

International Joint Commission Twelfth Biennial Report on Great Lakes Water Quality

ECOSYSTEM INTEGRITY: THE CHANGING LAKE ERIE ECOSYSTEM

September 2004

Overview

In the **Great Lakes Water Quality Agreement**, the governments of the United States and Canada agreed “to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem.” Under the terms of the Agreement, the two federal governments agreed “to make a maximum effort to develop programs, practices and technology necessary for a better understanding of the Great Lakes Basin Ecosystem and to eliminate or reduce to the maximum extent practicable the discharge of pollutants into the Great Lakes System.”

The **International Joint Commission (IJC)** is directed to make a full assessment of the progress toward achieving the objectives of the Agreement every two years. The **Twelfth Biennial Report on Great Lakes Water Quality** is the Commission’s most recent assessment of progress.

The Twelfth Biennial Report on Great Lakes Water Quality

In September 2004, the International Joint Commission released its *Twelfth Biennial Report on Great Lakes Water Quality*. The purpose of the report is to assess the progress being made under the Agreement and highlighting issues we conclude need timely and focused attention.

The Commission does not report on all subjects of importance to the Great Lakes, but analyzes and makes eight specific recommendations regarding the Agreement’s goals of

physical, biological and chemical integrity leading to an ecosystem approach to ecological integrity.

This information sheet is one of six that highlight important issues discussed in the report.

THE CHANGING LAKE ERIE ECOSYSTEM

Environmental problems in the Lake Erie ecosystem function as early warning signals for the other Great Lakes. As the shallowest of the lakes, Lake Erie has the shortest water retention time (less than three years), but it also has the largest watershed relative to its size, the highest human population density, the most farm land, and the largest number of major cities. These factors converge to make Erie the Great Lake where ecological disruption often shows up first. If we can develop a detailed understanding of ecological disruption symptoms on Lake Erie, we can perhaps avoid similar problems on the other Great Lakes.

Rapid ecological changes are in fact occurring in the Lake Erie ecosystem, some as puzzling as they are troubling. Evidence now suggests that these changes involve complex and often poorly understood interactions between many factors. From what we know now about the suite of possible problems and their causes, achieving ecosystem integrity in Lake Erie and the other Great Lakes will require greater recognition of the need to address chemical, physical and biological integrity as parts of a unified whole.

Recent Trends and Possible Causes

Trends in Lake Erie water and ecosystem quality since the early 1990s are not well understood. Recent research paints a confusing picture of simultaneously positive and negative trends in water and ecosystem quality. Considerable year-to-year variations in scientific observations also inhibit identifying cause-and-effect linkages that can guide resource management and policy decision-making. The *Twelfth Biennial Report* provides nine detailed examples.

Understanding Lake Erie’s Complexity

Because of their complex nature, addressing the overlapping and interacting issues affecting Lake Erie today requires a greater level of binational communication and cooperation than ever before. Significant information gaps remain; making it difficult for policymakers to determine what actions can and should be taken to improve the lake’s ecological integrity. Because the ecosystem is undergoing dynamic changes, scientists need to conduct more comprehensive biological investigations, including the effects of aquatic invasive species, climate change and other factors, as well as improve measurements of phosphorus loading. These investigations must clarify whether observed environmental changes result from increased phosphorus loadings from outside the lake or as a result of changes in phosphorus cycling within the lake, which could be due to zebra

and quagga mussels, environmental changes, or other factors.

Thus, the Governments should:

- improve phosphorus monitoring from point and nonpoint sources to determine relative contributions of external loadings versus internal cycling;
- improve research to resolve questions about cause-and-effect linkages between observed ecosystem changes and various stressors. The complexity of this issue requires a collaborative research approach between those associated with water quality and fisheries, including linkages with watershed land use issues; and
- insure that these research and monitoring improvements employ an ecological modeling framework that enables the most cost-effective and ecologically meaningful programs to be developed and implemented. Doing so would provide the greatest value to resource management and policy.

Unraveling the complexity of the issues requires new research and monitoring studies under the umbrella of a modeling framework, as recommended by the Commission's Council of Great Lakes Research Managers. The two governments should also develop a Great Lakes ecological observation and forecast network. Such a system of automated buoys and remote sensors would supplement traditional shipboard and shore-based sampling to provide simultaneous records at multiple locations, help us to observe large-scale patterns, test models and predictions, and to increase our understanding of ecosystem and species variability.

The two governments initiated a comprehensive study of the lake in 2002, with a large portion of the work

coordinated and communicated through the Lake Erie Millennium Network. This network of scientists, managers and policymakers is playing a vital and increasingly important role to identify the issues and research priorities, obtaining the necessary data, and providing the binational forum for exchange of information and reporting.

Recommendation

The Commission recommends that Governments continue to fund binational research efforts begun in 2002 and 2003 to better understand changes in the Lake Erie ecosystem. The institutional model provided by the Lake Erie Millennium Network should be considered for adaptation and adoption on the other Great Lakes to foster enhanced binational cooperation and communication.

Scheduled Review of the Great Lakes Water Quality Agreement

This report triggers the much anticipated review of the historic Great Lakes Water Quality Agreement. The current Agreement was signed in 1978 and was amended in 1987. It has not been updated or changed in more than 17 years. During this time, technology and our scientific knowledge and understanding have grown immensely. We need to keep pace with what we know and review the Agreement with an eye toward a sustainable future.

The International Joint Commission (IJC)

IJC was established through the 1909 Boundary Waters Treaty of the United States and Canada. The Treaty recognizes that each country may be

affected by the others actions in the lake and river systems along their common border; its purpose is to prevent and resolve disputes concerning these boundary waters.

For More Information

Additional information regarding IJC's *Twelfth Biennial Report on Great Lakes Water Quality* can be obtained by contacting an IJC office:

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