Manuscript: Impacts on Upper Great Lakes Water Levels: St Clair River Volume 1

Author(s): IUGLS Study Board

Name of Reviewer: Eric D. Loucks, PhD, P.E.

1. Are the objectives of the work clearly stated?   1

2. Are the methods employed valid, appropriate and sufficient to address
   the questions, hypotheses or the problem?   2

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

4. Are the assumptions used valid and are the mathematics presented correct?   1

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

6. Are all of the figures and tables useful, clear, and necessary?   3

7. What is the quality of the overall work?   2

Recommendation (please circle your response)

A - acceptable
B - acceptable with suggestions for revision
C - acceptable if adequately revised ←
D - unacceptable

If you have selected **C**, do you wish to receive the revised manuscript for
further review?   no

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**   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 analysis is thorough and comprehensive using the best available data and modeling techniques. Several issues were evaluated using multiple, independent techniques thus proving a greater understanding of the uncertainties involved. Much has been accomplished in a very short time frame.

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

The study has determined the likely causes of the decline, their magnitudes and their relative contribution. If I am reading this right, the historical cause of the decline dating back to 1860 is primarily unmitigated dredging, however the recent decline is primarily due to climatic conditions.

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

The presentation of the overall results is not completely clear. Specific problems are identified in the attached comments. Use of graphics rather than the mathematical function would improve the clarity.

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?

The differences between the residual and component method NBS are not fully resolved. If they are equally reliable with similar uncertainty then perhaps their mean could be consider the best available estimate of actual NBS.

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: <u>August, 28, 2009</u>

Comments for Transmission to Authors - Attached

It would be useful to have both general comments and specific comments for major and minor revision. Please use additional sheets should they be required.

St Clair River Draft Report Review Comments
Eric D. Loucks

Page	Location	Comment
ii	Finding 1	The declines of 62 and 23 cm are estimated medians and should be expressed as ranges. The apparent decline is different during periods of high and low supply
19	Table 2-1	The first column is too narrow and causes the numbers to wrap around. Many of the figures and tables in the draft report are not publication ready. The reviewer assumes that editors will correct these issues but sometimes it is difficult to hold such comments
19	Table 2-1	The footnote refers to chart datum which is not defined until Figure 2-1. Add "or the connecting channels" to the foot note.
19	Figure 2-1	Say "Lake Ontario to Montreal" rather than the reverse as this is the direction of flow
22	1st Para.	Being "difficult to determine" is not a sufficient argument for considering thermal expansion to be negligible. Later in the report, thermal expansion is given as a source of significant error in residual method supplies.
22	3rd Para.	The residual method and the component method are equally simple. Both methods have challenging data acquisition and estimation issues. One method is based on climatological inputs and the other is based on measuring system response
22	3rd Para.	Either here or in Chapter 3 or 6 there should be some discussion of the difficulties presented by hydrologic recycling.
27	2nd Para.	The sentence "Over the long term, NBS limits the amount of water that can be stored in or released from a Lake" is unclear and inaccurate.
28	7th line	Try to avoid using the possessive "lake's"
31	Last Para.	In the scheme of things, the Great Lakes Basin is not particularly complex and to say "highly complex" might be sensationalizing the issues
33	Figure 2-5	These are not hydrographs; the term is strictly limited to flow. The scales on these plots are not readable
35	Figure 2-6	This figure contains a lot of poor formatting including some entirely nonreadible text between 3500 and 4000 YA. The inset appears to be very important and should be presented as a separate figure.
35	Figure 2-6	Below the figure there is a note that includes important conclusions. Perhaps this discussion should be worked into the main text
36		Many of the gauges and connecting channels of interest appear to lie in the region of zero adjustment in Figure 2-8. While this is discussed later in the report, it may be worth mentioning the measurement difficulty and spatial variability of Isostatic rebound.
37	Figure 2-8	The units of the numerical data are not provided (cm/century)?
38		As I read the report, I found the Baird Report Hypotheses section to be out of place in Section 2.3
43	1st Key Point	Again, in my opinion, terms such as vast and complex overstate the situation. Due to the large volumes stored in the Lakes, the Great

St Clair River Draft Report Review Comments
Eric D. Loucks

		Lakes are naturally self-regulating….
47	Equation	I don't find this quasi-mathematical expression to be helpful in furthering understanding for either scientists or non-scientists. The concept should be expressed algebraically, graphically or in English words.
47	Data Challenges	This section alludes to a lack of data several times despite this being one of the most studied systems on earth. How many watersheds have their own scientific journal?
49	10th line	I wouldn't characterize the number of meteorological stations as "very limited" though admittedly sparse in Northern Ontario. I do recall there are long records at Bracebridge and Parry Sound
55	Table 3-2	Project 3 should read …Standardized HEC-RAS Model.
57	1st line	This discussion should be more precise in differentiating between the models developed for the study versus the modeling software developed by the HEC.
59	Table 3-3	The project title for projects 18 and 19 use the word affect where effect is intended.
62	Figure 3-4	Each of the three stud trains is formatted differently. Some of the boxes contain unreadable text
65	2nd Para	"mid-lake" has an unintended meaning and is a new term. Middle lakes model would be better and should be defined.
67	3rd Para	Instead of "and approved," I would prefer to say "followed by a process to resolve all comments and concerns of the reviewers."
86		Fontana is italicized and Martin is not
92	Footnote	Isn't Pa the abbreviation Pascals, the common SI unit for stress or pressure?
93	Figure 4-14a	The scales of these two maps should be provided. Larger maps would be more helpful.
104	footnote	The Reynolds number, not the Froude number, is used to identify laminar flow. The flow in the St. Clair River is most certainly turbulent, not laminar. What is meant here is subcritical flow which is sometimes also called quiescent flow
104	4th paragraph	A Froude number greater than unity would create a critical flow control section. A Froude number of one would just be a lot of unstable flow so the text is slight misleading. The term control section is also used at locations such as the Blue Water Bridge pinch point where there is no critical flow.
105	Equation 1	The Manning Formula is usually written with the subscript f on the slope to signify that S is the slope of the EGL (the friction slope). I recommend stating the formula for conveyance as well and pointing out that it depends only on the channel geometry and the depth of flow. This section is about conveyance, it should be featured here.
105	Last line	The S in the Manning formula is not the channel slope, particularly in this context.
112	Figure 5-4	The parameters that are graphed in these figures are unclear from the

		figure titles. The units of the y axis are not provided.
113	2nd Para	The purpose of italicizing some of the text is unclear. It begins in the middle of a word.
113	3rd Para	Why "Up to 69 percent?" Wasn't this the percentage of data pairs that showed an increase?
117	Figure 5-7	Same problems as with Figure 5-4
127	Table 5-4	The title of this table is confusing: Model and simulated are redundant, aren't both data sets averages? SSB71 is not defined
129	Table 5-5	Why is extra precision indicated on the Survey error?
144	2nd Para	The explanation in this paragraph is difficult to follow. Suggest developing a graphic of matrix that illustrates the interralationships among outlets and water levels
145	Figure 5-24	As noted previously, the units of measure used in this figure should be indicated
148	5th Para	The stated decline in fall from 2.9 m to 1.9 m does not equal 80 cm. Why the descrepency?
149	5th Para	There is an extra parentheses symbol before NBS
150	1st line	This is the first use of flux in this context. Suggest adding or using the word volume
151	1st Para	I would prefer calling the residual method supply estimates and component method supply estimates rather than residual supplies and component supplies even though my way will get wordy; it is far more precise.
152	Figure 6-1	The second title on this figure should be deleted
153	Last sentence	"declines" sounds like it comes from natural causes, how about "cuts"
155	Table 6-1	Some of the cells are blank. This table would look better if the symbols were centered. Replace the 0 with a symbol, maybe a tilde (~). The downward symbols in the key never appear in the table.
157	Figure 6-4	Somewhere, the low confidence/high variance associated with using such small samples should be discussed. Are the differences indicated statistically significant or within the historical range of normal climate variability. It should be pointed out that such changes are not statistically unusual, if this is the case. The y-axis labels on these plots are unreadable
160	2nd Para	The word basis in the sixth line is not the correct word; the statement is unclear. The statement that follows about residual method NBS estimates is out of place and is indicative of the authors' unfounded bias against the residual method. The point of this analysis is that the MH to Erie fall declines during periods of low NBS and the low supplies of the last decade are unprecedented in the past 60 years.
164		In reference to the last sentence of the fourth full paragraph, if this item is pure coincidence then it is not worth noting in this report. However, it may not be coincidence at all given the discussion in paragraph five. Isn't a major cause of the decline in fall due to low

		supplies?
164	5th Para.	This discussion is entirely devoted to the types of false conclusions that can be drawn from small samples of autocorrelated time series. It would be better to use the context of extreme low supplies and levels to describe how climate has affected the apparent decline in MH to Erie head difference.
165	Figure 6-9	I assume this figure will be formatted for the report.
165	1st Para.	"the lakes'" can be deleted
171	Table 6-6	Add "of Runoff" to the title. Too many significant figures are provided in the tabulated values.
179	Equation	Again in my opinion, this equation, as presented, does not serve to increase understanding of the analyses or results of this study.
183	Figure 7-3	This presentation is very good. Perhaps something similar could be used to replace the equation on page 179.