trilateral in character. The IJC's history of working with state, provincial and local authorities in the two countries can prove invaluable in helping governments balance the need for international action with the reality that much environmental management needs to begin at the local or regional level. Furthermore, involvement and consultation with all interested persons and sectors in both countries — cornerstones of IJC activities — provide an important basis for the identification and resolution of issues, demonstrate transparency, and help to build social capacity in boundary communities. The CEC, on the other hand, has different objectives and strengths. Its links are primarily at the federal level and it is therefore in a strong position to handle continental issues. Its mandate, among other things, speaks of "transboundary and border environmental issues, such as the long range transport of air and marine pollutants." It was not created to handle bilateral regional and local issues, particularly where there is a need for consultation and coordination between federal, state, provincial and other authorities.

It may be, of course, that the CEC will find it necessary to conduct studies on bilateral matters. Such studies, however, should fall within some essentially trilateral objective. Otherwise, the CEC might effectively be transformed from a trilateral body to a trilateral body with two bilateral arms or extensions. This could have a number of consequences, the most important of which relates to effectiveness in avoiding and resolving disputes between Canada and the U.S.

Because there is room for overlap between the CEC's and the IJC's activities, the likelihood of duplication is a matter of concern as the U.S. and Canada consider the role of the IJC in assisting them in meeting the environmental challenges of the 21st century. Given the nature of environmental management, what one

organization undertakes in a specific area can have significant impacts on the actions of the other. For example, the CEC is now engaged in examining, on a regional basis, water management at the U.S.-Canada border and at the U.S.-Mexico border. The study is considering the technical, social, economic, political and environmental implications of present and future water uses. The Commission believes that this represents essentially bilateral work involving federal, state, provincial and local issues that are addressed more appropriately and effectively through an integrated and coordinated binational approach rather than trilaterally.

The differences between the CEC and the IJC suggest a basis for an effective division of labor between them, which needs to be elaborated in a cooperative manner. In the IJC's view, it is essential to ensure that the two institutions avoid duplication in their work in the interests of avoiding a wasteful use of resources and a confusion of approaches to Canada-U. S. environmental issues. This can be accomplished by leaving it to the IJC to focus on transboundary cooperation between Canada and the U.S. with respect to transboundary environmental issues, while the CEC focuses on trade-related environmental issues and matters of trilateral, continental interest that are most appropriately dealt with through federal intergovernmental mechanisms. The IJC has opened discussions with the CEC to establish a cooperative relationship that will best serve the interests of Canada and the United States, and invites the Canadian and U.S. governments to consider these issues in the development of their binational transboundary environmental agenda.

There are today many other inter-governmental institutions at work in border areas, at federal, state, provincial and other levels. The list of institutions includes such bodies as: the Great Lakes Fishery Commission (GLFC), which was established by a 1955 convention between the governments of Canada and the United States to coordinate management of the Great Lakes' fishery; the Great Lakes Commission, which was formed by an inter-state compact of U.S. Great Lakes States and has links to Ontario and Quebec; the British Columbia/Washington Environmental Cooperation Council, which is intended to promote consultation and cooperation between the province and the state; the St Croix International Waterway Commission, which was established by the Maine and New Brunswick legislatures to develop and deliver a heritage management plan for the St Croix boundary corridor; the Gulf of Maine Council, which was established by Maine, Massachusetts, New Brunswick, New Hampshire and Nova Scotia to promote wise management of the Gulf of Maine and its watershed; and the Red River Basin Board, which was recently established by Manitoba and Minnesota, North Dakota and South Dakota to develop and implement a comprehensive water management plan for the Red River Basin and to facilitate the resolution of inter-jurisdictional disputes.

The International Joint Commission is seeking closer ties and, where appropriate, partnerships with all bilateral institutions of this type in the boundary region to combine resources, share knowledge, avoid duplication and cooperate in achieving common goals. The IJC and the Great Lakes Fishery Commission have, for example, collaborated effectively on a joint examination and report on exotic species, and the Executive Director of the Great Lakes Commission serves as a co-chair of the IJC's Great Lakes Science Advisory Board. The IJC looks forward to further and more extensive partnerships of this sort to ensure that the best possible use is made of all available resources.

In summary, only the IJC offers a broad and flexible binational mandate and has a successful track record in preventing and resolving transboundary disputes around environmental and water-resource issues. Only the IJC provides the institutional opportunities for officials from all levels of government in Canada and the United States, scientists, stakeholders and interested citizens to work together, in their personal and professional capacities, in the common interest of border communities. This is particularly important at a time of changing responsibilities within and across governmental and private sectors in both countries. These changes demand increased facilities for coordination and enhanced social capacity, particularly at a local level, to identify and respond to new environmental challenges. These are the very characteristics that have marked the work of the IJC for 86 years .

SECTION THREE

Proposals to Provide Greater Assistance to the Parties in Meeting Future Transboundary Environmental Challenges

Overview

The Commission recognizes that there are a number of priority issues that will influence transboundary conditions and that can and will be dealt with more effectively in other forums. These include such matters as population, energy policies, climate change, economic development, and infrastructure investment or disinvestment. The Commission does not intend to propose venturing into areas where other institutions are successfully involved, nor does it intend to make proposals that would require amendments to treaties or international agreements.

The Commission, of course, will continue to assist the parties by maintaining its present activities under the Boundary Waters Treaty. This includes pursuing vigorously the goals of the Great Lakes Water Quality Agreement, particularly virtual elimination of toxic contaminants that are already in the system, zero discharge or prevention of new inputs and an ecosystem approach to management of the Great Lakes basin. Beyond its present activities, the Commission has developed proposals that build on and creatively expand its traditional role and function of preventing and resolving transboundary disputes from coast to coast. These are intended to strengthen binational and local capacity to respond to the transboundary environmental challenges of the 21st century.

Proposal I: Establishment of International Watershed Boards

The International Joint Commission proposes to build on the successes of the Great Lakes Water Quality Agreement by offering to provide similar opportunities to other major transboundary basins through the establishment of permanent IJC international watershed boards. These boards would provide a much improved mechanism for avoiding and resolving transboundary disputes by building a capacity at the watershed level to anticipate and respond to the range of water-related and other environmental challenges that can be foreseen for the 21st century. This includes effective coordination of government institutions at various levels, acquisition and fostering of expertise, knowledge and information about the ecosystem of the watershed, consultation with and involvement of the full range of interests concerned, including the public, and above all the flexibility to identify and deal with unforeseen developments. This improved mechanism could be implemented without substantially affecting existing institutions.

In the past, transboundary water issues were often seen as localized at a specific dam or structure, or were examined as pollution problems in isolation from other factors. Experience with the Great Lakes Water Quality Agreement and the ecosystem approach have changed that perspective. Transboundary water issues must be addressed in an integrative manner, including both biophysical and human aspects.

Outside the Great Lakes region, however, existing IJC boards continue to deal with water issues under mandates that focus primarily on administering the terms of Commission orders or, in some cases, monitoring water pollution or apportionment arrangements. Even within the Great Lakes, distinctions are drawn between matters of water quality and quantity, and the three Great Lakes control boards are involved primarily in regulating the structures at Sault Ste. Marie, Niagara and Cornwall-Massena. By contrast, the new international watershed boards would adopt an integrative, ecosystem approach to the full range of water-related issues that arise in the transboundary environment, including consumptive uses, diversions and effects of air deposition and volatilization on water quality. Control boards will, however, have to remain to administer provisions of the IJC's legally-required approvals of certain structures.

For almost ninety years, the IJC has been involved in preventing disputes and resolving problems on transboundary watersheds between Canada and the United States. During that period, difficulties between the two countries over water have not degenerated into conflict and, for the most part, transboundary water resources have been managed successfully for the common benefit of Canadian and U.S. citizens. The Commission and its system of boards have played a major role in this achievement.

Demographics, climate change and technologies are, however, combining to increase the potential for conflict over water resources and other environmental concerns. At the same time, resolution of these issues is often made more difficult by changing governmental responsibilities at all levels and by demands from many interests to be involved in decisions that affect them. Changes in jurisdiction and governance may not always be the same on both sides of the border. IJC boards provide a proven means for dealing with such changes and with asymmetrical governance situations in an integrative and non-adversarial way. The Commission is vitally interested in coordinating the new watershed boards with any regional (e.g. provincial-state) structures that may already exist. This will in some instances, be facilitated by inviting members of regional institutions to serve on, or be associated in some way with, the relevant IJC watershed board.

Although governmental roles are changing, federal, provincial, state and other forms and levels of government will all continue to play important roles in transboundary water and environmental issues. In the Great Lakes Basin, the IJC's Great Lakes Water Quality boards have served as neutral forums in which federal, state and provincial decision-makers could meet to discuss issues, develop ideas, coordinate activities, reconcile differences and achieve efficiencies in water quality policies and programs that further the common interests of the region and both countries. This is a role that permanent IJC international watershed boards could be given a mandate to play in other transboundary basins. It could serve as a link that would help the U.S. Environmental Protection Agency and Environment Canada as well as state and provincial agencies address transboundary issues in the watershed in a coordinated and concerted manner.

The requirement for regional bodies to deal with transboundary environmental and water issues has been reflected in the growth of provincial-state arrangements discussed above. IJC boards can complement and contribute to these arrangements by bringing binational perspectives and expertise to bear on regional issues in ways that respect local concerns and responsibilities. Unlike the state-provincial bodies, the IJC's international watershed boards will offer a means of coordinating the efforts of federal, state, provincial, municipal and other authorities. This is essential when responsibility for related issues rests with different levels of government in the two countries.

Permanent IJC international watershed boards would provide governments at all levels, and the public at large, with independent binational institutions composed of persons expert in, and in some cases with responsibilities for, the watershed. The boards would encompass the public, private and non-governmental sectors, but would be committed to acting in the common interest. There are clear advantages to be gained from having stable, long-lived yet flexible institutions. Members would be accustomed to working together and the board itself would be a source of watershed history and experience. The boards' membership, mandate and priorities would be tailored to the needs of each particular watershed and could be adjusted over time to meet changing conditions and challenges.

International watershed boards of this sort would be available for monitoring, alerting, studying, advising, facilitating and reporting on a broad range of transboundary environmental and water-related issues. Like other permanent IJC boards, they would have the capacity to assist in coordinating the work of multiple jurisdictions and to contribute to the development of consensus among disparate governmental and non-governmental interests. They would also offer standing mechanisms — which can endure even in times of transboundary tension — for cooperative management, public consultation, joint fact-finding and dispute prevention and resolution. In recent years, IJC boards have also demonstrated their ability to serve an educational role in fostering knowledgeable transboundary communities and to act as a channel between citizens and governments. In short, boards contribute to the development of binational civil societies and help to build consensus and local capacity for binational action in response to water-resource and environmental challenges.

The IJC has developed considerable expertise in understanding and addressing the interfaces of freshwater, salt water and terrestrial ecosystems. This capacity and expertise should be further developed when the responsibilities of international watershed boards extend to coastal areas.

The IJC could be authorized by reference to establish international watershed boards for the following major transboundary watersheds that extend across the Canada - U.S. boundary, or some regional combination of these watersheds. Together, these boards would provide coverage of most of the Canada - U.S. border region. The watersheds are: St. Croix River and Saint John River; Lake Memphremagog-St Francis River and Lake Champlain-Richelieu River; Great Lakes-St Lawrence River; Rainy Lake-Lake of the Woods-Lake Winnipeg; Red River and Souris River, together or separately; St. Mary River and Milk River; the Columbia River system; Skagit River; Yukon River and Porcupine River; and the Alsek River, Taku River, Stikine River and Iskut River. (A map outlining the areas that would be covered by each international watershed board is attached as Annex C.)

The new international watershed boards would be constituted and directed to adopt a multi-disciplinary, integrative approach that takes appropriate account of all interests and sectors, governmental and non-governmental. While it would be necessary to tailor the mandates of individual international watershed boards to the needs of specific watersheds, these boards could, in general terms, be directed to:

(i) coordinate with existing agencies and institutions in the watershed;

(ii) assess and report to the Commission biennially on the state of the environment in the transboundary watershed, including the integrity of its ecosystem, water management issues and emerging environmental issues and provide recommendations, where appropriate, for addressing them;

(iii) advise on the core data sets that should be maintained by the parties and others for the management of water and the identification of emerging environmental issues in the transboundary watershed;

(iv) develop indicators for monitoring and assessing the state of the environment in the transboundary watershed and identify data that would have to be provided by the parties to maintain those indicators;

(v) undertake such studies as the Commission may direct, including studies for the purpose of determining the significance of emerging environmenta issues in the transboundary watershed;

(vi) facilitate, wherever possible, the prevention of disputes and the resolution of problems concerning the environment of the transboundary watershed, for example, by drawing upon information made available through procedures for transboundary impact assessment developed by the parties;

(vii) support the development of an informed transboundary watershed community through a range of activities, including the provision of information on principles for watershed management;

(viii) receive, consider and investigate comments and complaints from the public about transboundary watershed environmental issues and, as appropriate, draw such matters to the attention of the IJC with recommendations for further action if, in the opinion of the international watershed board, the comment or complaint raises a significant issue that pertains to the integrity of the watershed; and

(ix) in the case of international watershed boards whose areas of responsibility extend to coastal areas, address interfaces between freshwater, salt water and terrestrial ecosystems and related environmental issues in adjacent estuaries and marine areas.

In addition, these boards would be directed to

(a) work, as appropriate, in cooperation with other IJC boards, especially the International Air Quality Advisory Board, control boards in the watershed and the Health Professionals Task Force; and

(b) follow procedures that promote the involvement of all interested governments and sectors of the transboundary community, including private citizens.

For the purposes of this proposal, "trar -boundary watershed" would be defined as meaning watersheds,[15] including aquife that straddle the international boundary between Canada and the United States.

To avoid duplication, the work of the IJC's St. Croix, Rainy and Red River Pollution Boards, the Souris River Board of Control (which monitors an apportionment reference), and the Souris-Red Rivers Engineering Board would be merged into the international watershed boards. The other control boards, including those for the St. Mary and Milk Rivers, would remain in order to perform the specific duties assigned to them under the IJC's system of orders.

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Great Lakes Water Quality Institutions

Work on the reference given to the IJC in the Great Lakes Water Quality Agreement has for many years provided a significant share of the Commission's agenda. At the present time, the Commission does its work under the Great Lakes Water Quality Agreement primarily with the assistance of the boards established under the agreement, which, because of the terms of the agreement, focus on water quality issues. At the same time, the IJC orders (and the Niagara reference) on the structures at Cornwall-Massena, Niagara and Sault Ste. Marie provide the mandates for the three Great Lakes control boards. The capacity of the Commission and governments to identify and address transboundary water-resource and environmental challenges will be significantly enhanced in the Great Lakes-St Lawrence River watershed if, as in other transboundary watersheds, there is an institution that can adopt an ecosystem approach and integrate the full range of water-related issues.

There has been a proliferation of environmental and water-related Great Lakes institutions, reflecting the influence that the Great Lakes have over the region. None of these bodies, however, has the capacity of the IJC to bridge and enfold on a permanent basis all levels of government and interests. None of them has the capacity to address issues in an informed, expert, but, at the same time, impartial and dispassionate way, focusing only on the common interests of the region.

The IJC does not wish to add to the multiplicity of existing Great Lakes institutions by introducing a new "Great Lakes Watershed Board" nor does it wish to recommend abolishing the existing institutions, such as the Great Lakes Water Quality and Science Advisory Boards and the Council of Great Lakes Research Managers, which serve the objectives of the Great Lakes Water Quality Agreement. These institutions have in many ways served as the genesis for the Commission's proposal to establish international watershed boards from coast to coast. It therefore seems appropriate to expand the mandate and membership of one of these boards, the Great Lakes Water Quality Board, so that it can take on the role of an IJC international watershed board for the Great Lakes and St. Lawrence River. The Great Lakes Science Advisory Board and the Council of Great Lakes Research Managers would also be directed to expand and adjust their activities when supporting the Great Lakes Water Quality Board in its new role.

The mandate of the Great Lakes Water Quality Board under the Great Lakes Water Quality Agreement would not be altered. The Great Lakes Water Quality Board, as expanded, however, would be asked to assume the additional responsibilities of an international watershed board with respect to transboundary water-related issues in the Great Lakes-St Lawrence River watershed at least as far as tidewater and beyond, if necessary. This means that the Great Lakes Water Quality Board would address all water-related issues in the watershed whether they raise questions of water quality or quantity, including the issues of consumptive uses and diversions. The Great Lakes Water Quality Board would also take on the other functions of international watershed boards, including providing a forum for coordination and consultation among governments and interests, reporting (in conjunction with its reports under the agreement) on the state of the environment and emerging issues in the transboundary watershed, advising on the core data sets that need to be maintained to address the range of challenges that can be foreseen, facilitating the avoidance and resolution of disputes, and supporting the development of an informed transboundary watershed community.

All other IJC boards with responsibilities in the Great Lakes region, including the control boards, the International Air Quality Advisory Board and the Health Professionals Task Force, would be directed to adopt an ecosystem approach and to cooperate and work together to the maximum extent possible within their mandates.

Membership of International Watershed Boards

The members of international watershed boards would be selected bearing in mind the nature of the boards' responsibilities and any transboundary issues that have been identified in the watershed. International watershed boards would normally include members drawn from federal, state, provincial, municipal and other authorities with relevant responsibilities. In addition, consideration would be given to including members familiar with relevant interests, including members from the public. Co-chairs of control boards would, as a matter of practice, be appointed to watershed boards, including the Great Lakes Water Quality Board, to provide a link between boards in the same watershed. The IJC would continue its long-standing practice of appointing an equal number of members from Canada and the United States, of requiring members to act impartially in their personal and professional capacities, and of calling on them to seek collegially the common interest of communities in both countries.

The Great Lakes Water Quality Board would expand to reflect its additional functions. It would need, among others, additional members who have knowledge of water quantity issues, the policies of the governments and of key interests involved in these issues. The Commission intends to include members from organizations such as the Great Lakes Commission and the Great Lakes Fishery Commission.

Proposal II: Commission Studies on Crucial Transboundary Issues

The Commission will initiate studies of transboundary water demand and supply and water quality, transboundary air quality and core data requirements. These studies will help the Commission carry out its long-standing responsibility to bring to the attention of governments emerging issues, trends and other matters that demand urgent attention. They will also help the international watershed boards, when they are established, to identify the transboundary water-resource and air quality issues that are on the horizon, suggest how they should be approached, and indicate the core data base that needs to be maintained binationally to anticipate and deal with these and other challenges of their watersheds. In addition, they will provide input to the Commission's reporting on the transboundary environment, discussed below. The Commission will begin these studies with the assistance of its existing boards, building upon its own past work and the work done by others, including the CEC. International watershed boards would participate as they are established.

Study 1: Management of Water Demand and Supply and Water Quality

Predicted increased demands on ground and surface waters can be expected to create pressures for reapportionments and additional water storage and diversions both within and beyond transboundary watersheds, as well as for changes in environmental water quality standards and land-use controls. To ensure that water and related resources are managed in a rational, consistent and anticipatory way to prevent transboundary disputes, it is necessary to keep water use and management under

continuous review in transboundary basins. These reviews need to examine such matters as the amount of water available, its quality, maintenance of biodiversity, socioeconomic considerations and ecosystem integrity generally.

It is important to determine existing supplies and uses of water as a baseline for monitoring future trends in supply, demand and distribution across and within jurisdictional boundaries. Using its traditional approach, the Commission will initiate this study drawing upon the expertise, data, relevant studies and technology available through existing IJC boards as well as federal, provincial and state governments, other international and regional organizations and other sources. It will assess:

(i) current surface water supplies and uses in transboundary watersheds, including, among other things, ecological and other local requirements, water quality conditions, the maintenance of biodiversity, the introduction of exotic species, consumptive uses and diversions into and out of the watershed;

(ii) the location, quality and present uses of aquifers that straddle the Canada-U.S. boundary or are important contributors to surface waters in transboundary watersheds;

(iii) existing or proposed regulatory or planning regimes that can significantly affect water and related resource management, including information about existing effects, in particular, on water quality, quantity, aquatic biota and habitat;

(iv) the ecological, economic and social values of water;

(v) the effects of climate change on surface and groundwater and water demand;

(vi) the effects of air deposition and volatilization on surface and groundwater;

(vii) the effects of population growth and urbanization on the demand, use and quality of surface and groundwater; and

(viii) the present state of knowledge and resources available to address the foregoing issues.

Study 2: Transboundary Air Quality

Transboundary flows of polluted air can affect the environment and a variety of human interests directly through inhalation and through deposition on land and water. Present local and regional trends for some pollutants are expected to worsen. It is therefore important to assess the existing and long-term situation with respect to transboundary air flows and their effects, to track future changes and to formulate appropriate remedial and preventive measures. At present, there are broad concerns about transboundary and regional flows of ground-level ozone and precursors of smog, persistent toxic chemicals, acid rain and greenhouse gases. The Commission will ask its International Air Quality Advisory Board together with other IJC boards, as appropriate, to continue and enhance their on-going assessment of the above-noted matters and, in particular, to initiate studies of:

(i) the transboundary flows and deposition of persistent toxic chemicals (focusing initially on substances listed in the Binational Strategy for the Virtual Elimination of Persistent Toxic Substances), together with an examination of existing control programs and any proposed changes to those programs, as well as an assessment of the adequacy and consistency of efforts in both countries to prevent transboundary damage;

(ii) the transboundary flows and the interactions between toxic substances, particulate matter, ozone and climate and their effects on ecosystem and human health;

(iii) the transboundary flows of airborne nitrogen species which exacerbate eutrophication damage to lakes, estuaries and coastal waters and which also contribute to ozone formation and acid deposition; and

(iv) the trends in transboundary flows, and an assessment of the effectiveness of current monitoring and surveillance programs to detect trends and identify causal factors.

The Health Professionals Task Force will be asked to work with the International Air Quality Advisory Board and other relevant IJC boards to continue providing information on human health implications of these transboundary flows and depositions.

Study 3: Data and Indicators

Rational management of complex ecosystems such as transboundary watersheds and air quality requires basic data to determine and report on the current state of the environment and environmental trends. At present, there appear to be difficulties in establishing, maintaining and communicating the required core data. The Commission will build on existing efforts to assess the state of transboundary water-related and air-related data collection and assessment, including:

(i) the core data sets required to monitor water supplies, levels and flows in surface and ground waters, water and air quality and other parameters;

(ii) consistency in past and present data collection by the different agencies involved and their expected performance in the future; and

(iii) compatible data for the development of indicators that are relevant for policy purposes.

Proposal III: Review of Existing Orders

Over 20 IJC orders govern the maintenance and operation of structures on six transboundary watersheds. Some of these structures and orders are now almost 80 years old and there is reason to believe that the terms of some of the orders may no longer satisfy the requirements of the Boundary Waters Treaty for the protection and indemnification of other interests. Such other interests, notably the environment, may not have been recognized or given appropriate weight in earlier times. In undertaking these reviews, the IJC will be removing usually complex and sometimes emotionally-charged issues from the bilateral diplomatic agenda of the two countries.

The Commission can deal with these matters in an impartial, quasi-judicial manner that follows accepted rules which have been established by the parties in the treaty. By working through its international watershed boards and control boards, with their established bases of local knowledge and collegiality, the Commission is in a unique position to facilitate development of a binationally acceptable statement of facts and to promote the development of a binational consensus that takes account of the full range of local, regional, national and binational interests and concerns.

The Commission has retained jurisdiction over its orders and has the authority to amend them, providing that it follows procedures that are "in accordance with justice and equity", as those principles are recognized in the two countries. The Commission may review an order whenever it is satisfied that there may have been, for whatever reason, a fundamental change in the circumstances on which its original order was premised. Further, the Commission may amend an order if such a review discloses that the original order no longer satisfies the terms of the treaty.

The Commission is in the process of reviewing its orders in the St. Croix and Rainy Lake watersheds and has also informed the parties of its intentior to review its orders of approval for the hydroelectric generating stations in the St. Lawrence River at Cornwall and Massena.

Proposal IV: Reference to the IJC to Examine and Report on Certain Nuclear Issues

The Great Lakes Water Quality Agreement contains a "Specific Objective" for radioactivity. In the 25 years of the agreement's existence, neither the objective nor the subject of radioactivity itself drew much Commission attention. With the impending decommissioning of large numbers of nuclear power plants, including those in the Great Lakes basin, the growing problems of storage and disposal of high-level and low-level nuclear waste, the signing of a Comprehensive Test Ban Treaty on 24 September, 1996, and the disposal or reuse of weapons-based plutonium, general concerns about the effects of radioactivity on humans and ecosystems have made this subject a pressing one.

The Commission's Nuclear Task Force and previous Great Lakes Water Quality Board reports on radioactivity help address the amount of radioactivity in the Great Lakes. The reports are inadequate for addressing such issues as ecosystem impacts of radioactivity, the technology and resource needs for nuclear waste isolation, the decommissioning of nuclear reactors, and interactions of toxic chemicals and radiation in the ecosystem.

Accordingly the Commission proposes that it be asked by reference to examine the following matters and make recommendations thereon:

(a) the impending decommissioning of reactors in the Great Lakes basin and remediation of these sites, specifically the criteria used by nuclear agencies on when to decommission a reactor and how to remediate a site following decommissioning;

(b) the interactions of radiation with toxic substances at nuclear power plants to determine the extent to which radioactive versions of persistent chemical pollutants are an additional hazard;

(c) risk assessment guidelines for radioactivity and specific nuclides; and

(d) the extent to which the move to low-sulfur coals in electric power generation could increase the dispersion of nuclear materials to the air because the mineral content of the western low-sulfur coals tends to be considerably higher in thorium than other coals.

Proposal V: Reporting on the Transboundary Environment

The Commission proposes that it report biennially on the state of the transboundary environment, basing its report on advice received from its existing and proposed institutions and from other sources, including meetings along the border.

The report will describe the state of the transboundary environment and alert the Parties to emerging issues and trends requiring attention to prevent disputes and resolve developing problems. The report will address the most significant issues along the boundary and is not intended to catalogue all issues in the border region or replicate or replace other reporting mechanisms that are available in both countries.

The Commission proposes that the biennial report be presented, in person, to the appropriate cabinet-level officials of the two countries. It will also be presented or otherwise made available to provincial and state governments and to the public in an appropriate form.

Implementation

International Watershed Boards

The Commission proposes that the Canadian and U.S. Governments provide it with a reference to establish international watershed boards as confirmation of the governments' support for this action.

The Commission would establish the boards at appropriate times, on a staged basis, following consultations with relevant federal, state, provincial, and other authorities as well as bilateral inter-governmental organizations, and after taking steps to identify relevant interests and issues in the watershed.

The Commission would arrange for the establishment of locally situated binational secretariats to support the work of the international watershed boards. In the case of the Great Lakes, secretariat services would be provided by staff of the Great Lakes Regional Office, who would support the watershed work of the Great Lakes Water Quality Board in much the same way as they support its work under the Great Lakes Water Quality Agreement. In other watersheds, the Commission would provide secretariat services or ask governments with members on an international watershed board to furnish those services. This would be a matter for further consultation with governments in the implementation phase.

Studies

The Commission proposes to undertake at once the water supply and demand and water quality study, the transboundary air quality study, and the core data requirements study, and will coordinate with its existing institutions as well as its proposed new ones as soon as these are established. It is expected that board members who are government officials will continue to make available the services of their departments and agencies for Commission work of this sort free of charge. The Commission will, in all cases, look to establish partnerships with departments, agencies, binational inter-governmental organizations, universities and foundations to avoid duplication and to take full advantage of work that has or can be done elsewhere, provided only that such arrangements are satisfactory to the IJC and its binational advisory institutions.

The IJC will seek early consultations with the parties with respect to the execution of the above-noted studies.

Reviews of Existing Orders

The Commission has begun and will continue to review orders over which it has continuing jurisdiction. In each case, the Commission has informed and will continue to inform the parties in advance of its intention to undertake these reviews. Reviews have been undertaken with the assistance of existing IJC boards and the Commission expects that, once established, the international watershed boards would take on this responsibility with the help of the control boards. In some instances, the Commission's ability to review its orders has depended and will continue to depend on the IJC receiving necessary resources from the governments or others.

Resource Implications

The IJC has been a good bargain. It operates a great number of services at low cost. In assisting the Canadian and U.S. governments in responding to the environmental challenges of the coming century, it will continue to exercise fiscal prudence. Increased surveillance along the border will, however, require new resources. The Commission has noted that the parties are putting new resources into some areas of the transboundary environmental relationship, and some greater funding of the IJC will be required if it is to be of greater assistance to the parties in meeting the environmental challenges of the 21st century.

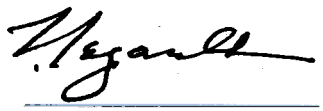
The proposals will not have significant resource implications for the IJC if governments at all levels continue the long-standing practice of allowing their officials to serve on IJC boards without charge and if departments and agencies continue to support without charge the work of the IJC boards on which their officials serve. It is important to note that the IJC's existing budgets were developed on the assumption that these practices would continue and that government departments and agencies would recognize and take advantage of the benefits of having their boundary related work done under the IJC's umbrella.

The IJC recognizes that any new programs will place difficult strains on departments or agencies that are called on to provide additional resources. With this in mind, the Commission intends, wherever possible, to avoid imposing greater demands on governmental resources than it has in the past. To accomplish this, the Commission will, in all cases, examine the possibility of establishing partnerships with other compatible institutions, to the extent that these will not compromise the independence of the Commission.

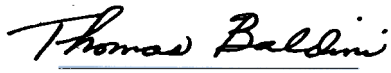
Conclusion

The Commission is optimistic about the future of the Canada-U.S. transboundary relationship despite the challenges the two nations will face in the 21st century. In addition to their long tradition of peaceful relations, the United States and Canada have demonstrated an ability to engineer new institutions and mechanisms to ensure that the interests of their citizens in the boundary area, as well as their common environment and their natural resources, are properly managed and protected.

The very flexibility of the Boundary Waters Treaty and of the Commission itself has enabled the IJC to respond to changing times. The Commission sees the creation of international watershed boards as a refinement that can assist the parties greatly in addressing new challenges. The Commission urges the parties to capitalize on the full potential of the IJC and its institutions to assist them in preparing for the transboundary environmental challenges of the 21st century. The Commission can help the parties only to the extent that they want that help and make it possible for the Commission to provide it through the consideration they give to the Commission's advice and the resources they make available for the Commission to carry out its work.



Leonard H. Legault
Canadian Chairman

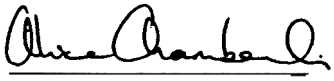


Thomas L. Baldini
United States Chairman

Dr. Pierre Béland
Commissioner

Susan B. Bayh
Commissioner

Francis Murphy
Commissioner



Alice Chamberlin
Commissioner

October 21, 1997.

ANNEX A

The Charge to the IJC from the Governments April 16, 1997

The governments of the United States of America and Canada have agreed to request the advice of the International Joint Commission on how the Commission itself might best assist the parties to meet the environmental challenges of the 21st Century within the framework of their treaty responsibilities.

The governments affirm that the International Joint Commission, under the Boundary Waters Treaty of 1909 and the Revised Great Lakes Water Quality Agreement of 1978, and through its various Boards of Control and its Water and Air Quality Boards, has assisted the United States and Canada in establishing the best environmental relationship of any two countries in the world.

The Governments of Canada and the United States of America reaffirm their commitment to the IJC and its important role in fostering cooperative action in support of the health and well-being of their citizens and the natural ecosystems along the border. The governments recognize that these ecosystems constitute an environmental and economic resource of tremendous value that must be conserved and protected into the next century and in perpetuity for the mutual benefit of present and future generations of both countries.

The governments further recognize that the environmental challenges faced collectively by our peoples have grown in size and complexity, requiring strengthened collaborative action.

With a view toward confronting these challenges, the Governments of the United States and Canada request the International Joint Commission, in consultation with governments and others that the IJC deems appropriate, to examine its important mission in the light of relevant agreements and references, and to provide to the parties, within the next six months, proposals on how the Commission might best assist the parties to meet the environmental challenges of the 21st century within the framework of their treaty responsibilities.

ANNEX

List of Respondents to IJC Request for Consultation on the Charge from the Governments

Governmental Agencies

Alberta, Department of Federal and Intergovernmental Affairs
Commission for Environmental Cooperation
Environment Canada, Ontario Region
Great Lakes Fishery Commission
Manitoba, Secretary to the Cabinet for Intergovernmental Relations
Michigan, Department of Environmental Quality
Natural Resources Canada, Geological Survey of Canada
Newfoundland and Labrador, Department of Environment and Labour
Northwest Territories, Executive Council
Nova Scotia, Department of Intergovernmental Affairs
Ontario, Ministry of Environment and Energy
Pennsylvania, Department of Environmental Protection
Prince Edward Island, Department of Fisheries and Environment
Québec, Ministère de l'Environnement et de la Faune
Québec, Ministère des Relations internationales
Saskatchewan, Department of Intergovernmental and Aboriginal Affairs
U.S. Department of the Interior, U.S. Geological Survey
U.S. Department of State, Bureau of Oceans & International Environmental and Scientific Affairs
U.S. Environmental Protection Agency, Air Division
U.S. Environmental Protection Agency, International Affairs
U.S. Environmental Protection Agency, Water Division
Wisconsin, Department of Natural Resources

International Joint Commission Boards and Board Members

David Bates, International Air Quality Advisory Board
R.G. Boals, International Souris River Board of Control
Christopher De Rosa, Council of Great Lakes Research Managers
Max Dodson, International Red River Pollution Board
Great Lakes Science Advisory Board (1995-97 Priorities Report)
William Gummer, International Red River Pollution Board
Richard L. Kellow, International Souris-Red Rivers Engineering Board
Paul Lioy, International Air Quality Advisory Board
Don McKay, International Air Quality Advisory Board
G. Tracy Mehan, Great Lakes Water Quality Board
Chris Pharo, International Columbia, Kootenay and Osoyoos Boards of Control
Victor Shantora, Great Lakes Water Quality Board
David Sprynchatyk, International Souris River Board of Control
Neil Stessman, International Souris-Red Rivers Engineering Board

Helle Tosine, Great Lakes Water Quality Board
Jay Unwin, Great Lakes Science Advisory Board
Peter L. Wise, Great Lakes Water Quality Board
Thomas J. Zembrzuski, International Osoyoos Lake Board of Control
Health Professionals Task Force
International Air Quality Advisory Board
International St. Lawrence River Board of Control

Individuals Commissioned to Advise the IJC with respect to the Charge

James P. Bruce
Jutta Brunnée, Faculty of Law, University of British Columbia
John Cairns, Jr., Professor Emeritus, Virginia Polytechnic Institute and State University
Andre Delisle, President, Transfert Environnement
Michael Donahue, Great Lakes Commission
David Edgington, Center for Great Lakes Studies, University of Wisconsin
William Leiss, School of Policy Studies, Queen's University
Stephen J. Toope, Faculty of Law, McGill University
Konrad von Moltke, Institute on International Environmental Governance, Dartmouth College
Oran R. Young, Institute on International Environmental Governance, Dartmouth College

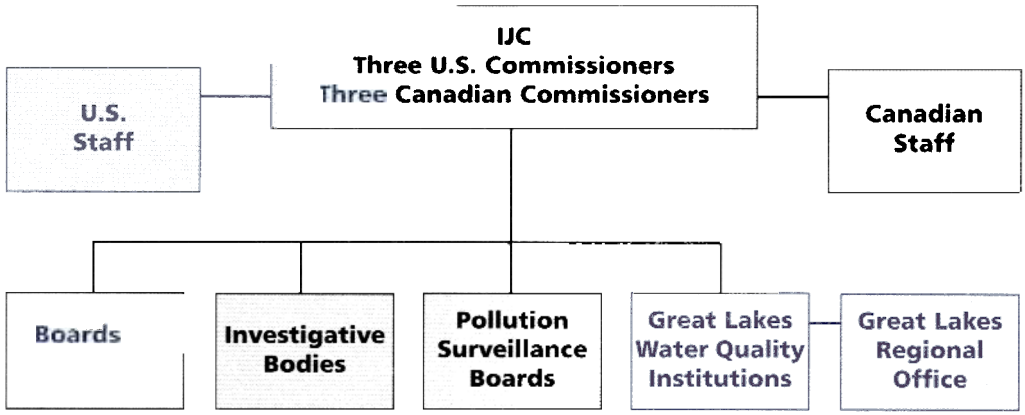
Others

Anne Barton, U.S. Environmental Protection Agency, Science Advisory Board staff
Bay Area Restoration Council of Hamilton-Wentworth and Halton Regions
Terry Bidleman, Environment Canada
Lee Botts, Lake Michigan Federation
Paula Brand, Prairie Farm Rehabilitation Agency, Calgary
John Buccini, Environment Canada
Russ Bullock, U.S. Environmental Protection Agency
Mark Cohen, Queens College, City University of New York
Stewart Cohen, Environment Canada/University of British Columbia
Donald Cole, McMaster University
Rodney Dobell, University of Victoria
Dick Draper, New York State Department of Environmental Conservation
Wayne Draper, Environment Canada
Gordon K. Durnil, former Chairman, U.S. Section, IJC
Leonard Dworsky, Cornell University
Gary Foley, U.S. Environmental Protection Agency
E. Davie Fulton, former Chairman, Canadian Section, IJC
Mike Goffin, Environment Canada
Lino Grima, University of Toronto
Gary Gulezian, U.S. Environmental Protection Agency, Region V
Tom Hamilton
Michael Harcourt, University of British Columbia
Keith A. Henry, former Commissioner, Canadian Section, IJC
John Jackson, Great Lakes United
Barry Johnson, US Agency for Toxic Substances and Disease Registry
David Keeley, State of Maine Planning Office
James D. Kilgore, National Risk Management Research Laboratory, US-EPA
Gail Krantzberg, Ontario Ministry of Environment and Energy
Larry Kwicinski
Emmanuel Landau, American Public Health Association

Claude Lanthier, former Chairman, Canadian Section, IJC
Bob Linett, Science Applications International Corporation
Richard Liroff, World Wildlife Fund
Steve Lonergan, University of Victoria
Genevieve M. Matanoski, Chair, U.S. EPA Science Advisory Board
Elizabeth May, Sierra Club
John Mills, Environment Canada
Carol Misseldine, The Natural Step
Paul Muldoon, Canadian Environmental Law Association
Don Munton, University of Northern British Columbia
Carl Nash, U.S. Environmental Protection Agency
William K. Nuttle
Stephen Owen, University of Victoria
Peter Pearse
David Preston, Department of Foreign Affairs and International Trade, Ottawa
William Reese, University of British Columbia
Henry Regier
Kathleen Rogers, National Audubon Society
Norman Rubin, Energy Probe
Anthony Scott, UBC and former Commissioner, Canadian Section, IJC
Janelle Sharoni
Tom Sommer, U.S. Department of Agriculture
Byron Swift, Environmental Law Institute
Luke Trip, Environment Canada
Jack Vallentyne
Peter Victor, Dean, Faculty of Environmental Studies, York University
Gordon Walker, former Commissioner, Canadian Section, IJC
James W. S. Young

B.C. Wildlife Federation
Canadian Chlorine Coordinating Council
Canadian Environmental Law Association
Canadian Institute of Planners
International Association of Great Lakes Research
International Great Lakes — St. Lawrence Mayors' Conference
National Wildlife Federation

International Joint Commission Organizational Arrangement and Boards



Columbia River
Kootenay Lake
Osoyoos Lake
Accredited Officers
St. Mary & Milk Rivers
Souris River
Lake of the Woods
Rainy Lake
Lake Superior
Niagara River
St. Lawrence River
St. Croix River

Health Professionals Task Force
Red River Basin Task Force
Souris-Red Rivers Engineering Board

Air Quality Advisory
Red River Pollution
Rainy River Pollution
St. Croix River Pollution

Water Quality Board
Science Advisory Board
Council of Research Managers
Indicators Task Force
Nuclear Task Force

IJC BOARDS OF CONTROL

Columbia River

Canadian Section
Chris Pharo
Environment Canada

United States Section
Garald Parker
U.S. Geological Survey

Kootenay Lake

Canadian Section
Larry Adamache (S)
Environment Canada

Pradeef Kharé
BC Ministry of Environment

Chris Pharo (C)
Environment Canada

United States Section
Derrill Cowing
U.S. Geological Survey

Larry Merkle (S)
U.S. Army Corps of Engineers

Colonel James Rigsby (C)
U.S. Army Corps of Engineers

Osoyoos Lake

Canadian Section
Larry Adamache (S)
Environment Canada

Pradeef Kharé
BC Ministry of Environment

Robin McNeil
BC Ministry of Environment

Chris Pharo (C)
Environment Canada.

United States Section
Kris Kaufman
Consultant

Garald Parker (C)
U.S. Geological Survey

Colonel James Rigsby
U.S. Army Corp of Engineers

Tom Zembrzuski (S)
U.S. Geological Survey

Accredited Officers for St. Mary & Milk Rivers

Canadian Officer
Robert Halliday
Environment Canada

Acting United States Officer
David Lystrom
U.S. Geological Survey

NOTE: Officers Appointed by Governments

Souris River

Canadian Section
Russell Boals (C)
Environment Canada

Wayne Dybvig
Saskatchewan Water Corp.

Annette Verley (S)
Environment Canada

Larry Whitney
Manitoba Dept. of Natural Resources

United States Section
William Horak
U.S. Geological Survey

David Sprynczynatyk (C)
North Dakota State Water Commission

Colonel John Wonsik
U.S. Army Corps of Engineers

Jim Murphy (S)
U.S. Army Corps of Engineers

Lake of The Woods

Canada Section
Dale Kimmett
Environment Canada

Rick Walden (S)
Environment Canada

United States Section
Colonel John Wonsik
U.S. Army Corps of Engineers

Ed Eaton (S)
U.S. Army Corps of Engineers

Rainy Lake

Canadian Section
Dale Kimmett (C)
Environment Canada

Rick Walden (S)
Environment Canada

United States Section
Colonel John Wonsik (C)
U.S. Army Corps of Engineers

Ed Eaton (S)
U.S. Army Corps of Engineers

Lake Superior

Canadian Section
Doug Cuthbert (C)
Environment Canada

Peter Yee (S)
Environment Canada

United States Section
John Kangas (S)
U.S. Army Corps of Engineers

General Hans Van Winkle (C)
U.S. Army Corps of Engineers

Niagara River

Canadian Section
Robert Chang
Consultant

Doug Cuthbert (C)
Environment Canada

Len Falkiner (S)
Environment Canada

United States Section
John Kangas (S)
U.S. Army Corp of Engineers

Gus Tjoumas
U.S. Federal Energy Regulatory Commission

General Hans Van Winkle (C)
U.S. Army Corp of Engineers

St. Lawrence River

Canadian Section
André Carpentier
Quebec Ministry of Environment

Doug Cuthbert
Environment Canada

Ed Eryuzlu (S)
Canadian Coast Guard

Marjorie Hare
Ontario Hydro

Gary Running (C)
Canadian Coast Guard

Peter Yeomans
Mayor of Dorval

United States Section
John Bartholomew
New York Power Authority

James Bernier
Consultant

Tom Brown
New York State Dept. of Environmental Conservation

John Kangas (S)
U.S. Army Corps of Engineers

Frank Sciremammano, Jr.
Rochester Inst. of Technology

General Hans Van Winkle (C)
U.S. Army Corp of Engineers

St. Croix River

Canadian Section
Charles Power (C)
Environment Canada

United States Section
Lt. Col. Michael Pratt (C)
U.S. Army Corps of Engineers

Michael Keegan (S)
U.S. Army Corps of Engineers

IJC INVESTIGATIVE BODIES

Health Professionals Task Force

Canadian Section
Alan Abelsohn
Physician

Brian Gibson (C)
University of Toronto

Pierre Gosselin
Quebec Ministry of Public Health

Tee Guidotti
University of Alberta

Margaret Sanborn
Physician

United States Section

Kelley Brix
SRA International Inc.

Drew Brodkin
University of Washington

Theodora Colborn
World Wildlife Fund

Heraline Hicks
Agency for Toxic Substances & Disease Registry

Peter Orris (C)
Cook County Hospital

James Houston (S)
International Joint Commission

Red River Basin Task Force

Canadian Section

Robert Halliday
Environment Canada

Bruce Rawson (Co-director)
Rawson Group Initiatives Inc.

Slobodan Simonovic
University of Manitoba

Larry Whitney
Manitoba Dept. of Natural Resources

Dwight Williamson
Manitoba Environment

United States Section

Donald Herndon (Co-director)
U.S. Army Corps of Engineering

Jay Leitch
North Dakota State University

Kent Lokkesmoe
Minnesota Dept. of Natural Resources

David Sprynczynatyk
North Dakota State Water Commission

Craig Wingo
Federal Emergency Management Agency

Souris-Red Rivers engineering Board

Canadian Section

Richard Kellow (C)
Environment Canada

Frank Quinn
Environment Canada

Jim Rogers (S)
Environment Canada

United States Section

James Kircher
U.S. Geological Survey

Neil Stessman (C)
U.S. Bureau of Reclamation

Dan Jewell (S)
U.S. Bureau of Reclamation

Colonel John Wonsik
U.S. Army Corps of Engineers

IJC POLLUTION SURVEILLANCE BOARDS

Air Quality Advisory

Canadian Section

David Bates
University of British Columbia

David Besner
New Brunswick Dept. of the Environment

Wayne Draper
Environment Canada

Don McKay (C)
Environment Canada

Ed Piché
Ontario Ministry of Environment & Energy

United States Section

Richard Artz
National Oceanic & Atmospheric Administration

Gary Foley
U.S. Environmental Protection Agency

Harold Garabedian
Vermont Agency of Natural Resources

Paul Lioy
Environmental & Occupational Health Sciences Institute

Kathy Ann Tonnessen
National Park Service

John McDonald, Secretary
International Joint Commission

Red River Pollution

Canadian Section

David Donald (S)
Environment Canada

William Gummer (C)
Environment Canada

Joseph O'Connor
Manitoba Dept. of Natural Resources

Dwight Williamson
Manitoba Environment

United States Section

Max Dodson (C)
U.S. Environmental Protection Agency

John Giedt (S)
U.S. Environmental Protection Agency

Gaylen Reetz
Minnesota Pollution Control Agency

Francis Schwindt
North Dakota State Dept. of Health

Rainy River Pollution

Canadian Section

Wayne Scott
Ontario Ministry of Environment & Energy

Ron Shimizu (C)
Environment Canada

United States Section

Gaylen Reetz
Minnesota Pollution Control Agency

Jo Lynn Traub (C)
U.S. Environmental Protection Agency

St. Croix River Pollution

Canadian Section

Ken Hamilton(C)
Environment Canada

Michael Sprague
New Brunswick Environment

John Ritter
Fisheries and Oceans Canada

United States Section

Mickey Kuhns
Maine Dept. of Environmental Protection

Alfred Meister
Consultant

Vacancy (C)

Peter Eaton (S)
Environment Canada

IJC GREAT LAKES WATER QUALITY INSTITUTIONS

Water Quality Board

Canadian Section

Jim Ashman
Ontario Ministry of Agriculture

Doug Dodge
Ontario Ministry of Natural Resources

Michael Goffin
Environment Canada

Denyse Gouin
Quebec Ministry of Environment

Daniel Krewski
Health Canada

Craig Mather
Metropolitan Toronto & Region Conservation Authority

Vic Shantora (C)
Environment Canada

Helle Tosine
Ontario Ministry of Environment & Energy

Hardy Wong
Ontario Ministry of Environment & Energy

United States Section

Kelly Burch
Pennsylvania Dept. of Environmental Protection

Paul Johnson
U.S. Dept. of Agriculture

N.G. Kaul
N.Y. State Dept. of Environmental Conservation

Rod Massey
Minnesota Pollution Control Agency

Tracy Mehan
Michigan Department of Environmental Quality

Don Schregardus
Ohio Environmental Protection Agency

David Ullrich (C)
U.S. Environmental Protection Agency

Susan Sylvester
Wisconsin Dept. of Natural Resources

Peter Wise
Illinois Environmental Protection Agency

John Hartig (S)
International Joint Commission

Science Advisory Board

Canadian Section

Donald Dewees
University of Toronto

Michel Fournier
University of Quebec

Brian Gibson
University of Toronto

Isobel Heathcote
University of Guelph

Henry Lickers
Mohawk Council of Akwesasne

Tony Wagner (C)
Waterfront Regeneration Trust

George Werezak
Dow Chemical Canada Inc.

Michael Zarull
Environment Canada

United States Section

Anders Andren
University of Wisconsin

William Bowerman
Lake Superior State University

Stephen Brandt
SUNY College at Buffalo

Harold Day
University of Wisconsin-Green Bay

Michael Donahue (C)
Great Lakes Commission

Diane Henshel
Indiana University

Suzanne McMaster
U.S. Environmental Protection Agency

Jay Unwin
National Council of the Paper Industry for Air and Stream

Peter Boyer (S)
International Joint Commission

Council of Research Managers

Canadian Section

Renata Claudi
Ontario Hydro

Lynn Cleary
Environment Canada

Andrew Gilman
Health Canada

Dale Henry
Ontario Ministry of Environment & Energy

John Lawrence
Environment Canada

Keith Marshall
Environment Canada

Harvey Shear (C)
Environment Canada

Gary Sprules
University of Toronto

Richard MacDonald
McMaster University

Judith Orendorff
Ontario Ministry of Natural Resources

United States Section

Daniel Bauer
U.S. Geological Survey

Stephen B. Brandt
SUNY College at Buffalo

Joseph DePinto
SUNY College at Buffalo

Chris DeRosa
Agency for Toxic Substances & Disease Registry

Susan Haseltine
U.S. Geological Survey

Steven Hedtke
U.S. Environmental Protection Agency

J. Val Klump
University of Wisconsin-Milwaukee

James Lawless
Environmental Research Institute of Michigan

Jan Miller
U.S. Army Corps of Engineers

Jefferey Reutter (C)
Ohio State University

Russell Van Herik
Great Lakes Protection Fund

Chris Goddard
Great Lakes Fishery Commission (Binational member)

David Dolan (S)
International Joint Commission

Indicators Task Force

Canadian Section

Douglas Dodge (C)
Ontario Ministry of Natural Resources

Isobel Heathcote
University of Guelph

Gail Krantzberg
Ontario Ministry of Environment & Energy

Harvey Shear
Environment Canada

United States Section

Kelly Burch
Pennsylvania Dept. of Environmental Protection

Joseph DePinto
SUNY College at Buffalo

Gary Gulezian
U.S. Environmental Protection Agency

Tim Smith
U.S. Geological Survey

Doug Alley (S)
International Joint Commission

Nuclear Task Force

Canadian Section

Rosalie Bertell
Consultant

Murray Clamen (C)
International Joint Commission

Robert Krauel
Environment Canada

Bliss Tracy
Health Canada

United States Section

Marty Bratzel
International Joint Commission

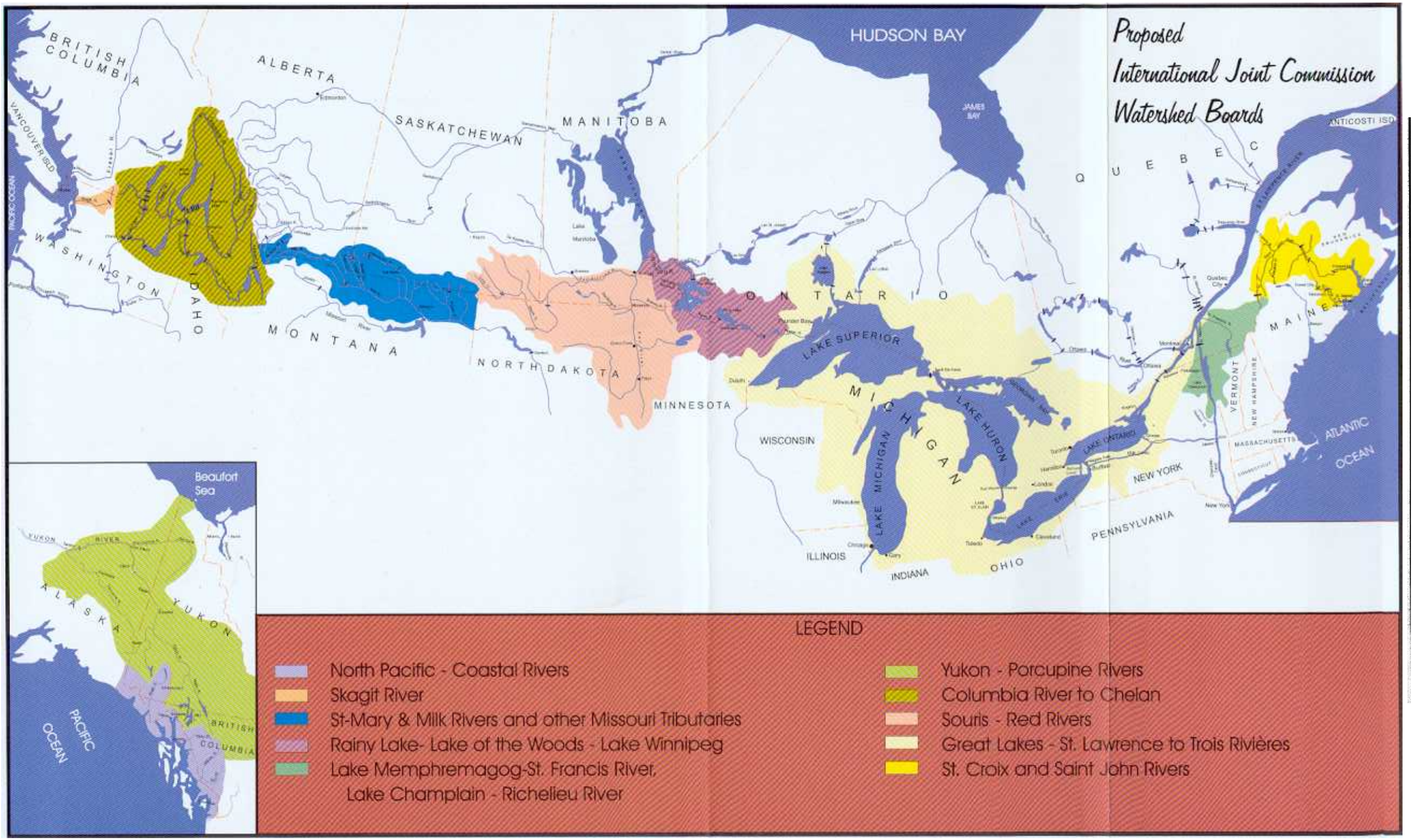
Walter Carey
Consultant

John Clark
International Joint Commission

Joel Fisher (C)
International Joint Commission

(C) Co-chair
(S) Secretary

ANNEX C


Proposed
International Joint Commission
Watershed Boards
HUDSON BAY
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
ONTARIO
QUEBEC
WASHINGTON
IDAHO
MONTANA
NORTH DAKOTA
MINNESOTA
WISCONSIN
MICHIGAN
ILLINOIS
INDIANA
OHIO
NEW YORK
PENNSYLVANIA
VERMONT
NEW HAMPSHIRE
MAINE
MASSACHUSETTS
LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
LAKE ONTARIO
ATLANTIC OCEAN
PACIFIC OCEAN
ANTICOSTI ISD
Beaufort Sea
ALASKA
YUKON
YUKON RIVER
BRITISH COLUMBIA
LEGEND
North Pacific - Coastal Rivers
Skagit River
St-Mary & Milk Rivers and other Missouri Tributaries
Rainy Lake- Lake of the Woods - Lake Winnipeg
Lake Memphremagog-St. Francis River,
Lake Champlain - Richelieu River
Yukon - Porcupine Rivers
Columbia River to Chelan
Souris - Red Rivers
Great Lakes - St. Lawrence to Trois Rivières
St. Croix and Saint John Rivers