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North Central Division

Great Lakes Update

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International Joint Commission's Report on the Great Lakes - St. Lawrence River Water Levels Reference Study

The International Joint Commission's (Commission) report to the Governments of Canada and the United States, released on March 31, 1994, recommends a range of actions to alleviate the adverse consequences of fluctuating water levels in the Great Lakes-St. Lawrence River Basin. The study began in 1986, when the Great Lakes, with the exception of Lake Ontario, were at record high levels. The two Federal Governments asked the Commission to examine and report on methods of alleviating the adverse consequences of fluctuating water levels. The Commission's report is based on studies by its Levels Reference Study Board (Study Board), Citizens Advisory Committee, Project Management Team and Great Lakes Water Levels Task Force, as well as extensive public consultation. These studies were reported on in the following reports: *Interim Report on 1985-86 High Water Levels in the Great Lakes-St. Lawrence River Basin*, October 1988; *Living with the Lakes: Challenges and Opportunities*, Main Report and Annexes A-G, May 1989; and, *Levels Reference Study Board, Great Lakes-St. Lawrence River Basin*, Main Report and Annexes 1-6, March 31, 1993.

In general, the Commission's report recommends that Governments should promote shoreline management measures as the principal component of a strategy to reduce flooding and erosion losses. The Commission did not recommend building additional dams and control works to regulate levels and flows to a greater extent than currently available. The Commission also recommended that data gathering and analysis be improved for flooding and erosion damages, wetland areas and conditions affecting water supplies. A binational information center is recommended for establishment, to increase information sharing with the public. Governments at all levels should prepare more effectively for crisis conditions.

The recommendations from the Commission's report are listed below (shown in **bold type**) along with some of the supporting information. Copies of the report can be obtained from the addresses listed at the end of this *Update*.

The Ecosystem Approach

Governments and citizens are recognizing that everything contained by the Great Lakes-St. Lawrence River Basin, including water, land, air and human and other life forms, comprise a single ecosystem. Because the component processes and structures of this ecosystem are integrated in a complex web of interdependent relationships, the Commission is convinced of the need to plan and act with these relationships in mind at all times. **The [Commission] recommends that governments continue to use, and promote the use of,**

the ecosystem approach in managing water levels and flows in the Great Lakes-St. Lawrence River Basin.

Public Involvement and Response

The Commission recognized that progress in addressing the water levels issue depended in large part on public understanding of the causes of water level problems, and the recognition that most proposed solutions could have consequences for others. To help accomplish these ends, the Commission involved the major interests and the relevant public directly in the final phase studies under the Reference. The Commission considers that the public involvement experience was an overall success. It allowed individuals with diverse interests to find common ground on many aspects of the fluctuating water levels issue. **The [Commission] recommends that the Federal Governments review the Commission's public involvement experience under the Reference and use this experience as a model for future large-scale studies of natural resource matters.**

Environmental Assessment

Studies under the Reference found that the wetlands of the Great Lakes-St. Lawrence River basin and the habitats they support are, to a large degree, dependent on water level fluctuations. Water levels, which are strongly related to weather and climate, have a significant impact on the abundance and productivity of wetland acreage. While each wetland is unique, narrowing the range of water level fluctuations generally results in less wetland acreage and less diverse plant communities, and often results in dominance by some plant species. The Commission notes that the Study Board relied heavily on qualitative assessments of environmental impacts and recognizes the value of the considered judgements rendered by the wide range of experts. However, because of the importance of environmental considerations in decision making, the Commission suggests that governments take steps to improve the body of quantitative information on the environmental impacts of water level fluctuations on wetlands. **The [Commission] recommends that the inventory of the location, extent and quality of existing wetlands be completed and that long-term monitoring and evaluation of the effects of water level fluctuations on wetlands be carried out.**

Shore Damage Estimates

For many years economic efficiency has been central to decisions on the desirability of public water and related land-based projects and programs. The most critical components are estimates of potential economic benefits and costs of the proposed projects/programs. The damage data available to the Study Board were developed in the 1970s and used in earlier Commission studies. The Commission has, however, raised serious questions regarding both the data and the methodology used to develop previous damage estimates. Since those earlier studies, there have been no significant improvements in the data gathering process. The Study Board chose to update the existing database and damage estimating method and to conduct a limited number of site-specific studies. It was determined that significant additional time and funding would likely be required to reach more definitive conclusions on measures having basinwide effects.

The [Commission] recommends that governments undertake a sample potential-damage survey to improve flood damage estimates.

The [Commission] further recommends that the first priority for the sample potential-damage survey be Lake Ontario and the St. Lawrence River.

The [Commission] recommends that governments undertake storm and flood damage assessments during or immediately following such events.

The [Commission] recommends that governments undertake long-term monitoring of shoreline erosion and bluff recession and that the information and methodologies developed under this study be used to improve erosion damage assessment capabilities.

The [Commission] recommends that governments undertake without delay

programs to build improved information bases in the following additional areas:

a. comprehensive land use inventory;

b. identification of shoreline areas that are particularly vulnerable to storm surge activity; and,

c. inventory of shore and near-shore installations at risk, particularly high risk installations.

The [Commission] recommends that governments undertake studies to improve forecasts of the frequency of extreme water level events, including the joint probability of combined static and storm induced water levels.

New Water Level Regulation Works

From the results of its studies, the Study Board concluded that, although it may be technically possible to build the additional engineering works required to regulate all five of the Great Lakes, it would not be economically or environmentally feasible to do so. All of these regulatory and protective works would cost billions of dollars to install and hundreds of millions of dollars annually to operate and maintain. Yet for all their cost, these works would permit only limited control of lake levels. The environmental implications of these works are still largely unknown. From its assessments, however, the Study Board estimated that the potential environmental impacts would be highly adverse on Lakes Michigan, Huron and Erie, as well as on the St. Lawrence River. Environmental impacts on Lake Ontario would also be adverse, although not as severe. The Study Board advised that major environmental assessments would be required if such a plan were ever to be considered further. **The [Commission] recommends that no further consideration be given to five-lake regulation.**

For some of the same reasons, the Study Board also concluded that regulation of Lake Erie in combination with Lakes Superior and Ontario (i.e., three-lake regulation) would not be economically feasible or environmentally acceptable. **In light of the above considerations, the [Commission] does not believe that the case has been made for three-lake regulation. Furthermore, the Commission does not believe that such a case could be made in the near term.**

Changes to Existing Regulation

The Study Board also examined the existing regulation plans for Lakes Superior and Ontario to determine whether they could be made more responsive to the needs and desires of the users without jeopardizing the benefits and protections already provided under the Orders of Approval issued by the Commission over the past years. The Study Board also examined possible changes that would call for operations outside of the requirements of the Orders. **The [Commission] will review the Study Board's recommendations on changes to existing regulation. In carrying out this review the Commission wishes to emphasize that it is bound by the "rules or principles" set forth in Article VIII of the Boundary Waters Treaty of 1909.**

Other Hydraulic Measures

The effect of artificial infilling on the discharge capacity of the Niagara River was also examined. Further evaluations during the final phase studies support the initial conclusion that a number of obstructions placed in the river have had a significant effect on the flow capacity of the river and the level of Lake Erie. The Commission has suggested in the past that removal or modification of some of the existing obstructions, particularly those in the vicinity of the Peace Bridge, should be considered. **The [Commission] recommends that governments take appropriate steps to ensure that effective controls are in place concerning actions on one side of the boundary that affect water levels and flows on the other side, particularly with respect to activities that constrict the capacity of the connecting channels.**

Shore Protection

Studies in the final phase indicated that, regardless of whether there is any further regulation of lake levels, damage to shore properties and shore installations will continue to

occur unless preventive action is taken. Shore protection is only one component of a comprehensive approach to shoreline management. **The [Commission] recommends that, as part of a comprehensive shoreline management program, governments consider shore protection measures only where other alternatives alone are not appropriate.**

Measures to Ensure That Human Presence and Behavior in the Coastal Zone Are Appropriate

The Study Board also investigated a variety of land use and management measures to help adapt shoreline activities to large fluctuations in water levels. All of the measures recommended by the Study Board have been used successfully at various times and places around the basin. Although none of these measures would completely eliminate shoreline damage, they do offer practical and effective solutions to specific shoreline problems if undertaken in harmony with conditions unique to the site. **The [Commission] strongly recommends that governments aggressively promote the use of shoreline land use and management measures, including those described in this report, as the principal component of a strategy to alleviate the adverse consequences of fluctuating water levels. The Commission further suggests that flexibility in the choice and management of shoreline land use and management measures on the part of the responsible jurisdiction may be a key element in the success of such programs.**

Measures to Help Ensure that Public Expectations and Attitudes Concerning Living on the Shoreline are Realistic

The [Commission] recommends that the Federal Governments establish an information center as a binational effort, and that the information center be assigned the responsibilities of communicating with the public and facilitating communications between the public and governments on a wide range of issues related to the Great Lakes-St. Lawrence River Ecosystem. The [Commission] further recommends that this information center be linked to larger units within the government agencies, which would provide information resources and staff support, particularly during water level crisis periods.

Visibility, Transparency and Accessibility of the Regulation Process

Over the past few years, the Commission has been considering ways to ensure that its boards of control are more accessible to the public. At present, each board is asked to hold one public meeting each year at a location within the region directly affected by its actions. The meetings are organized to inform the public of the Board's responsibilities and actions and to receive public views and comments. **The [Commission] will examine several proposals to improve the visibility, transparency and accessibility of the regulation process.**

Development of Improved Operational and Management Tools

The [Commission] recommends that governments take action to improve information bases and analytical techniques in the following ways:

a. remedy deficiencies in the precipitation and snowpack network;

b. undertake efforts to improve long-range precipitation and temperature forecasts;

c. develop new technologies, such as satellite, airborne and ground-based radar to monitor lake evaporation, over-lake precipitation and basinwide snow conditions;

d. continue work to upgrade models used for simulation, forecasting and regulation in order to formulate a comprehensive water supply and routing model that includes the whole basin through Trois Rivières, Québec;

e. continue efforts to improve the forecasting and statistical information available to all users throughout the system to make decisions and couple these efforts with an upgraded systemwide supply and routing model;

f. implement the efforts

referenced in Chapter 8 of the Study Board's final report to improve the quality and communication of information to the public; and,

g. initiate efforts to standardize hazard mapping methodologies across the Great Lakes-St. Lawrence River region and develop procedures for allowing broad access to such maps for general use.

The [Commission] recommends that cooperative binational coordination and planning of geographic information system development and use be considered to increase the usability of information stored in geographic information systems related to the Great Lakes-St. Lawrence River System, and that national and international standards for data transfer be established.

The [Commission] further recommends that the following data elements be incorporated into geographic information system databases:

a. all land use information for the entire shoreline;

b. all hazard areas along the Great Lakes-St. Lawrence River System; and,

c. all coastal wetlands.

In view of all the data needs and gaps identified during the study, the Commission recommends that a binational mechanism or mechanisms be established to acquire and maintain improved data and information bases for the various hydraulic, hydrometeorologic, socioeconomic and environmental data and information.

The [Commission] recommends that efforts continue to develop a binational assessment of the potential impacts of climate change on the Great Lakes-St. Lawrence River System.

Measures to Plan for and Manage Water Levels Crises

The Study Board attempted to formulate a systemwide crisis action plan consisting of coordinated manipulation of the diversions at Long Lac and Ogoki on Lake Superior, Lake Michigan at Chicago and the Welland Canal between Lakes Erie and Ontario, as well as deviations from the regulation plans for Lakes Superior and Ontario, an ice boom at the head of the St. Clair River and additional flow through the Black Rock Lock in the Niagara River. Because the available information was inadequate in several important areas, the Study Board had difficulty assessing the socioeconomic and environmental effects of many of the potential measures inside and outside of the Great Lakes-St. Lawrence River Basin. **The [Commission] recommends that before definitive conclusions are reached regarding the use of the diversions at Long Lac, Ogoki, Lake Michigan at Chicago, the Welland Canal and the Black Rock Lock in the Niagara River as crisis relief measures, the potential impacts within and outside of the Great Lakes-St. Lawrence River Basin be determined.**

The Study Board also recommended emergency actions that the Commission might take within its existing areas of responsibility. **The [Commission] will review the Study Board's recommendations on possible deviations from the regulation plans for Lakes Superior and Ontario. In considering what action is appropriate for it to take, the Commission will observe the "rules or principles" set forth in Article VIII of the Boundary Waters Treaty of 1909.**

Work done by the Study Board also confirms the appropriateness and viability of a number of possible emergency planning and land-based crisis measures. Many Great Lakes communities currently practice some of these measures. **The [Commission] recommends that the Federal Governments, in cooperation with state, provincial and local governments initiate comprehensive, coordinated emergency preparedness planning for water level crises, using the following measures:**

a. intensified storm and water-level forecasting, warning, monitoring and public information/updating mechanisms;

b. clear delineation of responsibilities and lines of communication between federal, state, provincial and local governments, and other involved agencies and groups;

c. temporary emergency sandbagging and other temporary shore protection alternatives;

d. temporary land and water use restrictions; and,

e. assessment of environmental impacts of proposed actions.

The [Commission] further recommends that post-crisis action reports be prepared that include comprehensive assessments of the impacts of the measures taken in order to evaluate the effectiveness of emergency preparedness plans and to recommend areas for improvement.

Where to Get More Information

For a copy of the Commission's report, *Methods of Alleviating the Adverse Consequences of Fluctuating Water Levels in the Great Lakes-St. Lawrence River Basin, A Report to the Governments of Canada and the United States*, write or call the International Joint Commission offices listed below.

In the United States:

International Joint Commission
1250 23rd Street NW, Suite 100
Washington, D.C. 20440

Mr. Frank Bevacqua
(202) 736-9000

In Canada:

International Joint Commission
100 Metcalfe Street, 18th Floor
Ottawa, Ontario K1P 5M1

Mr. Alan Clarke or
Ms. Marie Terrien
(613) 995-2984

Meetings With the Public

The International Lake Superior Board of Control (Lake Superior Board) and the International St. Lawrence River Board of Control (St. Lawrence Board) invite you to two meetings with the public (one meeting for each Board). Each meeting is to inform the public of the Board's responsibilities and current activities and to hear your comments and suggestions regarding their work.

The Boards are binational organizations which report to and advise the International Joint Commission. The Lake Superior Board is concerned with Lake Superior levels and outflows and the control facilities used to regulate flow through the St. Marys River. The St. Lawrence Board is concerned with Lake Ontario and St. Lawrence River levels and outflows, the control and navigation facilities in the St. Lawrence River as far downstream as Montréal, and similar subjects.

The times and locations of each meeting are:

Lake Superior Board:

June 14, 1994,
from 7:30 to 10:00 p.m.
Canal Park Museum
600 Lake Avenue South
Foot of Canal Park Drive
Duluth, Minnesota

St. Lawrence Board:

June 21, 1994,
from 7:30 to 10:00 p.m.
Captain's Quarters Hotel
26 East 1st Street
Oswego, New York

RICHARD W. CRAIG
Colonel, EN
Commanding

Table 1

Possible Storm Induced Rises (in feet) at Key Locations on the Great Lakes
May 1994

	Degrees of Possibility				
	20%	10%	3%	2%	1%
LAKE SUPERIOR					
Duluth	0.8	0.9	1.1	1.2	1.3
Grand Marais	0.5	0.7	0.9	1.0	1.2
Marquette	1.1	1.3	1.6	1.8	2.0
Ontonagon	0.7	0.8	1.0	1.1	1.3
Point Iroquois	0.9	1.1	1.4	1.5	1.7
Two Harbors	0.6	1.0	1.6	2.1	2.7
LAKE MICHIGAN					
Calumet Harbor	1.4	1.6	1.9	2.1	2.3
Green Bay	1.8	2.0	2.3	2.5	2.7
Holland	0.6	0.7	0.9	1.0	1.0
Kewaunee	0.7	0.8	1.0	1.1	1.3
Ludington	0.7	0.8	0.9	0.9	1.0
Milwaukee	0.9	1.1	1.3	1.5	1.7
Port Inland	0.8	1.1	1.4	1.7	2.0
Sturgeon Bay	0.8	1.1	1.4	1.7	2.0
LAKE HURON					
Detour Village	0.4	0.5	0.5	0.5	0.6
Essexville	1.9	2.2	2.5	2.7	3.0
Harbor Beach	0.7	0.8	1.1	1.2	1.4
Harrisville	0.5	0.5	0.6	0.6	0.7
Lakeport	0.9	1.1	1.3	1.5	1.7
Mackinaw City	0.6	0.7	0.8	0.9	1.0
LAKE ST. CLAIR					
St. Clair Shores	0.4	0.5	0.6	0.7	0.8
LAKE ERIE *					
Barcelona	1.1	1.3	1.6	1.8	2.0
Buffalo	2.2	2.6	3.2	3.6	4.0
Cleveland	0.9	1.1	1.2	1.3	1.4
Erie	1.0	1.2	1.4	1.6	1.8
Fairport	0.7	0.9	1.1	1.3	1.4
Fermi Power Plant	1.4	1.7	2.1	2.3	2.6
Marblehead	1.1	1.3	1.6	1.9	2.1
Sturgeon Point	1.4	1.8	2.4	2.9	3.4
Toledo	2.0	2.3	2.7	3.1	3.4
LAKE ONTARIO					
Cape Vincent	0.6	0.7	0.8	0.9	1.0
Olcott	0.4	0.5	0.6	0.6	0.7
Oswego	0.6	0.7	0.9	1.1	1.2
Rochester	0.6	0.7	0.8	0.9	1.0

* The water surface of Lake Erie has the potential to tilt in strong winds, producing large differentials between the ends of the lake.

Note: The rises shown above, should they occur, would be in addition to the still water levels indicated on the Monthly Bulletin. Values of wave runup are not provided in this table.

Great Lakes Basin Hydrology

During the month of April precipitation on each Great Lakes basin was above average. For the year to date, precipitation is about 3% below average for the entire Great Lakes basin. The net supply of water to Lakes Superior, Erie and Ontario was above average in April, while Lakes Michigan-Huron were below average. Table 2 lists April precipitation and water supply information for all of the Great Lakes.

In comparison to their long-term (1918-1993) averages, the April monthly mean water level of Lake Superior was 1 inch above average, Lakes Michigan-Huron, St. Clair and Erie were 8, 11 and 11 inches above average respectively, and Lake Ontario was at its long-term average. Shoreline residents on Lakes Michigan-Huron, St. Clair and Erie are cautioned to continue to be alert to possible adverse weather conditions, as these could compound an already high lake level situation. Further information and advice will be provided by the Corps of Engineers should conditions worsen.

TABLE 2
GREAT LAKES HYDROLOGY[1]

PRECIPITATION (INCHES)								
BASIN	APRIL				YEAR-TO-DATE			
	1994[2]	Average (1900-1991)	Diff.	% of Average	1994[2]	Average (1900-1991)	Diff.	% of Average
Superior	3.0	2.0	1.0	150	6.8	7.1	-0.3	96
Michigan-Huron	2.8	2.6	0.2	108	7.9	8.5	-0.6	93
Erie	4.3	3.1	1.2	139	10.6	10.4	0.2	102
Ontario	3.8	2.9	0.9	131	10.8	10.6	0.2	102
Great Lakes	3.2	2.5	0.7	128	8.3	8.6	-0.3	97

LAKE	APRIL WATER SUPPLIES[3] (CFS)		APRIL OUTFLOW[4] (CFS)	
	1994[2]	Average (1900-1989)	1994[2]	Average (1900-1989)
Superior	170,000	149,000	76,000	69,000
Michigan-Huron	210,000	286,000	188,000[5]	182,000
Erie	102,000	66,000	224,000[5]	203,000
Ontario	131,000	93,000	262,000	249,000

[1]Values (excluding averages) are based on preliminary computations.
[2]Estimated.
[3]Negative water supply denotes evaporation from lake exceeded runoff from local basin.
[4]Does not include diversions.
[5]Reflects effects of ice/weed retardation in the connecting channels.

CFS = cubic feet per second.

For Great Lakes basin technical assistance or information, please contact one of the following Corps of Engineers District Offices:

For NY, PA, and OH:
COL Walter C. Neitzke
Cdr, Buffalo District
U.S. Army Corps
of Engineers
1776 Niagara Street
Buffalo, NY 14207-3199
(716) 879-4200

For IL and IN:
LTC David M. Reed
Cdr, Chicago District
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111 North Canal Street
Chicago, IL 60606-7206
(312) 353-6400

For MI, MN, and WI:
COL Brian J. Ohlinger
Cdr, Detroit District
U.S. Army Corps
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P.O. Box 1027
Detroit, MI 48231-1027
(313) 226-6440 or 6441