

TO: Chair and Members of the Watershed Management Advisory Board
Meeting #4/06, September 15, 2006

FROM: Adele Freeman, Director, Watershed Management

RE: INTERNATIONAL JOINT COMMISSION
Options for Managing Lake Ontario and St. Lawrence River Water Levels and
Flows

KEY ISSUE

To report on the "Options for Managing Lake Ontario and St. Lawrence River Water Levels and Flows" - final report by the International Lake Ontario - St. Lawrence Study Board - March, 2006 and the recommendation adopted at the Conservation Ontario Council meeting of August 28, 2006.

RECOMMENDATION

THE BOARD RECOMMENDS TO THE AUTHORITY THAT the report on the three selected candidate plans labeled A+, B+ and D+ and other recommendations outlined in the final report "Options for Managing Lake Ontario and St. Lawrence River Water Levels and Flows" by the International Lake Ontario - St. Lawrence River Study Board to the International Joint Commission dated March, 2006 be received;

THAT the Toronto and Region Conservation Authority (TRCA) endorse Conservation Ontario Council's resolution from its August 28, 2006 meeting with emphasis on the strong support for Plan B+ - Balanced Environmental;

AND FURTHER THAT the International Joint Commission (by the end of the public comment period - September 15, 2006), Conservation Ontario and TRCA's waterfront municipalities be so advised.

BACKGROUND

The International Joint Commission (IJC) issued an Order of Approval on October 11, 1952, amended on July 2, 1956, for the construction of the St. Lawrence River Hydropower Project (Moses Saunders Dam, Cornwall). Regulation of Lake Ontario water levels and outflows in accordance with the Commission's orders began in 1960. The current plan, 1958-D, which has been in effect since October 1963, was designed for the hydrologic conditions experienced from 1860 to 1954. For that reason, 1958-D has not performed well under the extreme high and low water supply conditions experienced since that time. As a result, the IJC and its International St. Lawrence River Board of Control have had to deviate from the plan to better address changing needs and interests.

On December 11, 2000, the IJC issued a directive to the International Lake Ontario-St. Lawrence River Study Board, which it had appointed, to:

- i) review the current regulation of levels and flows in the Lake Ontario-St. Lawrence River system, taking into account the impact of regulation on affected interests;
- ii) develop an improved understanding of the system among all concerned; and
- iii) provide all the relevant technical and other information needed for the review.

Attachment 1 shows the Lake Ontario-St. Lawrence River Basin including the watersheds of the St. Lawrence and Ottawa rivers. The location of the St. Lawrence River control structures between Massena, New York and Cornwall, Ontario and the river through Montreal Harbour are also shown.

As part of the 5-year study and in preparation of the final report, the Lake Ontario-St. Lawrence (LOSL) Study Board released in mid-2005 three Candidate Plans for public and agency comment. After consideration of the staff report and Watershed Management Advisory Board recommendations, the Authority at Meeting #6/05, held on July 22, 2006, approved Resolution # A178/05 as follows:

THAT the report on the Candidate Plans recently released for public and agency comment by the International Lake Ontario-St. Lawrence Study Board be received;

THAT the Toronto and Region Conservation Authority (TRCA) support the study board's vision "to contribute to economic, environmental and social sustainability of the Lake Ontario and St. Lawrence System" and the integrated evaluation approach in developing the Candidate Plans for the six interests;

THAT comments contained in this report on the Candidate Plans be forwarded to the International Lake Ontario-St. Lawrence Study Board for their consideration in preparing the recommendations to the International Joint Commission;

AND FURTHER THAT Conservation Ontario, the conservation authorities on Lake Ontario and the St. Lawrence River and TRCA's waterfront municipalities be so advised.

Current Status

The International Lake Ontario-St. Lawrence River Study Board has prepared "Options for Managing Lake Ontario and St. Lawrence River Water Levels and Flows" (March 2006). The IJC has released the final report for public comment until September 15, 2006 and the IJC will develop a draft decision based on consideration of the final report, public comment and any other relevant information. The IJC will hold public hearings and invite written comments after the release of the draft decision and will consult with the governments of Canada and the United States to seek their concurrence before making a decision whether to change its Orders of Approval or the current regulation plan. The IJC's final decision will be released to the governments and to the public in print and online.

Summary of Lake Ontario Report

This summary borrows heavily from the Executive Summary of the Main Report. Copies of the Study Board Main Report and Annexes are available on-line at <http://www.losl.org/reports/finalreport-e.html>.

The document summarizes findings from the scientific and other undertakings of the study, describes three new candidate plans for IJC consideration, presents recommendations on public involvement and regulation-related matters and outlines some steps towards implementation of a new regulation plan. The study board indicates confidence that each of the three candidate plans performs better than the current operating regime (1958D) in terms of overall net economic and environmental benefits to interests throughout the system and that a plan selected from these three will satisfy most of the affected interest groups. The report notes that changes to the criteria and existing operating plan are not possible without harm to some interests and that the majority of board members do not consider these damages a "disproportionate loss." It is indicated that the Study Team has identified all the significant trade-offs that have to be made among competing interests and quantified the relative benefits and costs. The result is an intensive, comprehensive and detailed analysis of the physical and ecological dynamics that are interacting with the human uses of the system. The study presents a comprehensive set of tools, models, supporting data and information that is intended to facilitate the ability of the IJC to make the final decision regarding regulation of Lake Ontario levels and outflows.

New Candidate Regulation Plans

The Study Team formulated and evaluated numerous possible regulation plans. It has selected three candidate plans labeled A+, B+ and D+, which address the range of interests and issues that emerged as part of an extensive evaluation effort. These plans have the designation + as they represent improvements over the versions of plans A, B and D that were made public during the study's summer 2005 outreach activity. From an interest perspective, all three candidate plans benefit commercial navigation and hydropower and have no impact on municipal, industrial and domestic water use relative to Plan 1958-D with Deviations (1958-DD). The greatest difference between the plans is in how they address recreational boating, the shoreline flood and erosion or coastal interests and the environment or natural ecosystem. Attachment 2 shows a comparison for the three candidate plans and 1958-DD and represent average levels, the level exceeded 1% of the time and the level exceeded 99% of the time in each quarter-month of the year based on the 50,000 year stochastic sequence for Lake Ontario.

The report summarizes that Plan A+ is the most regimented of the three plans, striving to keep Lake Ontario within as narrow a range as possible. It provides the highest overall net economic benefit, the greatest economic benefit for recreational boaters, both upstream and downstream, and benefits in terms of shore protection maintenance and flood concerns on Lake Ontario. In comparison with Plan 1958-D with Deviations, higher erosion rates along unprotected Lake Ontario shoreline are of concern, as are increased flood damages on the lower St. Lawrence River. Plan A+ provides small improvements for the environment, but, of the three candidate plans, has the smallest gain in this regard when compared with Plan 1958-D with Deviations.

The report summarizes that Plan B+ strives to return the Lake Ontario-St. Lawrence system to a more natural regime, with conditions similar to those that existed prior to the St. Lawrence River Hydropower Project, while at the same time attempting to minimize damages to present interests. In comparison with Plan 1958-D with Deviations, it does indeed provide overall improvement for the natural environment on Lake Ontario and the upper St. Lawrence River (e.g. coastal wetlands). It also provides net benefits for hydropower and commercial navigation. Its downside is that it results in higher damages for Lake Ontario shoreline properties and is associated with increased flood damages on the lower St. Lawrence River. Although Plan B+ has some negative recreational boating numbers, at public meetings, many in the boating community, especially on the upper St. Lawrence, supported Plan B as presented at the summer 2005 public meetings prior to its final "fine tuning." From their point of view, this plan has better St. Lawrence River and Lake St. Lawrence performance, generally higher Lake Ontario levels in spring and fall, and better overall performance for boaters more than half of the time than Plan 1958-D with Deviation. In the eyes of many, Plan B+ is the only candidate plan that consistently transforms and improves the diversity and productivity of the natural ecosystem (e.g. coastal wetlands), addresses species at risk legislation objectives, and represents an important step forward towards a level of ecological integrity that would otherwise be difficult to achieve.

According to the report, the intent of Plan D+ is to increase the net economic and environmental benefits of regulation, relative to Plan 1958-D with Deviations, without disproportionate losses to any interests. In this respect, this plan succeeds in achieving gains in net benefits for recreational boaters, hydropower and commercial navigation. Despite some small losses in the Lake Ontario shore protection category, Plan D+ is very close to 1958-D with Deviations in terms of shoreline property interests. Plan D+ also provides a general level of improvement for the environment across the range of performance indicators considered.

Summary of Study Board Recommendations

The study highlights that conditions and the priorities for lake level and flow regulation always change over time, and new scientific and technological advances will continue to be made. It is recommended that "An adaptive management process should support the selected regulation plan and incorporate performance tracking: an initial performance review of the new plan should be undertaken five years after its implementation; and a more in-depth evaluation should be carried out ten years from its implementation to include consideration of adaptive changes to the selected plan."

The study indicates that they've considered in detail the trade-offs between interests, and this is reflected in the plan rules. The Study Board has agreed that long-term deviations from plan rules and flows have the effect of changing the intended performance of the plan(s) as designed and the benefits that flow from the plan(s). However, the Board recognizes and supports the need for short-term deviations from plan flows under specified emergency conditions but there would be a need for considerable public relations support at such times.

The Study Board indicated that a significant opportunity exists to move forward on longterm resolution of a few vexing issues related to fluctuating water levels, for example, shoreline flood and erosion problems. They recommend that: "During International Joint Commission consultations with governments, the Commission should act as a catalyst to promote and advance mitigation of persistent shoreline flood and erosion problems. For example, in light of the findings of this study, responsible state, provincial and municipal authorities could undertake a review of shoreline management practices and policies.

Shoreline management strategies and permitting processes could be revisited and renewed for critical reaches of the shoreline utilizing new data and information gathered during this study, including water level regime information for a new regulation plan. This review should help to identify options for dealing with problems affecting land use and existing structures within shoreline flood and erosion hazard zones." The report recommends that the IJC should consider applying the general planning approach used in this exercise ("Shared Vision Modeling") in subsequent International Joint Commission studies.

The study suggests that the basic data and information collected, the research undertaken, the models developed and the body of knowledge accumulated during the study have many possible and potential uses beyond the review of the Commission's Lake Ontario regulation criteria and plan. The report recommends that the IJC and the International St. Lawrence River Board take steps to make this information as accessible and useful as possible to a broad range of organizations and applications.

Additionally, the Study Board recommends that additional resources and personnel needed to meet new responsibilities of plan implementation by the International St. Lawrence River Board of Control be sought and provided. As a first priority, a full-time communications officer should be engaged to lead outreach activities relating to implementation of a new plan. Then, as a second priority, more science capacity should be added to develop links with science organizations, monitor regulation plan performance and assume responsibility for seeking out and identifying future adaptation actions and strategies.

Further recommendations derived from the outreach activities and experiences of the Study Board and Public Interest Advisory Group include the following:

- i) People living and working along Lake Ontario and the St. Lawrence River shorelines need to be educated and informed with respect to the basic hydrology of the Great Lakes-St. Lawrence system. An education program is necessary.
- ii) People affected by changing water levels and flows resulting from regulatory actions, in both the short term (hours) and the long term (years), need to understand and be informed of these conditions so that they can prepare for and adapt to them. It is recognized that shoreline development, infrastructure and regulatory programs have evolved with some dependence on the current Orders of Approval and regulation plan operations. Changes should be accompanied by education, outreach and help in accommodating a new water level regime and water management decision-making structure.

- iii) The International St. Lawrence River Board of Control should be restructured to better reflect the views of all interests and should incorporate a public advisory body. Consideration should be given to renaming the Board, deleting the term "Control."; and,
- iv) For studies such as this, the Commission should appoint Public Interest Advisory Group members for their expertise and ability to reach out to local interest groups.

Publication of the results of Study Board and Commission research should be encouraged and supported by the Commission. In that vein, the Commission's website could reference current and future study-related publications in order to broaden public awareness.

Scientific and Technological Advances

The report describes how the Study Board has introduced a new planning approach referred to as "Shared Vision Planning." This approach combines scientific and public input in an interactive analytical framework that has helped the Study Team and public interest groups explore numerous plan formulation opportunities, operating nuances and performance impacts in an organized fashion.

The Shared Vision Planning approach used in the study integrates a hierarchy of advanced models. They include an ecosystem response model, shoreline dynamics models used for flood damage and erosion predictions, and a series of new economic models that provide the economic benefits and costs associated with recreational boating, hydropower and commercial navigation.

The report indicates that the Study Board used highly sophisticated hydrologic modeling to ensure the reliability, resilience and robustness of each plan under a stochastically generated 50,000-year sequence. Four different climate change scenarios were analyzed and used to thoroughly test candidate plans, ensuring that none had fatal flaws that would inhibit their performance under these extreme potential conditions. When choosing options, the Study Board decided that a legitimate comparative analysis of the benefits and costs associated with the various plans, should be based on the long-term stochastic hydrologic sequence rather than the 100-year historical record.

The report highlights that implementation of a candidate plan will impose a new set of requirements on the International St. Lawrence River Board of Control. The new requirements (including information management; greater public communication and outreach; model running, maintenance and upgrading; the analysis of monitoring data) must be addressed to enable the Board to remain aware of plan impacts and to know when and to what extent adaptive changes in policy should be considered.

Conservation Ontario Review and Recommendations

The study was reviewed by Conservation Ontario and the 11 authorities (Central Lake Ontario, Credit Valley Conservation, Ganaraska Region Conservation, Conservation Halton, Hamilton Conservation Authority, Lower Trent Conservation, Niagara Peninsula Conservation Authority, Quinte Conservation, Toronto and Region Conservation Authority, Cataraqui Region and Raisin Region Conservation Authority) along the Lake Ontario-St. Lawrence system.

The following recommendations on the Study Board's final report were adopted by Conservation Ontario Council at its meeting held on August 28, 2006 .

WHEREAS the International Joint Commission established in December 2000 the International Lake Ontario and St. Lawrence River Study Board to comprehensively evaluate options for regulating levels and flows in the Lake Ontario – St. Lawrence River System beyond the current plan 1958-D which has been in effect since October, 1963.

WHEREAS the Study Board adopted a Vision to contribute to the economic, environmental and social sustainability of the Lake Ontario and St. Lawrence River System and a Goal – to identify flow regulation plans and criteria that best serve the range of affected interests, and address climatic conditions in the basin.

WHEREAS the Study Board was directed to consider six interests – 3 interests under Plan 1958D (commercial navigation, municipal – industrial – domestic water uses and hydroelectric power generation) and 3 new interests (wetlands/environmental, recreational boating/tourism and coastal processes).

WHEREAS the International Joint Commission has initiated a five-step decision process and is requesting by September 15, 2006 public comment on the Lake Ontario-St Lawrence River Study to assist them in their deliberations towards a draft decision.

WHEREAS Conservation Ontario advocates the need for implementation of “integrated watershed approaches” and the continued preservation and restoration efforts of the environment to ensure the sustainability of the Great Lakes Basin.

AND WHEREAS Conservation Ontario will have further opportunity after development of a draft decision to participate in Commission hearings on the draft decision.

THEREFORE BE IT RESOLVED THAT Conservation Ontario strongly support Plan B+ – Balanced Environmental as the basis for regulation of out flows from Lake Ontario consistent with the Study Board's vision, goal and guidelines.

THAT predicted small increases in shoreline erosion and flooding under Plan B+ be managed, as discussed in the study, with measures employed by various levels of government, including the conservation authorities regulation of development within hazardous lands.

THAT Conservation Ontario supports the Adaptive Management recommendations as critical in maintaining the investment and benefit of data collection, scientific analysis and plan evaluation models to monitoring and performance review of a new operating plan and making informed adjustments in future.

THAT Conservation Ontario and the 11 Conservation Authorities along the Lake Ontario-St. Lawrence system will continue to support the Adaptive Management Approach and recommendations by providing monitoring information, analysis and commenting on future plan adjustments.

AND THAT this recommendation be forwarded to the International Joint Commission.

RATIONALE

The Study Board's approach in formulating the three candidate plans A+, B+ and D+ and the associated recommendations on mitigation actions, adaptive management including data management/sharing and changes to the Lake Ontario-St. Lawrence Board of Control and public outreach activities, etc. has provided a scientific based model for other Great Lakes work of the IJC. The IJC recently announced the initiation of a major study on the Upper Great Lakes (Superior, Michigan, Huron, and Erie) to investigate the factors affecting water levels and flows including physical changes in the St. Clair River and possible improvements to the regulation of outflows from Lake Superior.

The study and recommendations are very consistent with the summer 2005 resolutions passed by the Great Lakes and St. Lawrence Cities Initiative and Conservation Ontario's advocacy of "integrated watershed approaches and the continued preservation and restoration efforts of the environment to ensure the sustainability of the Great Lakes Basin."

Plan B+- Balanced Environmental is the preferred candidate plan as set out in Conservation Ontario's adopted recommendations but also "is the only candidate plan that consistently transforms and improves the diversity and productivity of the natural ecosystem (e.g. coastal wetlands), addresses species at risk legislation objectives, and represents an important step forward towards a level of ecological integrity that would otherwise be difficult to achieve." Any predicted small increase in erosion/flooding which for Lake Ontario are existing hazard concerns on the south shore can be managed by complimentary actions of different levels of government as recommended by the Study Board.

As important are the study's recommendations for 'adaptive management' in maintaining the investment and benefit of data collection, scientific analysis and plan evaluation models to monitoring and performance review of a new operating plan and making informed adjustments in future.

DETAILS OF WORK TO BE DONE

The comments and recommendations should be forwarded to the IJC by September 15, 2006 and also forwarded to Conservation Ontario and our member municipalities along Lake Ontario. As a result, TRCA staff will forward the recommendations of the Watershed Management Advisory Board after the meeting on September 15, 2006.

Once the IJC has made a draft decision on a plan, public hearings will be held. TRCA will work with our other conservation authorities along the Lake Ontario-St. Lawrence system and Conservation Ontario to recommend the appropriate participation at the future public hearings. We will report back to the Authority at a future meeting on the draft decision of the IJC.

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Date: August 30, 2006
Attachments: 2

Attachment 1

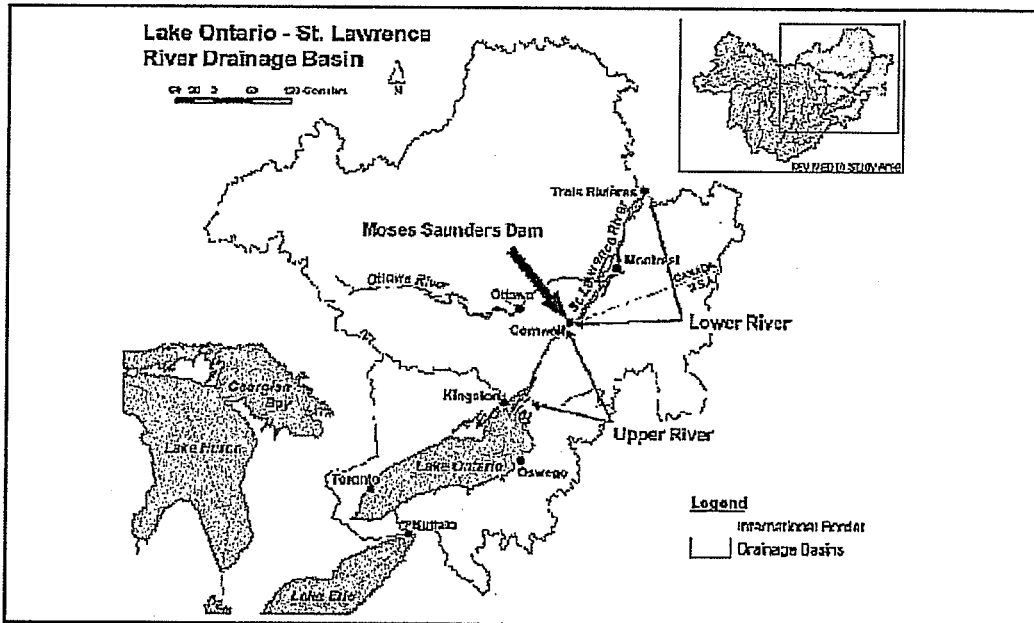


Figure 2: The Lake Ontario-St. Lawrence River Basin

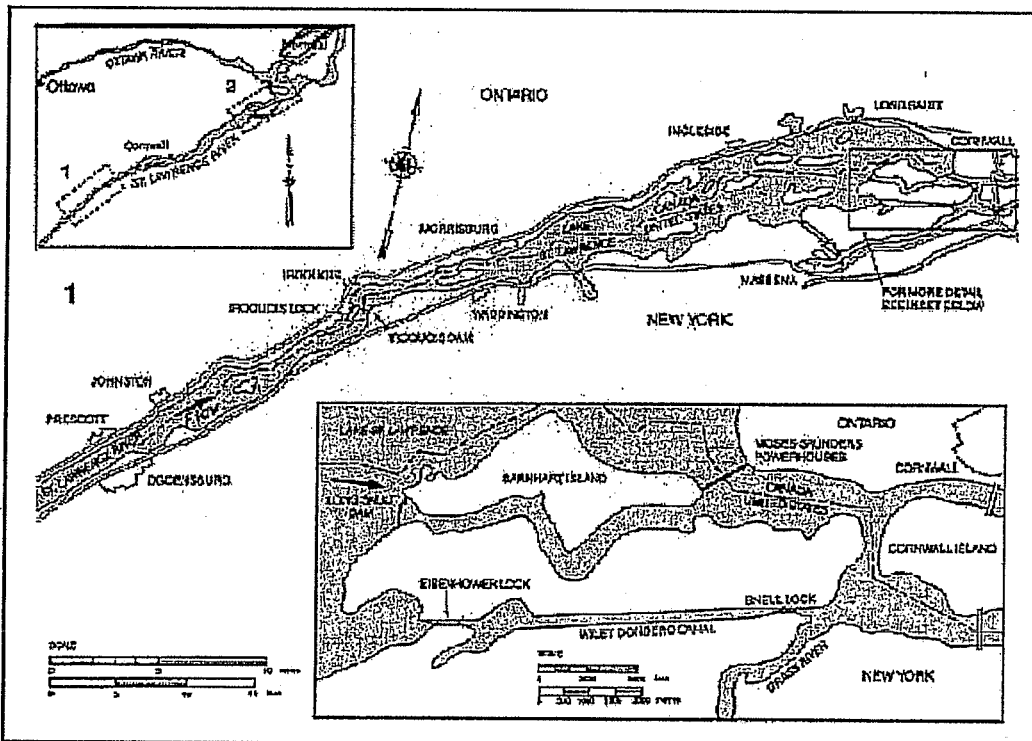


Figure 3: Location of the control structures in the St. Lawrence River and other features, to Montreal, Quebec

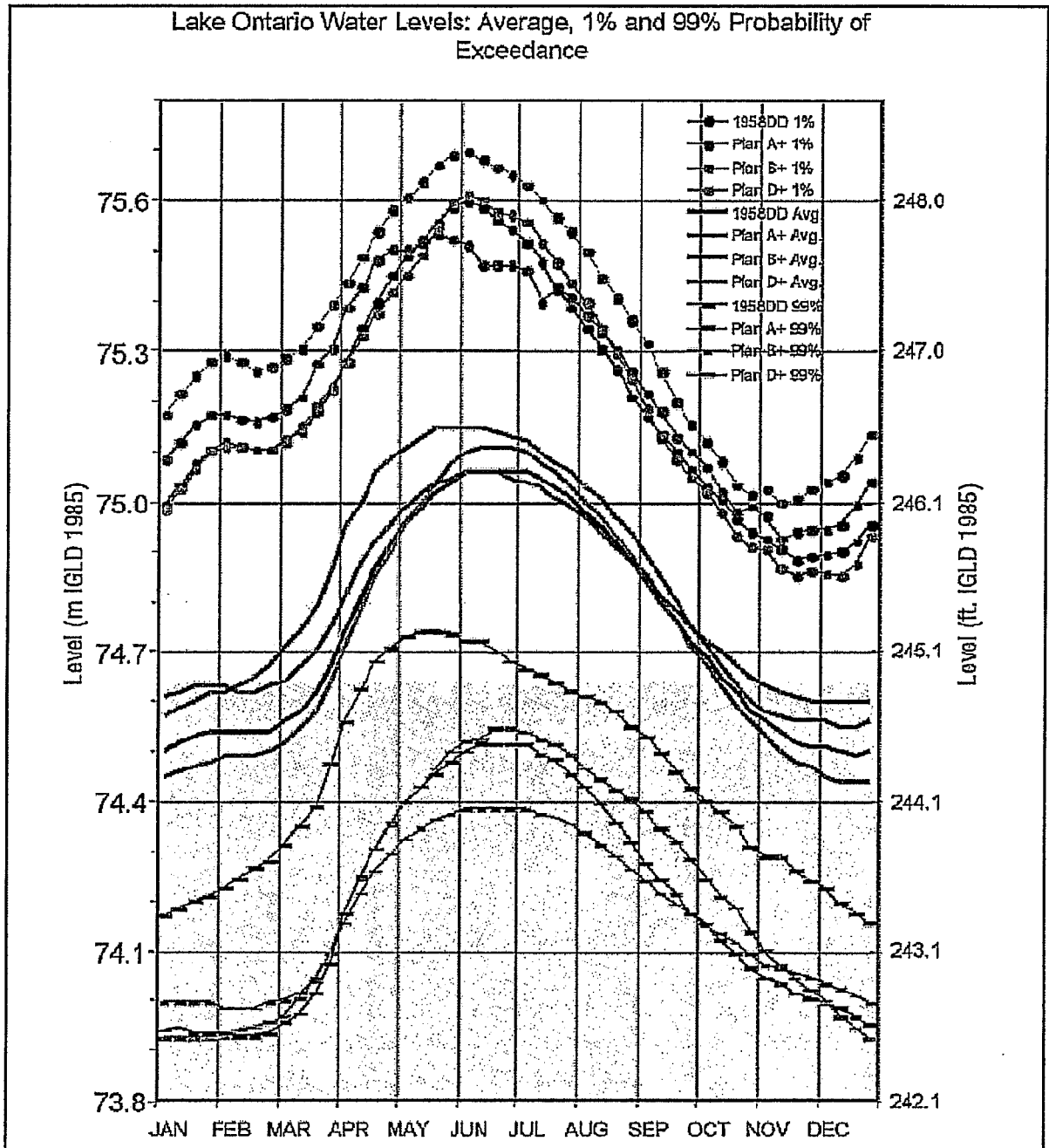


Figure 29: Lake Ontario water levels: average, 1% exceedance and 99% exceedance based on the 50,000-year stochastic simulation