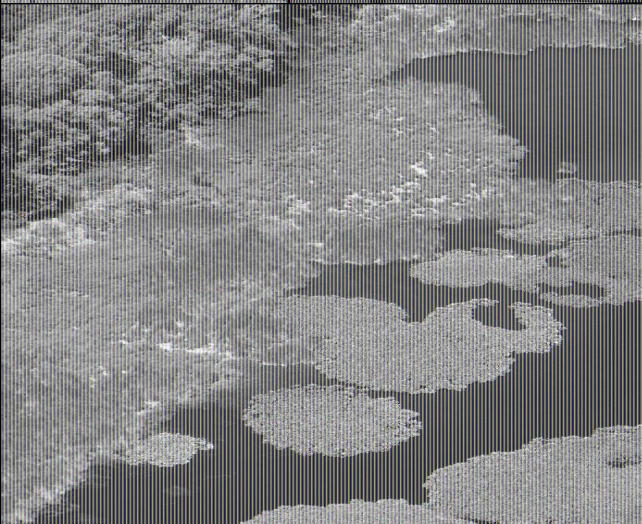


Minority Opinion Concerning the Lake Ontario St. Lawrence River Study



**Minority Report of the
Lake Ontario - St. Lawrence River
Study**

to the

**International Joint Commission
March 2007**



Minority report of the
International Lake Ontario-St. Lawrence River Study
March 17, 2007

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Introduction – summary of concerns

The purpose of this document is to express the concerns of its authors regarding questions they feel remain unanswered as part of the recently completed International Lake Ontario- St. Lawrence River Study. In this document, we will be expanding on the letter sent to the International Joint Commission expressing our views about the findings of the Study. We will point out inconsistencies, which create concern as to the accuracy of the findings of the Lake Ontario-St. Lawrence River Study.

On May 31, 2006, the authors of this report sent the following letter to the International Joint Commission:

Dear Chairman Schornack and Chairman Gray:

As Study Board members, we are writing to express our disappointment with the results of the Lake Ontario-St. Lawrence River Study and explain why we do not support the recommendations made and will not sign the final report.

As you are aware, the Study was initiated in 2000 to review the current Orders of Approval for the St. Lawrence project, and in particular the Criteria contained within the orders, to determine if they are relevant to today's conditions and if they reflect the interests of all that are affected by the system. In its Directive to the Study Board, the Commission stated that it "will be seeking to benefit both these [affected] interests and the system as a whole, consistent with the requirements of the Treaty".

Based upon our involvement with the Study over the past five years, the content of the Final Study Report, and the recommendations contained therein, we have reached the following three conclusions:

(1) The Study was conducted and reported in a manner biased against residents and businesses located on the shoreline and embayments of Lake Ontario;

(2) The Study lacks the scientific data, analysis and justification to reach the stated conclusions and recommendations;

(3) Even if the above two factors are discounted, the Study recommendations represent poor public policy, ignoring essential social and economic considerations that should be factored into decisions regarding the operation of the system.

In order to limit the length of this letter, we will merely give a bullet summary of some of the supporting reasons for these conclusions.

(1) Study was biased.

- All of the recommended operating plans will result in increased damages to the shoreline and riparian property owners. None provide for an improvement for this interest group.*
- Damages due to erosion for property located along the lower St. Lawrence River are based upon the loss of property and the value of the lost property. By contrast, damage due to erosion on the Lake Ontario shoreline is limited to the cost of building shore protection and no cost is associated with the loss of property itself. In fact, the loss of property due to erosion for undeveloped land is not even included in the economic results. Also not included is the cost associated with erosion damage to public infrastructure, such as roads, water and sewer lines, and the loss of publicly owned and maintained park land at the State, County and municipal level.*

- *The cost of shore protection, the only damage accounted for in the Study for shoreline erosion, is significantly underestimated. This includes both the basic construction cost assumed in the analysis and the lack of any engineering and/or regulatory costs associated with such construction. In addition, it is assumed that shore protection adequate to protect properties would be permitted by regulatory authorities having jurisdiction. There is no assurance provided of this and the Study does not account for costs to property owners if approvals for adequate protection are not granted by the regulatory agencies.*
- *The Study does not recommend retaining the upper and lower water level targets for Lake Ontario contained in the current Criteria and does not offer any such water level targets for the operating plans recommended. The existing water level targets have been relied upon for more than forty years in the design of shore protection and recreational boating facilities. In fact, even the regulatory limits utilized by the US Army Corps of Engineers and the NYS Department of Environmental Conservation are based upon this target water level range. The Study does not account for the substantial costs associated with the redesign and retrofit of the existing shore protection and recreational boating infrastructure.*

(2) Study lacks adequate scientific justification.

- *The environmental results are based almost solely upon assumptions regarding the diversity of wetland areas that occur along the shoreline and the habitats they provide. Other environmental considerations, including near shore fish habitat, shoreline sand dune habitats, and shoreline cliff/bank habitats, are essentially ignored in the evaluation. Based upon an independent review of the Study by the National Research Council, even the wetland work is limited in applicability since it does not adequately weigh the impacts to wetland areas located directly behind barrier beaches, the dominant type of wetland along the Lake Ontario shoreline.*
- *The wetland benefits derived in the analysis are based upon an ideal water level regime that has never occurred within the period of record (1900-2005). It appears that the "ideal" wetland water level regime envisioned is based upon situations that would be expected in a riverine environment and not that which occurs naturally on the Great Lakes. This is evident by the continuing statements during the study that the regulation of Lake Ontario has resulted in a delay of the spring water level peak, which ideally occurs in April for wetland species and vegetation. However, the Great Lakes' levels are modulated by their large size and the peak levels naturally occur later in the year than rivers and streams. In fact, since regulation has been in place on Lake Ontario, the timing of the spring peak has changed little and the change has been toward an earlier peak, not a later peak as alleged.*
- *Review of the Study results by two environmental scientists actively involved in the Study have concluded that the extreme high water levels created by the recommended plans are not necessary and that the existing operating plan has produced a high water regime adequate for wetland functioning. It is the lack of low water levels under the current operation that is thought to create problems with the wetland habitats. Yet each of the recommended plans has no upper water level limit and each produces levels higher than the existing criteria limit intends on a more frequent basis.*
- *The primary tool utilized to evaluate the environmental effects of alternative operating plans, the Integrated Ecological Response Model or IERM, is not an ecosystem model at all. It only compiles first order effects generated by other process models and does not incorporate important feedback effects of water level variation on species and habitat conditions. It is, therefore, an impact accounting model rather than an ecosystem model. As an example, the coastal process model (FEPS) alters the bathymetry of shoreline environments due to erosion processes, but those bathymetric changes are not fed into the IERM to vary wetland inundation, which is the primary driver to model vegetation occurrence and other environmental performance indicators associated with water level variation.*

- *In reviewing the scientific basis for the Study conclusions, a special panel of the National Research Council concluded that the scientific work done is neither sufficient nor adequate to support the kind of decision-making attempted. This, in itself, should give the Commission pause in implementing proposals that would result in the substantial damages projected.*

(3) Study recommendations represent poor public policy.

- *The Study recommends radical changes in the way the Lake Ontario-St. Lawrence River water levels and flows are regulated. This includes the lack of any controls on extreme high or low water levels. While such changes may be justified in the face of substantial, irrefutable evidence of need and benefit, such justification has not been provided by this Study.*
- *Despite assurances to the public throughout the Study process that any recommendation resulting in significant negative consequences would be accompanied by provision for mitigation and, perhaps, compensation, none are recommended by the Study.*
- *The existing criteria in the Orders of Approval reflect a comprehensive social and political compact reached in the 1950's. The portion of New York State along the upper St. Lawrence River receives economic benefits in the form of jobs, enhanced navigation and a subsidized electricity set-aside for industrial development from the NY Power Authority. The Lake Ontario shoreline and downstream Montreal communities receive protection from extreme water levels, both high and low. To have the Commission unilaterally set aside only one portion of this social contract, with no mitigation and no compensation, represents a betrayal of citizens by government.*

In summary, we do not believe that the final Study Report presents a fair, balanced, scientifically supportable, or well-reasoned set of options to the Commission. Minority views of the work were ignored during the Study and are not adequately discussed in the Final Report.

Due to these serious shortcomings, we encourage the Commission to not act upon the majority recommendations contained in the Study Report.

Sincerely,




Frank Sciremammano, Jr, PhD, PE




Daniel Barletta, DDS

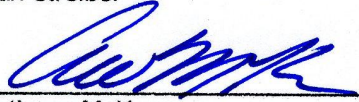
We the undersigned members of the Lake Ontario St. Lawrence River Study Public Interest Advisory Group have read this minority report and agree with its authors in their findings.




Max Streibel



Henry Stewart



Anthony McKenna



Scott Tripoli

Chapter 1 - Detailed concerns regarding Environment Science

Lack of control

The Environmental TWG assumed that fluctuation of water levels beyond the present range is needed for the benefit of the wetlands and that wetland areas around the Lake have been damaged due to regulation of the system since 1960. It was surmised that the wetlands would develop a better diversity if the range of levels were increased, but it was never demonstrated that this is necessary or natural in a Great Lakes setting where water level fluctuation are naturally dampened due to the large storage area available..

Prior to regulation, the range was approximately 6.6 ft. After regulation the range has been 6.1 ft. There has been no demonstration that this small change in range has resulted in any significant impact to wetland areas in particular or the environmental conditions of the Lake in general.

A periodic drying of the wetlands was proposed to kill off the cattail population, which is the predominant type of vegetation in many wetlands. This period of drying out was to be over a 4-year period. At no time during this 5-year study was an experiment using the scientific method developed which included a control group to see if this drying-out period would have the desired effect. With the timeframe of the LOSL Study being 5 years, and the assumption based on a 4 year dryout period, the results would have been available prior to any regulation plan development. In addition, at no point in study has the basic assumption that wetlands around the basin have been harmed by regulation of water levels been demonstrated.

Since this assumption was adopted prior to the initiation of the study, an experiment should have been developed in the first year of the LOSL Study to test this assumption. This may have been done by isolation of a group of cattails either *in situ* or transplanted to an area, where the amount of inundation could be controlled. Another approach, suggested by one of the authors of this report in year one of the study, would be to compare the wetland diversity of Lake Ontario wetlands to those on one of the other, uncontrolled Great Lakes such as Lake Erie.

This basic and unproved assumption is the basis of most of the habitat and wildlife models forming the IERM model. This hypothesis, has to be verified to complete the wetland investigations if any validity is to be attached to the results. The need for verification is keenly needed because there is published evidence to the opposite effect: cattail distribution has been shown to increase with low water levels in Cootes Paradise Marsh, a large urban marsh at the western end of Lake Ontario (Chow-Fraser 2005; Wei and Chow-Fraser 2005; Wei and Chow-Fraser 2006). Literature also shows that *Typha* species have broad environmental tolerance and are excellent competitors. Recent expansion of invasive species, such as *Phragmites australis*, into the sedge meadow under similar conditions have also been noted. Both of these situations would result in an expanded emergent rather than sedge-meadow zone. It is concluded that the marsh meadow hypothesis, the basis of the environmental modeling done in the study, needs additional testing to be validated.¹

Isostatic (Glacial) rebound effect

The wetlands study relied on a time series of photographs of wetlands along Lake Ontario ranging from 1937 to the present to justify the assumption that damage has occurred due to water

¹ **Committee to Review the Lake Ontario- St. Lawrence River Studies**, Water Science and Technology board, Division of Earth and Life Science, National Research Council in collaboration with the Royal Society of Canada, The National Academies Press, 2005, page 82

level regulation. No attempt was made to account for other factors which may have contributed to changes in wetland area. Such changes include urbanization, changes in water quality due to direct discharges and runoff from upstream areas, including agricultural runoff, deposition of air pollutants directly on the wetlands, and the impact of invasive species.

In addition to the above factors, during the period from 1937 to the present, the Lake Ontario Basin would have experienced approximately 7 to 9 cm (2.75 to 3.6 in) of glacial rebound dependent on location in the Lake Ontario-St. Lawrence river basin. While this may be a small change, the effect was not even calculated in the wetlands study. The question was raised by one of the authors of the this report during the study since wetlands have a very small inclination slope topographically. This effect would manifest itself mainly in the drowned river mouth and barrier beach wetlands. The question remained ignored and the effect of this rebound was not quantified in the environmental evaluation.²

The deficiencies cited above were also evident to the external scientific reviewers of the Study. The National Research Council/National Academy of Science Peer review report stated that other factors such as surrounding aquatic and uplands, deterioration in water quality, exotic species, encroachment by urban areas and other external stressors are know to affect the reestablishment of different types of aquatic vegetation and should have been accounted for.³

Wetlands

The wetland vegetation report identified four distinct vegetation communities associated with suites of flood/dewater histories: the marsh meadow (not flooded 5-30 years), marsh meadow/emergent mix (not flooded < 5 years or dewatered < 4 years), emergent marsh (not dewatered 4-39 years), and submergent/floating aquatic bed (not dewatered 40 years or more) within 32 wetlands distributed primarily around the eastern half of Lake Ontario in Canada and the United States.⁴

By consistently sampling only four of each wetland type in each country, the study may have inadvertently biased results in favor of open and protected embayments. Simultaneously, this approach may have under-sampled drowned river mouth marshes, especially in the heavily urbanized west end and north shore of Lake Ontario. A rough estimate using the inventory showed 37 wetlands that could be described as urbanized, and these accounted for 970 ha. In addition, wetland size should be considered in any sampling scheme as wetland area may be an important factor in vulnerability to perturbation and may be important to a site's function as wildlife habitat.⁵

Wetlands sampling was limited to a minimum depth of 74.25 m above sea level (asl). However, the typical profiles developed for the four geomorphic types included depths from 73.00 to

² <http://www.lre.usace.army.mil/greatlakes/hh/newsandinformation/iglddatum1985>

³ **Committee to Review the Lake Ontario- St. Lawrence River Studies**, Water Science and Technology board, Division of Earth and Life Science, National Research Council in collaboration with the Royal Society of Canada, The National Academies Press, 2005, page 71

⁴ EVALUATION OF WATER LEVEL REGULATION INFLUENCES ON LAKE ONTARIO AND UPPER ST. LAWRENCE RIVER COASTAL WETLAND PLANT COMMUNITIES, FINAL PROJECT REPORT March 2005 **Douglas A. Wilcox, Joel W. Ingram, Kurt P. Kowalski, James E. Meeker, Martha L. Carlson, Yichun Xie, Greg P. Grabas, Krista L. Holmes, and Nancy J. Patterson, pages 3-8**

⁵ **Committee to Review the Lake Ontario- St. Lawrence River Studies**, Water Science and Technology board, Division of Earth and Life Science, National Research Council in collaboration with the Royal Society of Canada, The National Academies Press, 2005, page 74

75.75 m asl. It is difficult to ascertain how the Environmental Technical Working Group assigned plant information to depths between 73.00 and 74.25 m. This sampling regime appears to have under-sampled the submerged aquatic vegetation (SAV), since sampling only included depths <1.0m. By not sampling in deeper waters, the study excluded many of the submergent species in the high-quality wetlands. Had the study expanded its sampling effort to survey more of the deeper aquatic habitat, a more representative suite of species of submergent species would likely have been reported. The current sampling methods likely underestimated the diversity of submersed vegetation and available fish habitat.⁶

Many of the habitat models used to develop the SAR Performance Indicators rely on predictions of wetland vegetation (e.g., Least Bittern, Yellow Rail), including submergent vegetation, (e.g., Bridle Shiner). All of these Performance Indicator models will, thus, be vulnerable to the same criticisms that have been made of the wetland vegetation models and vegetation sampling methods (e.g., wetlands sampled are not statistically representative of wetlands in the LOSLR; submergent vegetation appears to be under-sampled; and there are limited linkages between bathymetric changes and vegetation models). Error from wetland sampling deficiencies may be propagated through the SAR material, through the IERM, and into the SVM. This is a serious limitation to the credibility of these SAR Performance Indicators.⁷

Additionally, the dune-barrier beaches report nicely describes the dune-barrier beaches; it even documents the report's shortcomings. Inexplicably, no Performance Indicator was developed by the Environmental TWG to represent this habitat or its characteristic species, many of which are SAR. Failure to include barrier beaches and dunes misses the opportunity to consider species and habitats associated with them, particularly along the southern coast of Lake Ontario, where loss of barrier beaches and dunes will also jeopardize wetlands that are presently protected by them.⁸

The protected barrier beach wetlands of Lake Ontario comprise a major hydrogeomorphic community and are included in the wetland empirical work, but not integrated into the FEPS, IERM, or SVM models. A Performance Indicator was developed by the Coastal TWG for barrier beaches and sand dunes, but "no algorithm or economic calculations were developed for the FEPS due to inability of modeling sandy shore evolution over very long time periods" (Baird and Associates [no date], Barrier Beaches and Dunes, Performance Indicator Summary, Coastal Working Group). Evidence exists, however, that barrier beaches are being eroded away along the southern shore of Lake Ontario at Hamlin Beach State Park (NYORHP, 1998, Makarewicz et al., 2000), as armoring efforts are underway. The omission of barrier beach wetlands from the IERM and SVM is a serious omission as these represent an important hydro-geomorphic type of wetland present along coastal Lake Ontario.⁹

⁶ **Committee to Review the Lake Ontario- St. Lawrence River Studies**, Water Science and Technology board, Division of Earth and Life Science, National Research Council in collaboration with the Royal Society of Canada, The National Academies Press, 2005, page 74

⁷ **Committee to Review the Lake Ontario- St. Lawrence River Studies**, Water Science and Technology board, Division of Earth and Life Science, National Research Council in collaboration with the Royal Society of Canada, The National Academies Press, 2005, page 77

⁸ **Committee to Review the Lake Ontario- St. Lawrence River Studies**, Water Science and Technology board, Division of Earth and Life Science, National Research Council in collaboration with the Royal Society of Canada, The National Academies Press, 2005, page 78

⁹ **Committee to Review the Lake Ontario- St. Lawrence River Studies**, Water Science and Technology board, Division of Earth and Life Science, National Research Council in collaboration with the Royal Society of Canada, The National Academies Press, 2005, page 85

Cootes Paradise Marsh Recommendations

During the course of the study the Public Interest Advisory Group held a number of public meetings to provide interested publics information about the progress of the study and to obtain information from the public to input into the study. The ecologist at the Cootes Paradise Marsh evaluated the information received from the study and produced a research paper based on this information. The suggested recommendation on Lake Ontario regulation and any new plan is:

The goal of the Cootes Paradise restoration is to recreate a marsh with a mixture of emergent, submergent and floating leaf vegetation able to support the native fish and wildlife. Two possible water level scenarios could achieve this goal.

1) Return to the high disturbance water cycle of pre-regulation, which resulted in highly variable fish and wildlife habitat, but with ability to regularly mass-regenerate the emergent plant community from seed (every 3 or 4 years).

Or

□ Reduce the annual level of disturbance to increase stability in the entire marsh community, reducing the likelihood of plant destruction (drowning of freeze-out), and subsequently the dependence on regular mass-recolonization from seed (i.e. once in 20 years).

Royal Botanical Gardens would prefer to see the **second** scenario of greater stability for Cootes Paradise. Characteristics of the water cycles of the second scenario for Cootes Paradise match quite well with the operating parameters of the International St Lawrence River Board of Control. Also, historically, Cootes Paradise had much more stable water levels as it was separated from Lake Ontario by a sand bar. This sandbar has since been removed to facilitate shipping. One requirement in the Board of Control's orders is to regulate Lake Ontario within a target range from 74.15 m (243.27 ft) to 75.37 m (247.27ft) above sea level (msl), with the 74.15msl target for April 1 (Regulation Plan 1958-D, LOSL 2003). We would like to see essentially the same overall range that has occurred since water level control first occurred in 1960, save for the few extreme high water levels (>75.5msl) that have occurred. These high water levels result in substantial die-off of deeper emergent vegetation, cause severe shoreline erosion, and, more significantly, will directly impact Cootes Paradise marsh by overtopping existing carp control measures (set at 75.6msl) currently protecting the RBG marshlands. Regardless, these water levels far exceed the current maximum level guidelines (75.37msl) for lake regulation by the Board of Control.¹⁰

The authors of this minority report would like to point out that Cootes Paradise marsh is one of the only sites on the southern shore of Lake Ontario that has continuous monitoring due to a local remedial action plan. These ongoing efforts have led to a more thorough understanding of the relationship between the marsh, and Lake Ontario levels than the short term evaluations conducted during the Study. The Cootes Paradise report also highlights the fact that a simple relation between water level fluctuation range and wetland quality, as assumed and built into the environmental performance indicators, is not appropriate and will not accurately or reliably predict the outcome of alternative water level regimes.

¹⁰ Environmental Considerations –Lake Ontario Water Regulation as it pertains to the coastal marsh Cootes Paradise, Royal Botanical Gardens, Science Dept., October, 2003, page 18.

Chapter 2 - Detailed concerns regarding Coastal Science

Cost of protection

During the course of the LOSL Study, the Coastal TWG was advised that the cost utilized in the analysis for shore protection was too low based on input received from numerous sources in the United States. The Coastal TWG values shore protection costs at \$1000.00/meter shoreline whereas the actual cost for class 1 shore protection is closer to \$3000.00/meter of shoreline. With this undervaluing of the actual cost, the results produced for the study are skewed tremendously. Thus the losses incurred due to erosion by the coastal areas along Lake Ontario with all three optional plans are approximately three times greater than actually stated in the Study's Final Report since the economic analysis limits the damages to the cost of shoreline protection

FEPS – Although 100% of US shoreline was classified, approximately 17% of the same shoreline representing State, County and Municipal owned property was not part of the economic evaluation. Only private property and its cost to build shore protection alone were used in the economic evaluation. The FEPS model also does not include privately owned land without shore protection and does not use property value for economic comparison. Economics are based on the cost of shore protection not the value of property itself or property tax assessment basis. (It is interesting to note that losses due to erosion on the lower St. Lawrence River were based upon property values and the loss of land. Questions regarding this inconsistency by this report's authors remained unanswered.) Economic experts for the LOSL Study have stated that property tax assessment value transfers to the next line of houses if the first line of homes on the shoreline is lost into the lake. This may be correct from an economic expert's view, but this is not rational thought from a property owner or local taxing authority viewpoint.

The FEPS model also does not evaluate wave damage to houses on the south shore. This is the major cause of loss to homeowners. It only measures the amount of damage due to 1st floor flooding, which for the most part does not occur.¹¹

There is an assumption that homeowners would build protection at a point where land had eroded to a point where it was no longer acceptable to the homeowner. Therefore, the residential structure would not be affected. What was not taken into account was the fact that land value from a property tax assessment point of view is more valuable in many cases than the protective structure. In the Town of Greece, New York, along with the other entire neighboring towns along the Lake Shore, town vacant land along the lake is assessed at a much higher rate than land not bordering the lake or its ponds. The economic loss of the loss of land due to erosion for both developed and undeveloped properties was never included in the analysis despite this being brought up numerous times by study participants, by property owners during public sessions, and by municipal officials in public comments.

The FEPS model, used to predict shoreline erosion in the study evaluations, utilized a limited data set for damages. This dataset came from damages to buildings from the high water period in 1973. The houses were less expensive at that period of time. No data from 1993 was used even though such data exists and was in hand.¹²

The Coastal baseline considered three impacts on the value of coastal living - erosion of

¹¹ **Committee to Review the Lake Ontario- St. Lawrence River Studies**, Water Science and Technology board, Division of Earth and Life Science, National Research Council in collaboration with the Royal Society of Canada, The National Academies Press, 2005, page 57

¹² **Committee to Review the Lake Ontario- St. Lawrence River Studies**, Water Science and Technology board, Division of Earth and Life Science, National Research Council in collaboration with the Royal Society of Canada, The National Academies Press, 2005, page 57

developed but unprotected properties; shoreline protection maintenance; and first floor flooding. The baseline numbers for flooding, erosion and shore protection are different because different sets of properties are affected by each impact.

The annual value utilized for a coastal residence was the depreciation of the investment in the coastal residence including housing, land and protective structures. Depreciation is an estimate of the amount of expenditure needed to keep the value of the housing stock unchanged. It provides an estimate of annual loss of investment irrespective of a regulation plan. A standard way to calculate depreciation suggested by the economic advisors is the straight-method where the value of a property declines by an equal percentage over a fixed number of years. In the U.S., the IRS uses either a 27.5 or a 40-year time horizon for residential properties. This means that the depreciation rate per year is either 3.6% percent or 2.5%, respectively. The economic advisors reasoned that the depreciation of shoreline structures is likely to be higher due to greater exposure to moisture and the elements, apart from flooding and erosion. Hence, they recommended using the higher depreciation of 3.6%.

Unfortunately, depreciation of residential properties seldom occurs. The exact opposite is usually true, that the residential property appreciates in value over time. During the course of the LOSL study, the Coastal TWG was apprised that home values as stated at the beginning of the study may have escalated by as much as 25-30% during the five year study duration alone.

Another failure of the Study was to enforce its directives made during board meetings. An example of one of these failures was its directive to the PFEG and Coastal TWG to make sure that private property without structures was incorporated into the economic results.¹³ There were other failures regarding directives to the PFEG TWG's.^{14 15} The PFEG was directed on numerous occasions to present to the study board criteria and performance indicators for review and possible elimination. The Environmental TWG was also directed to look at the previously mentioned isostatic (glacial) rebound and its effect on the system and failed to do so¹⁶

Chapter 3 - Detailed concerns regarding Recreational Boating

There are a number of concerns about the Recreational Boating TWG's findings. This TWG also started their evaluation with an unproved and unfounded assumption. This assumption was that damages to Recreational Boating begin when water levels fall below 247 ft on Lake Ontario¹⁷. Through use of subjective telephone surveys, which they admit may have bias, this TWG produced data to verify this faulty assumption. In these subjective surveys, a key question that could have been asked, was not asked. This question was the boater's willingness to pay if fuel costs escalate as they have the last two years.¹⁸ The Recreational Boating TWG used anecdotal reports from the 1970's when boat size was less than the present day size of recreational boats.¹⁹ The authors of this report have contacted a number of marinas on the South Shore of Lake Ontario, many with deep water access, and have found that the increased cost for gasoline and other petroleum based fuels has had a greater negative effect than the below average water levels during the summer of 2006. The effect has been a 10 -15 % decrease in recreational boating activities.

¹³ **LOSL Study Board Minutes, May 28-29, 2003, Greece NY Action 3C**

¹⁴ **LOSL Study Board Minutes, May 28-29, 2003, Greece NY, Action 2C& 3C**

¹⁵ **LOSL Study Board Minutes, April 6, 2004 Conference Call**

¹⁶ **LOSL Board Minutes, Tony Eberhardt and Ed Eryuzlu editors, June 8, 2005, page 3**

¹⁷ ***Options for Managing Lake Ontario and St. Lawrence River Water Levels and Flows, Annexes to Final Report, 2006, page 40***

¹⁸ **Buffalo News August 12, 2006, John F. Bonfatti, *Many Boat's Few Waves***

¹⁹ ***Options for Managing Lake Ontario and St. Lawrence River Water Levels and Flows, Annexes to Final Report, 2006, page 52***

Additionally, according to the LOSL Boardroom, if this assumption that all Recreational Boating damages begin when levels fall below 247 ft, then all plans proposed or evaluated cause damages to this group 95- 98% of the time.²⁰

This TWG also had other assumptions that were not scientifically tested but deduced. *We do not have independent data from a year of high or low water to test this assumption (although other factors also affect participation). Thus, we have to examine the assumption deductively.*²¹

Additionally, the TWG admits that their data may have a number of other possible biased assumptions built into it. *The hypothetical nature of the estimate of additional days raises the possibility that boaters would not have gone boating on all of those days. Other types of bias could have affected their answers. One was response bias: respondents to the survey could have been more active boaters (boating more days) than non-respondents. We found this to be the case when we compared respondents and non-respondents' answers to a screening interview question regarding days boated thus far in 2002. The third type of bias is memory recall bias. Respondents could have trouble recalling exactly how many days they had boated each month in 2002 by the fall of that year. Past research has shown a general trend toward overestimation of participation (Connelly et al., 2000). Although we tried to minimize this bias by sending out the questionnaires as soon as possible after the end of the boating season, we believe there is likely some overestimation.*²²

Chapter 4 - Related concerns

The LOSL Study used depreciated values as a baseline for all interests except recreational boating and environment.

As stated previously, depreciation of residential properties seldom occurs. The exact opposite is usually true that the residential property appreciates in value over time. During the course of the LOSL study, the Coastal TWG was apprised that home values as stated at the beginning of the study may have escalated by as much as 25-30%.

Riverine vs. Lake Levels Environments

Much of the environmental work, especially that dealing with wetlands, appears to be based upon the desire to create hydrologic regimes typically found in riverine environments, which may be more ideal for environmental diversity and wildlife habitat production.

As an example, during the course of the study it was stated several times that regulation of Lake Ontario has resulted in an unnatural delay in spring peak levels which, it was stated, should occur in late March or April to benefit various fish species and other wildlife. It appears that this basic assumption that early peak water levels are desirable was built into some of the environmental performance indicators.

However all the Great Lakes and Lake Ontario actually function as large reservoirs due to the large area they occupy geographically. Changes in runoff and other hydrologic factors are, thus, integrated over time, resulting in a different water level regime than a riverine system. Unlike a

²⁰ **LOSL Boardroom Niagara Falls Version, Levels Distribution page**

²¹ ***Options for Managing Lake Ontario and St. Lawrence River Water Levels and Flows, Annexes to Final Report, 2006, page 49***

²² ***Options for Managing Lake Ontario and St. Lawrence River Water Levels and Flows, Annexes to Final Report, 2006, page 50***

river system that rises very quickly in the Spring due to the snow pack melt and increased precipitation, Lake Ontario and the other Great Lakes rise slowly to a peak in early to mid-summer as opposed to March or April for rivers and streams. Likewise, the lakes gradually decline to a low water point in early to mid winter rather than mid-fall for streams and rivers.²³

This slow rise in the Spring and gradual drop in the Fall is documented both prior to and after the regulation of Lake Ontario began in the 1960's with very little change due to regulation of water levels. In fact, the annual peak has moved earlier in the year by approximately one week for the period after regulation.^{24 25}

Despite raising this point repeatedly during the Study, it was not until the fifth year of the effort that statements to this effect were dropped from study report materials. In fact, the only reason they were finally dropped was due to an analysis conducted and presented to the Study Board by the authors of this report.

The fact that this obviously erroneous concept continued to be repeated throughout the study is evidence that faulty and/or unsupported assumptions were adopted regarding the desired or necessary water level regime for Lake Ontario. While it may be true that wetlands and certain wildlife species do better in a riverine water level regime, that does not make it the natural or appropriate regime to create for Lake Ontario. It appears that many Study participants wanted to create a false, and not natural, water level regime on Lake Ontario in the well-intentioned desire to improve the environment.

Poor public policy

During the Study, the LOSL Study Board developed guidelines which it was to use to select plan options. One of these guidelines stated for any plan that required mitigation for damages, the mitigation measures would have to be enacted and in place prior to any selected plan's implementation.^{26 27} Representatives of the IJC later told the Study Board that mitigation for damages, which is required by all plans, could not be guaranteed, but to select plan options nevertheless. The selected plan would be implemented without mitigation being in place despite what the Study's own guideline stated and despite assurances to the public. Throughout the Study process, the public was told that any recommendation resulting in significant negative consequences would be accompanied by provision for mitigation and, perhaps, compensation; however, no such provisions are guaranteed or even recommended by the Study.

The Study recommends radical changes in the way the Lake Ontario-St. Lawrence River water levels and flows are regulated. This includes the lack of any controls on extreme high or low water levels. While such changes may be justified in the face of substantial, irrefutable evidence of need and benefit, such justification has not been provided by this Study. While a majority of the Lake Ontario-St. Lawrence River Study Board did not feel any of the affected interests suffered significantly from any of the three plan options presented, a minority of the Board members did judge the damages to be significant (disproportionate) and the public clearly stated this during the comment period. This despite the fact that the Study results do not take into account any of the deficiencies presented in this minority report. .

²³ **Faye Regulation (PowerPoint) Presentation, David Faye, November 2002**

²⁴ <http://www.lre.usace.army.mil/greatlakes/hh/newsandinformation/iglddatum1985>

²⁵ **Barletta (PowerPoint) Presentation to the International Joint Commission, Dec. 2005**

²⁶ ***Options for Managing Lake Ontario and St. Lawrence River Water Levels and Flows, Final Report, 2006, page 9***

²⁷ ***Also, "Vision, Goals and Guidelines" Statement of the Lake Ontario-St. Lawrence River Study, January 2005***

The Lake Ontario-St. Lawrence River basin has relied on the present Orders of Approval for all development over the last 40+ years. Federal and State agencies that regulate development along the US shore have based all decisions on the present 4-foot range of levels. If a new plan is selected that does not have similar upper and lower limits, much of this development will be put at great risk. This risk will also be exacerbated by the failure of the LOSL study to agree on any emergency deviations and/or mitigation measures.

Thoughts from NRC Peer Review

During the LOSL Study, the idea of an outside agency looking at the science and findings of the study was viewed as being of significant importance. The IJC decided that an outside review by a committee of experts would aid in the decision process. During the final year of the LOSL study, the NRC/RSC was commissioned and funded by the IJC to review many of the study's scientific documents. These documents encompassed not only the final products of the study, i.e., the SVM and Boardroom, but underlying scientific research that was integral to the development of these larger products. The National Research Council in the U.S. and the Royal Society of Canada were employed to provide this independent review. The NRC/RSC published their findings in the book titled: *Review of the Lake Ontario-St. Lawrence River Study*, National Academies Press, 2006.

The major findings of this Peer Review are:

- 1. LOSLR studies and models expand interdisciplinary scientific inquiry on the potential environmental effects of water level and flow regulation options in the Lake Ontario-St. Lawrence River Basin in ways that are useful for informing some aspects of decision making.**
- 2. The scientific foundations of the studies and models presented for review vary widely in empirical support, and overall, need stronger and more consistent quality control, quality assurance and treatment of error and uncertainty to inform decision making.**
- 3. The LOSLR models and studies reviewed here do not adequately integrate and display the key information needed for comprehensive evaluation and understanding of the tradeoffs among the candidate regulation plans.**
- 4. Despite the breadth of LOSLR studies and models, ongoing analysis is needed to provide a strong scientific basis for long-term decision making about water level and flow regulation in the Lake Ontario-St. Lawrence River basin.**

The review looked at three general areas: The SVM, the coastal processes and the environmental aspects of the study. Below is a summary of comments not already discussed earlier in this report made in each area of the report:

SVM

Pre-project and modeled 58DD not same as actual levels experience, i.e., in 1952 Boardroom has highest recorded monthly level at 75.76m (248.55ft). USACE web site lists this level also but daily levels record could spike above 249ft. 58DD is modeled plan in SVM – not same as actual levels. More error in levels occurs as you go back in time.

Page 6

IERM is not ecosystem model only compiles first order effects. FEPS model not used by IERM to measure effects along shoreline.

*The SVM compiles first-order effects on environmental, coastal, and other indicators generated by FEPS, IERM, and other models. But, as the IERM user's manual indicates, it is not an ecosystem model that incorporates the feedback effects of water level variation on species and habitat conditions. Instead, it compiles initial impacts (first-order effects) on performance indicators, and it is thus an impact accounting model rather than an ecosystem model. In terms of model linkages, the FEPS model alters the bathymetry of shoreline environments, but those bathymetric changes were not fed into the IERM to vary wetland inundation, which could be used to model vegetation, shoreline habitats, and other environmental performance indicators associated with water level variation. These vegetation changes could have feedback effects on sediment transport and coastal erosion. External model linkages include economic and demographic scenarios that are relevant for evaluating candidate water regulation plans to replace Plan 1958DD. **For example, real estate values of coastal property continue to rise at rapid rates, and the demand for different water and related land uses is changing, but the SVM does not incorporate such scenarios in its structure.***

Page 31

SVM accuracy questioned because it uses single weekly water level for plan simulation when levels can vary up to 20 cm (8 in) within the week.

The STELLA model produces a single water elevation value for Lake Ontario for each quarter-month time period. This STELLA model value must be accurate for the SVM to function reliably because it is used in other models as input for wetlands, fauna, erosion, and bathymetric calculations. One problem in using a single value in the quarter-month time step is that Lake levels can be more dynamic than this value per quarter-month can capture. For example, the average change in water elevation of Lake Ontario may be as much as 20 cm in one week (<http://www.glerl.noaa.gov/data/now/wlevels/levels.html>). Implicit in this average value are some values that are lower and some values that are higher. This large range in water elevation values is nontrivial because erosion and ecological models use the average values to calculate coastal and environmental responses, respectively. Although some of the sub-models generate variable water level conditions from the average values, any inaccuracies in the average water level values would propagate through the erosion and ecological model outputs and the SVM. It is therefore surprising that the SVM documents do not report on how the accuracy of average water level values is determined, or how sensitive the other models are to the accuracy of this value.

Page 32

Conventional Hydraulic models were not used even though Plan of Study recommended them. The study used regression analysis, which is less accurate. There are also deficiencies in the socioeconomic analysis.

Page 33

Traditional Validation and verification methods need to be used, not self-assessments.

Page 35

There is an unknown amount of error between Stella and other SVM models based on different temporal and spatial time scales.

FEPS

Page 62

The FEPS model includes explicit forward linkages but limited feed-back linkages among its sub-models and no linkages with associated ecological or other socioeconomic models.

The important parameter for the erosion model is the lake level at the time of the storm, not an averaged value over a 1-week period. Connections between the SVM and FEPS models appear to give inadequate treatment to the spatial and temporal variation of lake water levels within the time step important for proper evaluation of flood damages. The compatibility of data on different scales and their use to simulate future conditions raises a prominent concern.

FEPS cannot capture change in local shoreline conditions that can occur during individual storms.

Page 65

FEPS conclusions inadequate for public decision-making.

Heuristic – valuable for observational (empirical) research but unproven or incapable of proof.

Public infrastructure omitted.

Page 66

FEPS sub-model needs to demonstrate that it is representative of actual conditions.

It should demonstrate that each of the sub-models (wave, coastal erosion, failure of coastal protection structures, flooding and damage models) are representative of actual conditions. Different models will combine these considerations in different ways leading to different results. When modeling complex physical processes that are poorly understood, such as coastal erosion and damages, the simpler the model the greater the difficulty in demonstrating the representativeness of complex processes (Pilkey and Cooper, 2004). Thus, modelers are challenged to demonstrate that (1) simplified erosion hazards models are sufficiently representative of the actual process and (2) model results lead to the same conclusion as detailed erosion hazards modeling.

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However, it is important to note that FEPS was not specifically developed for regulatory policy analysis, having been first conceived for the Lake Michigan flood damages analysis. As a result, the model is limited in the damages it examines. The FEPS model considers flood and erosion damages to structures and shorelines but not to infrastructure, agriculture, or environment within an integrated approach, as has been the case in previous studies carried out for the IJC (2000) and others (e.g. Simonovic and Carson (2003)).

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Against this background, the degrees of robustness and defensibility of the FEPS studies reviewed here have not been demonstrated or documented in a comprehensive way. The lack of explicit treatment of risk and uncertainty limits confidence in FEPS results for use in informing decision making, although, unfortunately, FEPS documentation and presentation may have conveyed to LOSLR and IJC staff an impression of accuracy and precision in the data, models and interactions within and external to the system. In addition, the failure to identify those risks that society cannot afford to take, and those risks that society cannot afford to take too often, render the study incomplete.

Environmental Science

External Stressors

The models and Performance Indicators seem to consider wetlands as discrete elements, when in fact, wetlands reflect attributes of their surrounding aquatic and upland systems. Surrounding uplands areas can be a major determinant of wetland structure and function through impacts to the physical and biotic aspects of wetland ecology. Without taking these external forces and stressors into account, the IERM cannot be used to predict the combined effects of water-levels and other stressors, such as deterioration in water quality, adverse impacts of exotic species (Lougheed et al. 2004; Wei and Chow-Fraser 2006) and urban encroachment, that are known to affect the re-establishment of different types of aquatic vegetation (Chow-Fraser et al. 1998; Wei and Chow-Fraser, 2005). For example, there are heavily urbanized wetlands in western and northern Lake Ontario (e.g. Cootes Paradise Marsh, Chow-Fraser 2005; Frenchman's Bay; Eyles et al. 2003), where currently there are no wet meadow communities due to urban encroachment.

Page 78

Performance Indicators

Performance Indicators employed in the LOSLR environmental science work are often indirect measures of integrity of a community (i.e., wetland area). In most cases, it is not clear why these metrics were chosen when more conventional, ecological assays, such as diversity, biomass, or productivity remain viable metrics. For example, the various plant Performance Indicators are based on the areal depth available for growth (available suitable habitat) for a community at a given lake level. Implicit in this Performance Indicator is the assumption that lake level area is directly related to species abundance, productivity or species diversity. Defense of this approach is needed in the environmental documentation because a large body of research shows that a number of different physical and biotic factors, in addition to hydrology, impact species distribution and growth (Hupp, 2000; Naiman et al., 1993; Pollock et al., 1998)

Page 81

Ecosystem

In general, the wetlands work and the IERM use a single-species approach rather than an ecosystem approach. A single-species approach focuses on the reaction of an organism to lake level or river flow. An ecosystem approach takes a systems view of an ecosystem and considers processes that transcend individual species and indicate integrity of the ecosystem as a whole, such as supra-specific measures like total site biomass and net primary production. An ecosystem approach can also account for the presence and abundance of organisms, diversity and composition of plant and animal communities, and their reactions to other stressors in the LOSLR environment, such as contaminants, inter-specific competition, invasive species, nutrients and sediment supplies from the watershed, climate change, and other fisheries stocking and harvesting practices. Omission of the effects of these other stressors in the LOSLR study may compromise the interpretation provided in the Shared Vision Model. The current design of the IERM (and the SVM) makes it very difficult to separate the effects of these and other stressors from effects due to water regulation alone.

QA/QC

Quality Assurance/Quality Control (QA/QC) in the environmental sciences provides ways to validate study and model results and a means to ensure that results are accurate and reliable. QA/QC does not appear to have been instituted for the LOSLR Study. In general, information on validation, calibration and verification presented on various algorithms in models is weak or nonexistent for wetlands, SAR, and the IERM. Initial

formal direction from the Study Board on QA/QC could have reduced the numerous concerns about the lack of validation and significance-testing that pervades the work in this component of the LOSLR study.

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Like quality control issues, a formal method to test for error and uncertainty was not documented for field investigations or simulations. In general, information on error propagation, risk, and uncertainty is weak or non-existent for SARs, wetlands and the IERM, and IJC documents note that "...cumulative uncertainties have not been estimated". Deficiencies in the treatment of error and uncertainty were identified with respect to methods used in wetland sampling, SAR analyses, and creation and selection of Performance Indicators.

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The overarching concern of error and uncertainty in the environmental sciences is how error is propagated from the wetlands and SAR sampling methodologies into the Performance Indicator development and through use in the IERM and SVM.

Linkage between FEPS and IERM are imperative

The environmental science work in the LOSLR Study, at least the contents presented for this review, use data and sub-models generated from the empirical wetland and SAR work in the IERM. The IERM, in turn, is used as a sub-model in the SVM as a means to present integrated environmental information. Linkages among the wetland, SAR, and IERM efforts are important for accurate interpretation and representation in the SVM and ultimately, in the regulation plan themselves. Furthermore, linkages between the wetlands work and the FEPS model may also be important, as some of the physical, geomorphic properties of wetland habitat (such as dune- and barrier beach wetlands) can be strongly influenced by wave erosive action. The biophysical underpinnings needed to develop Performance Indicators for barrier beach wetland complexes are severely compromised by failure of the FEPS model to include accretion of dunes and protective effects of dunes and barrier islands on other parts of the shore. The development of a barrier beach Performance Indicator with linkages between the IERM and FEPS models appears imperative. Linkages among SVM components could strengthen the integration and display of key information in the LOSLR Study. The FEPS model (see Chapter 3) developed scenarios to predict the response of the coastal lake bottom to various storms and outflow management options. These results might have been applied to the wetland studies. Alteration of bathymetry at the lower portion of wetlands may impact the rate of response of vegetation to water level change, not just in the lowest portion of a site but potentially in upper elevations if base level is altered. Wetland researchers should collaborate with the shoreline modelers to develop bathymetric scenarios for wetland sites.

The LOSLR environmental science work depends on the ability of the FEPS model to provide the type of information needed by the SAR and IERM work, and the connections between FEPS and environmental work need strengthening or better documentation.

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Major points of concern focus around inadequate documentation of: (1) wetlands and SAR sampling choices; (2) choice of Performance Indicators in lieu of more traditional ecological assays; (3) methods to select and eliminate Performance Indicators in reducing the number from several hundred to 32; (4) resolution of temporal and spatial scales; and (5) treatment of error and uncertainty, and documentation should be provided for these areas of concern.

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Wetlands summary

- The current sampling methods limited to shallow waters excluded or under-sampled many of the submergent species in the high-quality wetlands and likely underestimated the diversity of submerged vegetation and available fish habitat.
- The 32 “typical” wetland sites selected for sampling may not be representative of Lake Ontario-St. Lawrence River wetlands, as these sites were neither chosen randomly nor sampled to ensure representativeness of available wetland types. Therefore, the validity of applying study results to the entire wetland inventory remains in question.
- Wetlands results need to be validated using data on those or similar wetlands from previous studies (i.e., IJC Water Levels Reference Study, Wilcox et al. 1992) to demonstrate the quality of the analysis and the certainty of wetland forecasts.
- Propagation of error is a major concern for the LOSLR. There is a potential for error to be propagated from the wetlands empirical data through the SVM, but this potential is not documented and therefore cannot be quantified.
- Specific attention is needed to ensure that results for larger wetlands can be extrapolated directly to smaller ones in other geographic reaches of the LOSLR system.

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IERM Summary

The IERM and SVM were developed to answer the question: Can the impact of regulating Lake Ontario lake levels and St. Lawrence River flows be mitigated to improve environmental impacts compared to Plan 1958DD? From an environmental perspective, the IERM is a single-species approach—not an ecosystem approach—that does not include other stressors on abundance and performance of organisms. As a result, with time, the IERM will become less accurate as a predictor of performance. The main findings about and recommendations for improving the IERM follow:

- Performance Indicator ratios are calculated differently, based on different units, such as biomass, area, and other measures, and should be reconciled to calculate ratios in a consistent, comparable, and coherent manner.
- An explanation is needed about how Performance Indicators were selected or eliminated for use in the IERM and SVM.
- Better documentation is needed about how limitations of certainty and propagation of error is calculated, including clarification of or a quantitative substitute for the 10 percent rule that was derived from a Study Board’s “administrative decision”.
- The Performance Indicator for barrier beaches should be included in the IERM
- The Index of Ecological Integrity used in the LOSLR Study presents a single value that attempts to represent conditions upstream and downstream of the Moses-Saunders dam. It is recommended that the index not be used for the LOSLR Study.
- The quarter month time-step of the SVM needs to be reconciled with the shorter time steps used in the SAR and faunal sub-models in the IERM.
- Calibration, validation and error propagation must be estimated or better documented to increase confidence in IERM results.

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Treatment of error and uncertainty. This criterion was not fulfilled in the studies or models reviewed at the level expected for informing decision making. The SVM, FEPS, and IERM models do not present an overall framework for uncertainty analysis, which should include natural variability, data uncertainties, model uncertainties, model parameter uncertainties, and decision model uncertainties. Some individual studies (e.g., wetlands vegetation analysis) address natural variability and indicate error bars. The Species at Risk 3A report provides a good model for qualitative discussion of uncertainty. The Shared Vision Model treats the uncertainty of environmental indicators with a simplistic, and unexplained, 10% criterion, and it does not apply any uncertainty estimate to economic indicators. Linkages among LOSLR studies and models lead inherently to

the propagation of uncertainties, but SVM documentation does not analyze those cumulative uncertainties or discuss their implications for informing decision making. Without formal analysis and discussion, it is not possible to assess the types or magnitudes of error and uncertainty for particular water regulation plans, or to know whether differences between plans are significant.

Rebuttal of LOSL Study Chairpersons to NAS/RSC report

Due to the critical comments made in the above referenced report, the LOSL Study Directors/Chairpersons attempted to assuage the critical concerns raised in the peer review report by issuing a rebuttal that basically states that the NAS/RSC report is in error. The following quote is an example of this:

Almost all of the issues that were raised by the NRC/RSC were discussed by the Study Board, the Technical Working Groups (TWG's) and the Public Interest Advisory Group (PIAG) at some point during the course of the study. All were addressed to the satisfaction of the Study Board who were the decision makers in this process, and who guided the scientific, methodological and technical requirements for this Study.²⁸

The authors of this minority report find this comment to be false and typical of statements made throughout this rebuttal report of the LOSL Chairpersons. The authors of this minority report continued until the last day of the study to have questions that were raised early in the study, ignored or put off throughout, and that remain unanswered and unaddressed. One of the authors even gave an individual assessment presentation to the IJC Commissioners at the last meeting that highlighted many of the same issues recognized in the NAS/RAS peer review. It is noted that this was prepared prior to release of the NRC/RSC, yet raised many of the same basic concerns. This presentation also reiterated many questions that remain unanswered to this day.

Summary of Study

Education

Study Boards

The LOSL study, through its Public Interest Advisory Group (PIAG), was very successful in educating the public as to the various aspect of the LOSL system over the five years of the study. Many new and innovative techniques that can be used by future Studies and Boards of Control were tested and verified.

However, one area of education remains. This area involves the education of Commission Study Boards. Members selected must have the ability to see beyond their own niche of expertise, should have real-world experience in dealing with the area being studied, and should be willing to tackle tough issues regarding the setting of priorities.

²⁸ ***International Lake Ontario-St. Lawrence River Study***, Study Directors' Response to the December 2005 National Research Council/Royal Society of Canada Retrospective Review of the LOSLR Study, Dr. Gene Stakhiv & Douglas Cuthbert, page 2

Despite being told by experts at the beginning of the Study process that the most important first task is setting clear goals, objectives and priorities, the Study Board could not or would not come to grips with this important topic.

An example is the inability of the group to examine and prioritize the existing Criteria of the IJC Orders of Approval and to suggest new ones. This despite the fact that this was one of the principle intents of the Study as evidenced by the the September 1999 Plan of Study which was entitled “Plan of Study for **Criteria Review** in the Orders of Approval for Regulation of the Lake Ontario-St. Lawrence River Levels and Flows”. [emphasis added] Instead, a compilation was made of the desires of all affected interests with no priorities and no evaluation of relevance or validity. The result was a confusion of the “likes” of one interest, the “wants” of another, and the true “needs” of others. These were never sorted out so that priorities and objectives could be presented for operating plan development..

Plan G

One area where the authors and the PIAG members who signed this report felt that compromise could be achieved to better balance the benefits of alternative regulations was in the initial formulation of Plan G. In the last half of the final year of the study, after many requests, the authors of this minority report were granted the ability to work with the study’s plan formulators to see if a plan could be developed that would not have the same level of disproportionate losses that they saw in the other proposed plans.

The logic behind this Plan was to allow for the apparent environmental benefits of Plan B+, but to place water level restrictions on Plan B+ early enough to help avoid extreme water level scenarios. Although only preliminary analysis of this approach was done, it proved to be promising at avoiding some of the disproportionate losses of Plan B+. However, efforts in this regard were stopped by members of the Study Board in the absence of one of the principle proponents of this approach. This promising approach was abruptly cut short because “it was too late to look at new plans.” This was stated despite the fact that the other “final” plans were only presented to the Board a few months earlier in the six months of the Study.

Timelines

For future Commission studies, the Commission **must** allow the Study Board adequate time to discuss and evaluate the results of the underlying studies and any new ideas proposed. At the beginning of the LOSL Study, the following timeline was approved: Years 1-3.5- - data collection and verification; year 3.5- 4.5 - plan formulation and verification with data; year 4.5 – 5 – plan review, discussion and decisions by Study Board.

During the LOSL Study, the actual timeline of the Study was: Year 1-4.5-- data collection and evaluation; year 4 - final 6 months -- plan formulation and verification with data; final 6 months -- study board evaluation and discussion. During the first four years of the study, many of the key study reports underlying the economic and environmental analyses were not available for review. One study, the key wetlands study final report, was not available to the Study Board until the middle of the fifth year of the effort and well beyond the point when plans and the analysis of them was finalized. When serious questions were raised regarding this report, which were also subsequently raised by the NRC/RSC review, it was stated by one Study Chairperson that “it is too late to question” these basic studies”. The implication is that the Study Board had to make a decision,

with potentially large consequences for both sides of the border, whether or not the underlying analyses to be relied upon were true or false, reliable or unreliable.

It would be advantageous for future studies to have contractual obligations by investigators to prepare final reports in a timely manner and make them available for review and acceptance by the decision-makers prior to the presentation of the final results and report.

Legal Aspects & Mitigation

While the authors of this minority report do not profess to have expertise in legal matters, they would like to express to the International Joint Commission some thoughts in this regard.

The Commission should have the following questions evaluated by an independent legal authority with expertise in International Law:

1. Since the Orders of Approval that created the St. Lawrence power project, and the Criteria regarding the intended water level range, have been in effect and relied upon for over 40 years, do they carry the weight of de-facto International Law?

2. Does the Commission have an obligation for mitigation of damages by its actions. Article VIII of the Boundary Waters Treaty specifically states that, "the Commission shall require" adequate provisions for the protection and indemnity of all interests which may be injured by its actions. Due to the large and disproportionate losses, which will result from the final regulation plans presented by the Study, the Commission should evaluate its responsibility for mitigation or compensation to the affected interests.

It is also suggested that this evaluation be reviewed with consideration of the 1987 decision in the case of *Ketchum v. United States with PASNY as a secondary co-defendant*. In this case, the riparian landowners on Lake Ontario won the right to seek compensation for damages caused by water level regulation due to the project. The plaintiffs in that case did not proceed at that time due to escalating legal costs to prove their case and demonstrate damages. In today's litigious society, however, the LOSL Study has provided the data on losses that are expected to result from the Commission's actions.

Conclusions

In summary, we do not believe that the final Study Report presents a fair, balanced, scientifically supportable, or well-reasoned set of options to the Commission. Minority views of the work were ignored during the Study and are not adequately discussed in the Final Report. There are too many questions that have been asked that remain unanswered and too many directives from the Study Board to technical work groups that were not followed.

Due to these serious shortcomings, we encourage the Commission to not act upon the majority recommendations contained in the Study Report.

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Glossary of Terms

ASL – Above Sea Level.

COASTAL PROCESSES TECHNICAL WORK GROUP - A scientific and technical work group for the International Lake Ontario-St. Lawrence River Study that is investigating the impacts of water level fluctuations on shore property, with particular attention to erosion and flood processes.

COSMOS– Name of the erosion prediction numerical model used in this Study for the Lake and Upper River.

ENDANGERED SPECIES or SPECIES AT RISK (SAR) - A species threatened with extinction.

ENVIRONMENTAL TECHNICAL WORK GROUP (ETWG) -A group of scientific and technical experts that is investigating impacts of water level variations on fish, birds, plants and other wildlife in the Lake Ontario-St. Lawrence River system, with particular attention to ecological effects on wetlands.

FLOOD AND EROSION PROTECTION SYSTEM- (FEPS) – A series of numerical models including COSMOS that compile and evaluate shoreline data to compute flood and erosion damages.

HYDROLOGY AND HYDRAULICS MODELING TECHNICAL WORK GROUP (H&H TWG) - A scientific and technical work group for the Study that is developing models to predict water levels and flows in the Lake Ontario-St. Lawrence River system, based on various regulation plans and climate scenarios.

INTEGRATED ECOLOGICAL RESPONSE MODEL – (IERM) – A model that establishes the framework for evaluating, comparing, and integrating the responses for the environmental performance indicators.

PASNY – Power Authority State of New York or New York State Authority

PLAN FORMULATION AND EVALUATION GROUP- (PFEG) - A group established as part of the Study to develop alternative water level regulation plans, establish performance indicators for such plans, and to measure the effectiveness of such alternate criteria and operating plans.

RECREATIONAL BOATING AND TOURISM TECHNICAL WORK GROUP - A group of technical experts that will investigate the impacts of water levels on individual boaters, marinas, and boating-related tourism for the Study.

SHARED VISION MODEL – (SVM) - A decision-making tool used to develop a collective representation (image or view) of the future a group aspires to create.

TECHNICAL WORK GROUP (TWG) - A team of scientific and technical experts formed to study each of the following areas: the coastal processes, commercial navigation, common data needs, the environment, hydrology and hydraulics modeling, water uses, hydroelectric power generation, and recreational boating and tourism for the International Lake Ontario-St. Lawrence River Study.

USACE – United States Army Corp of Engineers