

Notes from the 21st Meeting of the International Upper Great Lakes Study Board

Homewood Suites, Chicago, Illinois
20-22 September 2011

Day 1 –

1. Welcome/ Attendance:

Study Board: Gene Stakhiv, Ted Yuzyk, Jim Bruce, John Boland, Don Burn, Allan Chow, Jonathan Bulkley, Jim Bredin (Days 1 and 2), Jon Gee (Days 1 and 2)

Study Managers: Tony Eberhardt, Syed Moin

TWG Reps: Bill Werick, David Fay, Jacob Bruxer, Wendy Leger, Casey Brown (Days 1 and 2), Jen Read (by phone – Day 2)

Communications & Administration: Jeff Kart, John Nevin (by phone – Day 3)

IJC: Susan Daniel (Days 1 and 2), Dave Dempsey (Policy Advisor)

Agenda was approved, but items were shifted to accommodate Board members that could not attend on Day 3. **Agenda is included as Attachment 1.**

Action Items are displayed as **bold** and summarized in Attachment 2.

2. (Agenda Items 2, 3 and 4) - Superior Regulation Plan Evaluations (Werick):

- a. All TWGs have provided “stamps of approval”, i.e., they have reviewed results from the SVM and feel confident that the results generated match their individual analyses well. TWG Co-leads were available by phone to respond to Board questions. However, calls were not necessary. **A report will be prepared by Bill on the formal internal review process related to TWG “Stamps of Approval”. Documentation will be included from each TWG regarding their response to requirements and their formal certification that the SVM accurately reflected their analytical formulations. Tony Eberhardt will assist.**
- b. Plan types that were reviewed:
 - i. Rule curve plans (55Mod49, 129, PFN3, Nat64, PP, PPReg and 77B).
 - ii. Interest Driven Plans (Bal26 an Interest Satisfaction-type model, Watkins levels optimization, Tolson model which selects parameters by optimization).
 - iii. 7 or 8 of the 10 plans all perform pretty well and result in very similar results.
 - iv. Ten plans were compared to thirteen water supply sequences/ four very different futures. These 13 supply sequences are biased on the dry side (Avg. NBS - 2006 cms, wet - 2092 cms and dry - 1252 cms).
- c. Evaluation of plans was based on eight criteria, previously agreed to by the Board:
 - i. Maintain Lake Superior between 183.86 and 182.76 m
 - ii. Minimize disproportionate loss
 - iii. Reduce net shore protection costs (average annual reduction)
 - iv. Are levels balanced?
 - v. Compress MH levels
 - vi. Increase navigation benefits
 - vii. Increase hydropower benefits at the Soo
 - viii. Minimize environmental impacts

- d. Test of robustness included:
 - i. a focus on six TWG Performance Indicators
 - ii. hydropower benefits
 - iii. navigation benefits
 - iv. shore protection costs
 - v. ecosystem indicators: Sup-01 and Sup-02
 - vi. a compression of Superior maxima
- e. Two plans showed most promise: Nat64D and Bal26. Nat64D performed a bit better than the others for the historical NBS case and performed slightly better more often than the others in the other NBS cases. The UW (Tolson) plan is also very good and provides comparable results to Nat64D, typically with better navigation and hydropower results but worse shore protection performance. Upon further review, Bal26 resulted in very low Lake Superior levels to provide higher Lake Michigan-Huron levels in a very rare dry stochastically generated event. The Bal26 outflows during this event varied radically in response to varying NBS during the 3-year event. Shore protection costs on Lake Superior were negatively impacted during this period. This operation was a marked difference from the more gradual releases of Nat64D and other than that, resulting differences were relatively small. As a result, Nat64D was “tentatively” chosen as the recommended alternative to replace Plan 77-A.
- f. Adaptive management aspects could be included related to a refining of a selected plan given future climate. For example, recommend Nat64D but switch to Bal26 in a very dry future situation sacrificing Lake Superior to raise levels on Lake Michigan-Huron.
- g. Focusing of the SVM and its internal workings:
 - i. Bal26 in an extremely dry scenario drops Lake Superior by about 30 cm helping Lake Michigan-Huron. Acceptance of the plan would require a policy shift.
 - ii. Nat64 provides good results at both extreme highs and extreme lows.
 - iii. **Bill Werick will prepare a summary of different criteria and IERM results in detail for the Board’s review for comparisons of Nat64D, Bal26 and 77-A.**

3. (Agenda Items 5 and 6) - Modifications to the Orders of Approval 1979 (Fay):

- a. Condition 6 – suggest that the wording “1955 modified rule of 1949” be replaced by “under the discharge conditions that existed prior to 1887” providing broader protection. But new wording would require a damage assessment. So wording should not change.
- b. Criterion (a) – update from 1976 to 2008. This change will occur.
- c. Criterion (b) – need to review occurrences other than the historic case –“supplies of the past” or “frequency should be no greater than pre-project”. Include wording to address safety of structures.
- d. Criterion (c) - revise to “provide no greater probability of Lake Superior levels being below 183.4 m than would have occurred under the St. Marys River condition existing prior to 1887”. Proposed plans would satisfy this criterion with new wording.
- e. Order of Approval 1985 related to fishery remedial; works flow and minimum flow in the St. Marys Rapid – no suggested change, but some PIAG members have suggested that the minimum ½ gate open limit supplying the rapids be higher.

- f. Suggest operational concerns/requirements be included:
 - i. Maximum winter flow to take into consideration ice management
 - ii. Gate movements should be slow enough to protect fish in the St. Marys Rapids
- g. May wish to address contingency measures and objectives under these conditions.
- h. Other revisions:
 - i. Peaking and ponding should be recognized.
 - ii. No need identified to grant control board discretionary authority.
 - iii. Existing Board authority to deviate from the plan in emergencies should be included.
- i. **Suggested wording will be prepared by David Fay for further review by the Board.**

4. (Agenda Items 7 & 8) - Hydroclimate Synthesis (Brown):

- a. Greater precipitation and higher temperatures and evaporation negate effects on NBS (based on opinion of how models are converging).
- b. Future variability remains unknown and is a key factor in regulation plan performance.
- c. Stochastic NBS – excellent check for robustness, best representation of the next 20 years.
- d. Angel and Kunkel’s GCM projections centered on 2055 demonstrate a great deal of uncertainty.
- e. Summary findings:
 - i. Great Lakes are not completely understood because of uncertainty in observations and water balance deficiencies, variability and predictability of hydrologic conditions and lack of sufficient data collection, e.g., evaporation measurements.
 - ii. Cannot rule out wetter or dryer futures – exposed to high or low risks; previous studies anticipated much lower lake levels.
 - iii. For a reasonable planning period (now 2030), RCMs for the Great Lakes offer no viable futures – most use average conditions centered on 2050; bias corrections based on stationary averages.
 - iv. Stochastic approaches provide futures consistent with historical including recent changes and global/local context.
 - v. Assessing risk without making future predictions was key climate-related analysis decision.
 - vi. Comparing plan expected value using stochastic versus GCM futures, all are fairly equal with a slight trend toward stochastic futures.
- f. Board discussion:
 - i. The Great Lakes are at that transition zone where they could be drier or wetter.
 - ii. Findings listed above are acceptable although at least one Board member considered that both models and recent trends suggest the likelihood of slightly lower average levels.
 - iii. Important message – none of the plans handle dry conditions well on Lake Michigan-Huron. Consider adaptively switching to another plan during future wet/dry conditions and/or other adaptive measures. Willingness to suggest policy changes will influence plan selection.

- iv. **Casey Brown will write an executive summary for Board consideration/ endorsement.**

Day 2 -

5. (Agenda Item 9) - Lake Superior Regulation Plan – Revisited (Werick):

- a. Comparing 77A, Bal26, Nat64D:
 - i. The summary SVM PI scores are solid but differences are very small.
 - ii. Based on historic NBS, Nat64D performs slightly better.
 - iii. In a stochastic case (very rare, 1 in 25,000 year event), Bal26 drains Lake Superior to put water on Lake Michigan-Huron.
 - iv. New Nat65, performs similarly as Bal26, however, the Lake Superior outflows are less drastic/ differences in Lake Superior and Michigan-Huron less extreme.
 - v. Triggers to transition from one plan to another are important but difficult to define.
- b. With the lowest MH supplies, Nat64D is best.
- c. Nat65 represents a plan that can change under extreme conditions – a possible adaptive management scenario.
- d. Clear reason for rejecting 77A is the Sturgeon metric.
- e. All agreed Nat64D is best and gave it tentative approval with further testing.
- f. **Bryan Tolson will be asked to provide an independent review of Nat64D; to see if his optimization can replicate the results and possibly provide improvements.**

6. (Agenda Items 10 & 11) - Multi-lake Regulation and Restoration (Stakhiv):

- a. Restoration – the finding regarding opinions about restoration will include a regional breakdown (US & Canadian).
- b. Restoration – low water issues in Georgian Bay should be addressed through local solutions – local wetland maintenance and adaptive management solutions for recreational boating.
- c. Multi-lake regulation Study Board recommendation options:
 - i. IJC consider a more detailed, feasibility-level study, as part of a broader study of adaptive management.
 - ii. No further consideration.
 - iii. Expanded exploratory level of analysis with SVM impact model.
 - iv. Undertake AM regional study for dealing with climate change uncertainty. All Board members agreed with this recommendation.
 - v. Incorporate both three and four above, and refine wording around those within the AM strategy, leaving it to the IJC to decide on action/ further study.
- d. The Board did not reach a consensus as to the best option. **Gene Stakhiv will provide more information to the Board for their final decision.** There will be a teleconference in the near future for a final recommendation.

7. (Agenda Items 12 & 13) - Adaptive Management (Leger):

- a. Key points during discussion:
 - i. Establish a Great Lakes-St. Lawrence River Water Management Advisory Board:
 - 1. Can ramp up if studies are required.

- 2. Membership – federal, state and provincial, independents, public, first nations.
- 3. Committees: PI monitoring/modelling, hydroclimate, plan evaluation, info management/distribution, and outreach.
- ii. Improve monitoring and modelling for better forecasting and climate change prediction.
- iii. Long-term on-going assessment of both human and naturally induced physical changes to the system.
- iv. On-going assessment of the Lake Superior regulation plan
- v. Should future studies of multi-lake regulation be considered, full benefit/cost analyses should be undertaken for economic and ecologic factors throughout the entire Great Lakes-St. Lawrence River System along with an assessment of alternative non-structural strategies for addressing extreme water levels.
- vi. Provide hydroclimate information
- vii. Integrated coastal management strategies
- viii. Estimated cost about \$1.5-2.5M per year.
- b. Add in attribution of observed trends and changes and revise conclusion 8 to state that the IJC “should seek to establish” an Advisory Board rather than they have the “mandate to establish”.
- c. Board discussion:
 - i. The establishment of the advisory board helps the control boards.
 - ii. It reduces the need to initiate high cost, periodic studies.
 - iii. It addresses the issue of uncertainty in future climates.
 - iv. The AM strategy was endorsed by the Board.
- d. **Wendy Leger will refine the conclusions. The Study Managers will send the full AM Chapter to the Board for their review.**

8. (Agenda Item 18) - Peer Review (Syed):

- a. Four chapters of the final report will go to a peer review after Study Board review.
- b. Report chapters will be completed during October-December. The full final report will be about 300 pages long.
- c. After December, the Board will review the Study final report and the Executive Summary through February 2012.
- d. After the Study, we need to assess the peer review process.
- e. A stand-alone document will be written on lessons learned regarding peer review.

9. (New Item) - Discussion regarding the 2010 St. Clair River bathymetric survey (Bruxer):

- a. Short summary document was produced and sent to the Study Board and Detroit District.
- b. The 2010 data cannot be used due to errors including: overlaying data, time stamps issues and nearly 4 metre discrepancies in several locations.
- c. Recommend that Coordinating Committee Hydraulic Subcommittee take on the role of on-going conveyance investigations.

Day 3 –

10. (Agenda Items 15 & 16) - Information Management Plan (Bruxer):

- a. Proposed an on-line map (schematic) that shows findings and recommendations with hyperlinks to reports and references.
- b. Could include a Great Lakes map, with links to specific research and products.
- c. A DVD backup of all information could be created.
- d. **TWG Representatives will be reminded that their Summary Reports need to be provided (Tony Eberhardt and Syed Moin)**
- e. **Study Managers need to provide info on all related Study reports to the IM Group**
- f. Decision needs to be made on where the final report, sub-reports, metadata and data will be stored/ archived.
- g. Jacob Bruxer and John Yee will continue to finalize the framework with Wendy Leger's assistance.

11. (Agenda Item 17) - Report on Summer Public Meetings (Kart & Bruce):

- a. 2500 brochures were printed.
- b. Meeting notices were printed in 13 newspapers.
- c. 1200 people attended the meetings.
- d. 100 comments received through different means.
- e. PIAG members felt the educational aspects of the presentations were very valuable.
- f. PIAG endorsed the idea of a water quantity board, which included a public connection.
- g. Kay Felt and Chris Baines are coordinating a meeting of representatives from both the Lake St. Clair and Georgian Bay areas to share ideas and concerns.
- h. A draft report has been prepared and will be presented by PIAG in Ottawa.
- i. First Nations are suggesting that the Long Lac-Ogoki be closed. This should be mentioned somewhere in the final report as a factor that could stress the system.

12. (Agenda Item 19) - Project Management and Next Meetings:

- a. Project Management:
 - i. The IJC has given tentative approval and funding for the establishment of two additional evaporation gauges on Lakes Michigan and Erie bringing the total to four. Maintenance of all four gauges would be funded through 2013.
 - ii. A modification was made to the Data Ring project to establish a more aggressive data collection program. A status report will be available shortly. The Board agreed that the results of this effort will come too late to be included in the Study final report, but could contribute to post-Study activities.
- b. Teleconferences and Next Meetings:
 - i. Friday, October 7, 9:00 to 10:30 am to discuss final plan selection;
 - ii. Friday, October 14, 9:00 to 10:30 am to discuss Board recommendations on multi-lake regulation
 - iii. PIAG Meeting, Tuesday, October 18 in Ottawa (Board attendance not required).
 - iv. Study Appearance with the IJC, Wednesday, October 19 (Study Team only)
 - v. SVAT Meeting (tentative), November 8-9 in Burlington, Ontario
 - vi. Next Study Board Meeting: Toronto on Nov. 29-30 and Dec. 1

13. (Agenda Item 20) - Round Table – All mentioned it was a very productive meeting.



Study Board Meeting #21

Tuesday, September 20, 2011 – Thursday, September 22, 2011
Homewood Suites, 40 East Grand Avenue Chicago IL

Objectives:

1. *Recommend a new Lake Superior Regulation plan*
 - *Recommend modifications to the Orders of Approval*
2. *Recommend a Great Lakes adaptive management plan*
 - *Recommend IJC actions regarding multi-lake regulation*
 - *Approve summary statements on climate risk assessment*
 - *Approve a summary statement on **local adaptation***
3. *Approve findings on the restoration of Lake Michigan-Huron water levels*
4. *Review responsibilities for final report writing*
5. *Agree on Board activity through the end of the study*
6. *Review and approve any remaining schedule and budget issues*

DRAFT AGENDA

Day 1 – Tuesday September 20th – Regulation Alternatives & Orders

| Item | Time | Topic | Lead |
|------|------|--|-----------------|
| 0 | 0830 | Arrivals | |
| 1 | 0900 | Welcome & Agenda Review | Stakhiv |
| 2 | 0930 | Superior Regulation plan evaluations | Werick |
| | 1015 | Break | |
| 3 | 1030 | Superior Regulation plan evaluations (continued) | Werick |
| | Noon | Lunch | |
| 4 | 1300 | Board meeting: select new regulation plan – Final step | Stakhiv & Yuzyk |
| | 1430 | Break | |
| 5 | 1445 | Modifications to the Orders of Approval | Fay |
| 6 | 1600 | Board meeting: approve action on modification of Orders – Final step | Stakhiv & Yuzyk |
| | 1730 | Close of first day | |

Day 2 – Wednesday, September 21st, 2011 – Risk Assessment & Adaptive Management

| Item | Time | Topic | Lead |
|------|------|--|-------------------------|
| 7 | 0800 | Hydroclimate synthesis | Brown, Lee & Pietroniro |
| 8 | 0915 | Board meeting: Approve summary of Study Board messages on climate change | Stakhiv & Yuzyk |
| | 1015 | Health Break | |
| 9 | 1030 | Lake Superior Regulation Plan - Revisited | Stakhiv & Yuzyk |
| | 1130 | Lunch | |
| 10 | 1230 | Multi-lake regulation decision | Stakhiv |
| 11 | 1330 | Board meeting: Recommendation to the IJC on the subject of multi-lake regulation | Stakhiv & Yuzyk |
| | 1430 | Health Break | |
| 12 | 1445 | Great Lakes Adaptive Management Plan | Leger/Read |
| 13 | 1615 | Board Meeting: Approval of Adaptive Management Plan | Stakhiv & Yuzyk |
| | 1730 | Close of second day | |



Day 3 –Thursday, September 22nd, 2011 – Information Management & Public Meetings

| Item | Time | Topic | Lead |
|------|------|--|-----------------------|
| 14 | 0830 | Review yesterday, overview of today | Stakhiv |
| 15 | 0900 | Information Management Plan | Bruxer |
| | 1000 | Health Break | |
| 16 | 1015 | Board Meeting: Approval of Information Management Architecture | Stakhiv & Yuzyk |
| 17 | 1045 | Report on Summer Public Meetings | Powers, Bruce & Nevin |
| | 1145 | Lunch | |
| 18 | 1245 | Peer Review update | Moin |
| 19 | 1315 | Final Report, Project Management & Future Meetings | Eberhardt & Moin |
| 20 | 1400 | Round-table | All |
| | 1430 | End of Meeting | |

Liaison List:

- *Coastal – Dave Powers*
- *Ecosystems – John Boland, Jim Bredin*
- *Rec Boating – Boland and Gee*
- *M&I – Bulkley and Chow*
- *Hydropower - Chow*
- *Navigation – Bredin and Bulkley*
- *Hydroclimate – Bruce and Burn*
- *PFEG – Stakhiv and Yuzyk*
- *AM – Stakhiv, Gee, Bredin, Bruce*
- *Economics - Boland*

Action Items from 21st Study Board Meeting – Chicago, Illinois

| No. | Description of Action Item: | Action Lead: | Due by: |
|------------|---|---|--------------------------|
| 1 | Documentation on TWG “Stamps of Approval” | Bill Werick with assistance from Tony Eberhardt | October 15 th |
| 2 | Summary of different criteria and IERM results in detail for the Board’s review for comparisons of Nat64D, Bal26 and 77-A | Bill Werick | October 5 th |
| 3 | Suggested wording for the revised Orders of Approval | David Fay | October 5 th |
| 4 | Executive summary for Board consideration/ endorsement of the Hydroclimate Synthesis Report | Casey Brown | October 15 th |
| 5 | Independent review of Nat64D to see if it can be replicated or improved by optimization | Bryan Tolson with assistance from Syed Moin | October 5 th |
| 6 | More details regarding possible Board recommendation on multi-lake regulation | Gene Stakhiv | October 11 th |
| 7 | Refinements of AM conclusions and full chapter sent to the Board | Wendy Leger with assistance from Study Managers | Sept. 30 th |
| 8 | TWG Representatives will be reminded that their Summary Reports need to be provided | Tony Eberhardt and Syed Moin | Sept. 30 th |
| 9 | Provide info on all related Study reports to the IM Group (Bruxer) | Tony Eberhardt and Syed Moin | October 30 th |