Manuscript: Impacts on Upper Great Lakes Water Levels: St. Clair River, Draft Vol. 1

Author(s): not identified

Name of Reviewer: Robert A. Halliday

1. Are the objectives of the work clearly stated? **1** 2 3 4 5

2. Are the methods employed valid, appropriate and sufficient to address the questions, hypotheses or the problem? 1 **2** 3 4 5

3. Are the observations, conclusions and recommendations supported by the material presented in the manuscript (e.g., data, model and analyses)? 1 **2** 3 4 5

4. Are the assumptions used valid and are the mathematics presented correct? 1 **2** 3 4 5

5. Is the manuscript well organized, material precise and to the point, and clearly written using correct grammar and syntax? 1 2 **3** 4 5

6. Are all of the figures and tables useful, clear, and necessary? 1 2 **3** 4 5

7. What is the quality of the overall work? 1 **2** 3 4 5

Recommendation (please circle your response)

C - acceptable if adequately revised

Rating (Circle the rating you would like to give this manuscript. Unacceptable work should be given a score of 40 or less.)

100 90 80 **75** 70 60 50 40 30 20 10 0

Comments (limit responses to one paragraph for each question; reference pages, charts, and data. Please distinguish if responses are of major or minor concerns.)

A. What is the best/most unique part of the analysis?

The hydraulic modelling component is well done and very thorough. The conclusions are supportable by the details provided. For the most part the technical work carried out in this study is to a high standard.

B. What is the most critical aspect of the study/analysis? Why?

The hydroclimate component in retrospect is most critical as the contribution to the change in elevation between the two lakes is significant, yet the range of values determined by the study is large.

C. Which aspect of the analysis/modeling is weakest? Why? How can it be improved?

Chapter 6 on hydroclimate contains considerable heavy jargon and is the most difficult to section of the report to assimilate. The large range provided in the hydroclimate outcome is unsatisfying.

Although it may have been done, the report does not elaborate on the measures taken to evaluate and quality check observational data that were used in the study. Insufficient information is presented for the reader to draw conclusions in this regard.

D. Are there any other suggestions that are related to how this analysis may be used more effectively or the results explicated in a more understandable manner?

Although the draft report contains recommendations for future modeling and data collection, if would be useful to include specific advice directed at improving the hydroclimate calculations. An estimate of uncertainty in the present 9 to 27 cm range would be useful.

Please indicate any confidential comments to the Co-Chair(s) of the Independent Peer Review Group in the space below. Comments for transmission to the author(s) should be on a separate sheet attached.

Signature: ___  _____ Date: __2009 08 31_____

Comments for Transmission to Authors

General Comments

This report is presented as a draft report for public review. Although parts of the report read quite well and explanations of technical material are probably understandable by a some non-technical readers, other parts of the report contain very dense writing and high-level jargon. The report would benefit from an end-to-end edit aimed at simplifying the text. Note as well that the glossary defines many basic technical terms but doesn't define others. As one example, chapter four makes a couple of references to 'binning' – a term that is not defined in the glossary. For the purposes of a public report, binning could be replaced with 'grouping' a more understandable term.

The draft report includes many figures arising from Excel plots. Because of arbitrary assignment of scales and other quirks of Excel plotting routines, the figures are often needlessly difficult to comprehend. The final report should include figures that are better than Excel plots. Some other figures appear to be place-holders; it is assumed the final report will contain improved versions.

This report was prepared before the authors received peer-review comments on various contributing reports. The peer-review comments on contributing reports should be considered during the revision of the draft report.

Specific Comments

Page 19 – Table 2-1. If agreed-on figures are readily available it may help inform the general reader if retention times for each of the Great Lakes were included in the table. Presumably, these are in the order of 100 + years.

Page 20 – Section 2.1.2. I assume IGLD (1985) is referenced to mean sea level at Pointe-au-Père rather than to an earth-centred datum such as WGS 84. I would like to assume that the GPS-based data acquisition described later in the draft report takes this into account, but this should be indicated. The horizontal datum, presumably NAD 83, for the study should also be specified.

Page 23 – Lake St. Clair, second paragraph. Indicate if there any significant flow from Lake Huron via the Black River to the St. Clair River? Note depiction in Figure 2.2.

Page 35 – Figure 2.6. It would be preferable if the figure read from left to right. In the note under the figure, a minimum time period of 33 years over which water level scenarios should be evaluated is mentioned. This could be based on the 32-year cycle plus one year. However the uncertainty in the 32-year cycle given in the text (page 34) is +/- 6 years. Treatment of apparent cycles in hydrologic records is fraught with problems. In this specific case, based on the information provided, a 40-year time period would be appropriate as the round number is greater than 32 + 6 and does not imply any unwarranted precision.

Page 46-47 – Note that the paragraph at the bottom of page 46 is worded in terms of NBS while the 'equation' uses NTS. Although these terms have been defined previously, this

dual usage needlessly complicates the discussion. One possibility would be to use NBS in the equation and show the inflow/outflow terms separately.

Page 69 – Chapter 4 is particularly well written. The text does, however, refer to many features, *e.g.* Sarnia Water Works, Casino, that are not shown on any map in the report.

Although there are implications elsewhere in the draft report that the river channel shoreline is protected against erosion, it would be useful to include an explicit description of the nature of the shorelines of the St. Clair and Detroit rivers, existing protective works, and any potential for erosion.

Page 80 – paragraph three. Was there any overall bias between the two surveys?

Page 85 – Figures 4.9(b&c). Could show the locations of these two in 4.9(a). Also, 4.9(a) shows IGLD85 elevations while 4.9(b&c) do not.

Page 90 (first line) and 92 (middle). It would be preferable to not to refer to 'vertical velocity profiles' in this manner especially given the discussion elsewhere in the report of concerning vertical velocity components. Use velocity distribution in the vertical or similar wording. Also it would be more appropriate to refer to a Price <u>current</u> meter.

Page 92 – Footnote. Change to read, "Pascal (Pa) is the SI metric measure …"

Page 104 – typo, "uppermost"

Page 106 – As for an earlier comment, simply refer to a Price current meter in paragraphs one and two.

Page 106 – discussion of ADCP measurements. Note that the plot of measurements in Figure 5.1 (page 107) shows an apparent bias in the ADCP measurements versus conventional measurements. It would be useful to discuss any apparent bias in ADCP measurements in this section. It would also be worth noting later in this chapter, say on page 125, that the change in conveyance determined by the models is in the same order as the uncertainty in a single measurement of discharge. This may provide a context for the modeling challenge faced by this study.

Page 107 – last paragraph. It may be more correct to state the AVM technology is new to the St. Clair River. It's actually a more mature technology than the ADCP. See Halliday (1975) for example.

Page 109 – Section 5.3.1. The eight gauges operated on the river are identified. It would be useful to describe the nature of these gauges. Do they all consist of float actuated instruments? How often do they record? Are the stilling wells all the same size? Given that the stream velocity can be as high as 2 m/s, what precautions have been taken in the configuration of the intake pipes to reduce drawdown due to velocity?

Page 125 – last line in paragraph below figure. The numbers in parentheses are ft^3, not m^3.

Page 130 – last paragraph of 5.4.6, second last sentence. An 'annual discharge' should be a volume. Is 5500 m^3/s the mean discharge?

Page 132 – Ice jams. The discussion concerning the possible effects of the 1984 ice jam on conveyance need to be reconciled with the discussion at the top of page 128 concerning the quantity of material that could be removed without changing conveyance. Assuming that the exact location of the ice jam is known, it should be given. Knowing the location, is there anything unusual about the pre-and post-jam bathymetry. Note also the last sentence of this section indicates there were no velocity measurements while page 99 says velocities may have been up to 1 m's.

Given that this section is speculative, would the authors care to speculate on the potential effects, if any, of the record high flows in 1986-88 on changing conveyance?

Page 134 – line 8. As indicated earlier, Figure 5.1 does not appear to support the assumption that the two methods produce similar results.

Page 135. Could note that the standard error is not dissimilar to the conveyance difference. In the first sentence below the figure there is a syntax problem.

Page 140 – 5.6.1 line 13. Change to read, "lakes Michigan-Huron and Erie are <u>each</u> considered …"

Page 149 – Chapter 6 is covered by other reviewers.

Page 184 – confident. Although the draft report discusses the possible effects of the 1984 ice jam, it does not discuss the possible effects of extreme high or extreme low water on changing conveyance. It seems out of place to introduce these notions in this section of the report.

Page 185 – Hydroclimate. It is understandable that, given the wide range in values, one could be 'confident' in the hydroclimate component. There is no uncertainty band given for the figure and the wide range makes the 'confident' classification somewhat unsatisfying.

Page 188 – Conclusions. The report is careful to identify science questions at the beginning of each chapter. As part of the Conclusions, or perhaps in a separate Summary, it would be useful to provide a short response to each science question. This response should also be part of the Executive Summary.

Page 192-93 – Legacy Recommendations. The authors may wish to develop specific recommendations concerning improved understanding of the hydraulic regime during ice

and weed conditions. For example, development of a contingency plan in the event of a significant ice jam. This could include monitoring plus post-jam detailed bathymetry.

Reference

Halliday, R. A., W. M. Archer and P. I. Campbell (1975). "The Niagara River Acoustic Streamflow Measurement System." Technical Bulletin No. 86. Inland Waters Directorate, Water Resources Branch, Ottawa.