

Notes from the 18th Meeting of the International Upper Great Lakes Study Board

Riverside Hilton Windsor
22-24 February 2011

Day 1 -

1. Welcome/ Attendance:

Study Board: Gene Stakhiv, Syed Moin (Acting Co-Director), Jim Bruce, Dave Powers, John Boland, Don Burn, Allan Chow, Jonathan Bulkley, Jim Bredin, Jon Gee

Study Managers: Tony Eberhardt, Wendy Leger (Acting Co-Manager)

PFE & AM TWG Reps: Bill Werick, David Fay, Jen Read (Day 2)

IJC Liaison & Legal Advisor: Paul Pilon, Susan Daniel

Communications: John Nevin, Jeff Kart (Day 2)

Commissioners: Lana Pollack, Irene Brooks

Agenda was approved and is Attachment 1.

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

2. SVM Tutorial (Bill Werick):

- a. One SVM uses the historic NBS simulations to evaluate dozens of plans
- b. Another SVM uses stochastic NBS to test plan robustness
- c. Purpose is to create a transparent defensible basis for Board decisions for:
 - i. A new Superior regulation plan
 - ii. New peaking and ponding rules
 - iii. An adaptive management strategy for Superior regulation
- d. There are seven criteria in the “Board Room” that will be used by the Study Board to evaluate plan alternatives:
 - i. Maintain Superior levels between 183.86 and 182.76 m. Hydro TWG reports that Soo power plant could be flooded at levels above 183.86 m. Need to address frequency of exceeding this level and need to include a metric for exceeding the 55 modified rule of 49.
 - ii. Minimize disproportionate losses. Arbitrarily set at 2%.
 1. Coastal TWG has provided a flooding metric in terms of exceedence of historic static level of flooding, erosion model (e.g., comparing Allegan and Ozaukee Counties on Lake Michigan – a plan which provides a 10 cm restoration will increase erosion along about 60 metres of shoreline at Ozaukee but not so much at Allegan) – shows no difference between plans, but some difference with restoration, shore protection costs (average annual differences in maintaining structures) – has been integrated into SVM and could be an important metric. **The Board asked that the absolute damage for shore protection be shown (Bill Werick).** The Board also questioned how they should consider complicating factors such as lack of ice cover, increased wind and GIA. **It was suggested that there be some kind of**

sensitivity analysis regarding these factors (Bill Werick and David Fay).

2. Boating Impacts assessment is based on measurements from 13,000 slips and the occurrence of levels making slips unusable. Canadian data is more robust than U.S. Impacts on Lake Superior compared to Lake Michigan-Huron are small due to the nature of interests on that lake – marinas in non-susceptible locations, low population impacted, etc. **Board requested some new graphs for rec. boating that maybe show depths at various locations (Bill Werick).**
- iii. Are levels balanced? It is the nature of Lake Superior that it doesn't vary as much as Michigan/Huron. Current definition of Balance – standard deviations from the mean level resulting from an alternative plan. Bias – comparing the standard deviations on Lake Superior and Michigan-Huron. Board and PFEG were asked to prepare a white paper that considers the balancing question and whether there is some other formulation for the balancing rule – economic or non-economic.
- iv. Compress Lake Michigan-Huron levels. The SVM looks at the highs and lows on Lake Superior and Michigan-Huron. Levels on Michigan-Huron are fairly correlated where both are high or low at similar times. This means there are limitations on what can be done to compress levels on Michigan-Huron.
- v. Increase navigation benefits. Based on costs, routes and sub-routes. SVM calculates the depth at each port and groups similar port impacts generated by GLSAND – the navigation routing model component - to assess plan performance. According to navigation models St. Marys River depths don't seem to make much difference and that doesn't match with what the captains are saying. **Need to follow-up with captains on this (Bill Werick).**
- vi. Increase hydropower benefits. Considers Synapse 2040 prices with a premium added for CO₂ savings. Mark Lorie is working on a plan based on prices rather than simply water levels. There won't be a plan that can increase hydropower by significant amounts (e.g., 10%) because of the plant capacities at the Soo. Niagara energy – even small changes (a few centimetres) on Lake Erie can have large impacts due to spillage by Ontario Power Generation (OPG). Likely a small issue, since New York Power Authority (NYPA) can use most of this extra water. **Board asked that the numbers for Hydropower at the Soo and Niagara be reported separately (Bill Werick).** Spill to be reported as a percentage of the simulation run – some function of potential loss of benefits (e.g., how many times they spill).
- vii. Minimize environmental impacts. IERM "Zone" calculator is integrated into the SVM. PFEG decided not to include native PI scores (108 years of 33 PI) in the SVM, but rather to include zones. The PIs are highly theoretical and the coping zones give interpretation of the PIs. It has long been known that no plan alternative being considered will adversely impact the environment, so the zones are being defined for adaptive management rather than plan comparisons. But specific factors may still provide benefits, e.g., increased St. Marys River flows for lamprey entrapment. There may also be site-specific adaptive management options to improve conditions, e.g., structural measures to improve wetland conditions in Georgian Bay.

3. NBS Sequences; NBS Map, Plan Statistics (David Fay)

a. Sequences used for various evaluations:

	Water Supply Sequences	Usage
1	<u>Historical:</u> Residual NBS – historical 1900-2008	Lake Superior Regulation St. Clair Restoration
2	<u>Stochastic:</u> Stochastic sequences of contemporary supplies (2 sets – Fagherazzi and Seidou with ENSO and NCEP) LOSLR Stochastic	Lake Superior Regulation - robustness St. Clair Restoration – may use a few additional scenarios to look at extremes Multi-lake Regulation (allows assessment downstream to Montreal)
3	<u>Climate Change:</u> Stochastic sequences transformed by climate change (Ouardo) GCM-RCM sequences (MacKay/Seglenieks; Lofgren) GCM downscaled scenarios (Angel/Kunkel)	Lake Superior Regulation - robustness
4	Pre-recorded: 1860-1899 scenario (Frank Quinn) Paleo-hydrology based on tree ring data (Casey Brown)	Lake Superior Regulation - robustness
5	All	Non-structural Adaptive Management – plausible NBS sequences

b. Stochastics:

- i. Distribution of Lake Michigan-Huron levels – not much different in terms of exceedence probabilities comparing historic (1900-2008) and stochastic (based on contemporary NBS) sets (Seidou’s NCEP and ENSO and Fagherazzi’s). For Lake Superior, similar results are seen at the lower and upper ends of the distribution showing consistent stochastic sets.
- ii. For plan formulation and to some extent robustness, four extreme stochastic sequences were used, some of which show rapid variation from extreme highs to lows and vice versa within a one hundred year period.

c. Climate change sequences:

- i. Considering 160 scenarios from Angel and Kunkel, roughly 25% show results to 2050 above the mean (75% below the mean).
- ii. Using 8 Regional Climate Model scenarios - show little to no change in the mean. The seasonal variation shows generally higher levels in the spring (more runoff) and low fall, early winter levels (more evaporation).

- d. Paleo-Stochastic NBS: Casey Brown’s result show levels between 182.75 and 184 m considering 10,000 years (one hundred 100 year-sequences).

4. Plan Formulation Teams and Design Directions (David Fay)

	Plans – Design Direction	Teams
1	Simpler balancing plan, same as 1977A but simpler formulation.	Rob Caldwell/Yin Fan
2	Natural based plan, theoretically an ecological plan.	Yin Fan
3	Levels Reference Study Plan 121 with tweaking – best performing plan so far	Yin Fan
4	Variations to Plan 1977	Matt McPherson/ Travis Dahl
5	Plan considering optimization of rule curves; subset of multi-lake regulation (minimize the occurrence of entry into coping zones).	Bryan Tolson, et al
6	More traditional optimization plan.	Dave Watkins
7	Hydropower plan based on peaking, ponding and banking.	Mark Lorie
8	Restoration plans – strive to add 10 cm to MH	Yin Fan/David Fay
9	Alternate plan	Casey Brown’s students

- a. All are striving to score well against the seven Study Board criteria.
- b. **Need for a fact sheet on each of these plan alternatives for Board information (David Fay).**
- c. Regarding a plan to assist with sea lamprey entrapment, a separate group is working with the Lake Superior Control Board on possible operational changes and a test program. However, the timing of this work will likely prevent it from being included when Study Board options are considered. But it may be addressed as an adaptive management activity.
- d. IJC lawyer Susan Daniel noted that there is no requirement under the Treaty to keep within Criterion 1 range, nor is it required that the plan meets the existing balancing Criterion. These are elements of the current Order and can be changed.

5. Evaluations, insights and findings (Bill Werick):

- a. Plan 1977-A and various 122 plans with Criteria C modifications (122, 122C, 123 through 130) are considered along with Plan 1955 modified rule of 49, PreProject, Balanced PP, 77R1, 77R2, P77B, OptRest2S and UW Opt.
- b. All values are clustered around certain results.
- c. Strong correlation between port depths on Lake Michigan-Huron levels and navigation costs. St. Marys River flow is not well correlated.

- d. Regarding restoration plans, it hurts hydro but helps navigation. Can add 10 cm to MH within 10 years. Lake Erie adjusts after a few years. Small impact on Lake Superior. However, efforts to try to raise lows, but not highs on Lake Michigan-Huron resulted in considerably higher Lake Superior levels.

6. Facilitated Board Discussion:

- a. State of Pls and other issues:
 - i. Navigation: Opinion that the economic analysis is lacking since it doesn't include cost imposed by the industry due to invasive species.
 - ii. M&I: Chicago municipal water intakes are not impacted by any of the levels that may result under any alternative and scenarios; safe to a 1:10,000 year event. Updated numbers will be provided to the M&I TWG.
 - iii. Ecosystems: How does balance impact ecosystems in the system particularly in the compensating works? Various metrics are included in the IERM to measure performance in terms of various species. Would like more information on the sea lamprey issue.
 - iv. Hydropower: Concentrate on the energy production not the price.
 - v. Hydroclimate: Need to pull together information about the various climate change projections coherently. Casey Brown is developing a piece on plausibility. The material will be developed for the summer meetings and final report. Suggestion made to strive toward a Hydroclimate TWG consensus on scenarios. **Propose a final workshop to develop a common opinion/consensus. Jim Bruce, Don Burn and Syed Moin will facilitate the discussion; Syed will coordinate with Debbie Lee and Al Pietroniro. Also discussed the need for a plain-spoken narrative on climate change. Study Team is working to engage Tom Shillington on this with input from Linda Mortsch.**
 - vi. Ranking of Evaluation Criteria for Plan Comparison: Need some kind of formal method for eliminating and selecting plans which focuses on areas where the attributes are different. Each Board member could assign a weight on each criterion indicating their perceived importance when ranking plans. The IJC will be receiving one plan as an alternative to 77A from the Study Board. However, variations to that one plan can be provided which deal with uncertain futures. The September Board meeting will be focused on the key differences between plans and a formal method for ranking plans.
- b. Discussion regarding the SVM:
 - i. By April Study Board meeting, model will be 95% complete. Considering the historic state, it's 90% complete now.
 - ii. **Board requested that all coping zones be added to the SVM (Bill Werick).**
 - iii. Two plans may be promising – Dave Watkin's and Mark Lorie's since they represent a different type of formulation than the traditional 77A. Important to recognize that the hydroclimatic scenarios will be used for future non-regulation issues (adaptive management); can also be considered in the SVM.
 - iv. **Request LimnoTech to provide a full set of the Georgian Bay wetland changes over time. A meeting will be scheduled with reps of Georgian Bay to discuss actions to address their wetland issue (Bill Werick with Scudder Mackey).**

- v. **Conduct uncertainty analysis around hydropower prices and changes to ship traffic to determine if these might impact plan rankings (Bill Werick and David Fay).**
- vi. At the April and June meetings, the Study Board will use the SVM to choose an alternative. Small group approach will be used, to allow each member to provide insights from individual findings. **Prior to these meetings, a tutorial will be provided (Bill Werick).**

Day 2

7. Review yesterday, overview –

Direction to Plan Formulators (Don Burn/ Syed Moin):

- i. Important to identify the base case - 77A or PreProject
- ii. Better plan documentation
- iii. Better defining the disproportionate loss aspect – better sense of the magnitude of the impact, not just pass/fail
- iv. Need to drill down on some ecological PIs so that sensitivities can be identified.
- v. Provide some flexibility in the plans allowing adaptive management refinements/ adjustments by the Control Board
- vi. How to consider Niagara River benefits; likely keep them separate from the other hydropower considerations
- vii. Consider uncertainty analysis of hydropower and navigation
- viii. How we respond to the Treaty requirements needs to be identified – layered approach was suggested – historical analysis, then stochastic, then climate change.
- ix. Next Board meeting, describe these points in more detail for comment.
Prepare a “white paper” regarding balancing and balancing at the extremes – impacts resulting from balancing/ trade-offs (Bill Werick with Don Burn).

8. Institutional options for implementing a new regulation plan – legal paper (Wendy Leger)

- a. February Workshop White Papers:
 - i. Implementing a new plan by Supplemental Order or Directive from IJC
 - ii. Possible changes to the Control Board; include an AM group (not likely required)
 - iii. Regarding adaptive management, focus on better forecasting and reducing the uncertainty in the water budget.
 - iv. Periodic monitoring – time requirement to analyze the collected data to see if change/ update is required. Possibly expand the role of the Coordinating Committee as a centre for Great Lakes hydroclimatic expertise and information. Committee could serve all Great Lakes Control Boards. This has been emphasized before and stressed at the FIRM Workshop in Burlington. As follow-up to FIRM workshop, a business case is being developed for requirements to reduce hydroclimatic uncertainty. Follow-up meeting is planned with agencies for possible support of business case including:
 - Agencies performing monitoring – specific data requirements.

- Basic monitoring requirement and AM requirements.
- Funding options.
- More detailed analysis of what Doug Brown started in terms of AM institutional options.
- **Jim Bruce, Syed Moin and Tony Eberhardt volunteered to help as liaison to FIRM actions/follow-up from last workshop.**

9. St. Clair Restoration Framework (Syed Moin):

- a. Final report on restoration options and impacts due to Peer Reviewers on April 1, 2011. Restoration report posted on May 18th.
- b. Public consultation process begins after discussion with IJC in April.
- c. Investigations underway:
 - i. Bryan Tolson – impacts/analyses of restoration options
 - ii. Jacob Bruxer – structural option review
 - iii. Scudder Mackey – assessment of St. Clair River ecological impacts
 - iv. Bill Werick – preliminary evaluation of impacts using SVM
 - ii. Doug Brown – institutional analysis of implementing structural options
 - iii. Bill Merte of Corps Detroit District – structural cost determination
- d. Restoration hurts hydropower since it raises the tailrace level thereby reducing the head at the St. Marys River power plants. Commercial navigation benefits from the increased lake levels.

10. Evaluation of alternatives 77R1 and 77R2 (Syed Moin):

Plans 77R1 and 77R2 can eliminate a 10 cm impact of restoration on Lake Michigan Huron, but at the expense of Lake Superior requiring additional stored water on that lake.

11. Ecosystem at-site impacts of restoration (Syed Moin):

- a. Sturgeon spawning area corresponds with the location of the possible restoration structures in the St. Clair River
- b. Re-suspension of contaminated sediment.

12. Institutional workshop restoration findings (Wendy Leger):

- a. Government commitment to compensate for the 25 and 27- foot dredging, but authority expired and need was overshadowed by occurrence of high water.
- b. Extended time to put structures in place – 30 to 50 years.
- c. No structure has ever been built in the Great Lakes without a strong economic impetus.
- d. Will include a recommendation that future maintenance dredging be disallowed due to resulting reduced upstream levels and ecological impacts (although both impacts are viewed as small). **Attempts will be made to determine this impact.** New bathymetric data was collected in 2010. **Dave Bennion will be requested to analyze this data (Tony Eberhardt).**

13. Response to the 17 Feb 2011 letter - Discussion regarding adaptive management:

- a. Point made regarding recommendations of implementation by agencies; non-structural measures including floodplain management, shore protection permitting,

- dredging and low water considerations. IJC is cautioning that this is beyond the IJC's authority.
- b. Study Board recognizes that AM for non-regulation is outside mandate of IJC, but government letter requested it and IJC could provide leadership/facilitation role.
 - c. A Lake Superior Adaptive Management plan will be developed along with recommendations for AM beyond Superior regulation
 - d. The recommended Superior AM plan will be one that is flexible enough to consider future conditions and be able to adapt to these conditions.
 - e. Additional time and funding is not required to develop beyond Superior regulation AM recommendations.
 - f. Unique opportunity with Study to set something up that is adaptive
 - g. Three levels of AM being considered:
 - i. Information out to agencies to help them make management decisions.
 - ii. Information in from agencies on status of vulnerabilities, effectiveness of management actions and data and information gaps for proper management.
 - iii. Bi-national, coordinated AM effort – some Board members think we should not spend much time on this. Others see the value. Will depend on whether agencies are interested.
 - h. Need continual dialogue between the Study Board and IJC advisors to determine to what degree recommendations can be made that may extend to agencies beyond the Study.
 - i. **The Study Team will prepare a response to the IJC letter.**

14. Discussion – Communication Issues with PIAG (Gene Stakhiv/ Syed Moin):

- a. IJC Letter confirms Commission's desire to have the restoration component included with the rest of the Study and provided the same opportunity for public consultation and be included with the main Study report.
- b. Board agreement that restoration would be presented along with Lake Superior Regulation and multi-lake regulation at the summer public meetings.
- c. Three public engagement options were presented by John Nevin:
 - i. Prefer to have public input on the restoration document prior to the public meetings. This allows the presentation to be tailored around the comments that have been received.
 - ii. The emphasis during the public meetings will be Lake Superior regulation with less emphasis on restoration and multi-lake regulation.
 - iii. PIAG Co-Leads endorsed options 1 (post report and mention that public will have an opportunity to comment at summer meetings, PIAG provides information to constituents, PIAG reports findings at their July 11th meeting) and 2 (webinars for government officials with IUGLS scientists, with interests/ PIAG members and with the media).
- d. *At PIAG meeting (Feb. 24-25), some members wished to meet with constituency groups as "invitees" to describe restoration – a variation of option 3. Study Team will attend as requested. PIAG will develop a synthesis report on any constituency findings by June 30th.*

15. Study Board insights on peer review documents:

- a. Institutional (Dave Powers):

- i. Doug Brown’s paper on a new regulation plan – should have included citations identifying specifically where information was drawn from (e.g., citing for what constitutes “considerably different”). Paper also describes opportunities for change to Lake Superior Board of Control but doesn’t mention why these changes are necessary.
 - ii. Doug Brown’s paper on new structures – discussed paper for clarification, but offered no comments. **Ask Doug Brown to check to see if 1960 authorization was also decommissioned (Wendy Leger).**
 - iii. Michael Donahue’s paper on adaptive management – good conceptual ideas, but not necessarily practical.
- b. Hydropower (Jonathan Bulkley):
 - i. Great uncertainty in future pricing.
 - ii. Concern that although there is great uncertainty associated with hydropower pricing, etc., that it will be the driver for selecting acceptable plan alternatives.
 - iii. Generally accepted that the marginal price of electricity is the best measure of the incremental gain/loss of societal value.
 - iv. **Sensitivity analyses will be used to address uncertainty of hydropower pricing and other factors (PFEG).**
 - v. **PFEG was requested to show a range in hydropower results based on hydropower prices and overlaps between plans (Bill Werick).**
- c. Recreational Boating (Allan Chow):
 - i. Report clear but needs a section upfront on the study objectives and methodology, assumptions, limitations of the data collected and summary of the study results.
 - ii. Study addresses damage incurred by marina operators only and assumes 100% occupancy.
 - iii. Suggest expanding adaptive management section.
- d. Low water impacts (John Boland):
 - ii. Two studies are relevant: coastal property values and recreational boating impacts.
 - iii. Data ring project (which will be awarded soon) will help determine impacts at local sites (Duluth, Macomb and Wayne Counties and South Georgian Bay).

16. Multi-lake Regulation Update – Simulations and Institutional Workshop Findings (Bryan Tolson by phone):

- a. Considering improved release rules for existing structures (at St. Marys and St. Lawrence Rivers) and various sub-sets for additional structures, i.e., optimizing rule curves.
- b. Document will be provided for peer review for submission on April 21st.
- c. Objective function is to maximize improvement in the system performance over that provided by Plans 1977A and 1958DD (Lake Ontario plan with deviations) – frequency of going beyond historic measured extremes at various Great Lake points (quarter-monthly violations or benefits).
- d. UW-ML type plans are developed and results compared to present plans.
- e. At the moment, not considering structures downstream of Moses-Saunders.
- f. Meeting/teleconference next week to refine further.

17. Risk Management Framework Introduction (Casey Brown by phone):

- a. Defining “risk” – possible negative consequences and “plausibility” – likelihood of risks.
- b. Determining when levels enter coping zone C; under what hydrologic scenarios.
- c. Review made of annual NBS standard deviations versus NBS mean, percent change from historic identifying extreme events within the 50,000 year stochastic set relative to Coastal coping zone C.
- d. Identification of coping zone C occurrences that cause Plan 77A to fail regarding Coastal PIs. Similar analyses would be performed for all other interests.
- e. Need to develop rules to implement during extreme lake levels.
- f. Need to screen out GCM that will be evaluated.
- g. **Need to relate Angel and Kunkel model to whole 100-year mean, not just the 1961-90 mean (Casey Brown).**

18. Planning for PIAG Joint Meeting (Syed Moin/ Gene Stakhiv):

Document provided and refined regarding restoration information.

19. To do list and schedule:

- a. Action items and the timelines for their completion are shown in Attachment #2.
- b. Schedule:
 - i. Study Board Mtg. #19: April 11th, 9:00 am to April 12th, 5:00 pm in Washington, DC.
 - ii. Study Board Appearance with the IJC, April 13th, 8:30 to 10:15 am in DC.
 - iii. Study Board Mtg. #20: June 7th, 1 pm to June 9th, 5:00 pm in Niagara Falls, Ontario.
 - iv. Study Board Mtg. #21: Sept. 20th, 9:00 am to Sept. 22nd, 5:00 pm in Chicago.



Study Board Meeting # 18

Tuesday, February 22, 2011 – Thursday, February 24, 2011

Riverside Hilton Windsor

Ontario Room (2nd Floor)

Objectives:

- *Practice Session on Superior Regulation with new PIs*
- *Discussion of restoration analysis with PIAG*
- *To glean Board insights from the peer review documents for decision making*
- *To establish a framework for Restoration process*
- *Introducing a risk evaluation framework*

AGENDA

Day 1 – Tuesday February 22nd

Item	Time	Topic	Lead
	0830	Arrivals	
1	0900	Welcome & Agenda Review	Moin
2	0930	SVM Tutorial	Werick
	1015	Break	
2	1030	SVM Tutorial (cont'd) PI Status Report including metrics (\$ and %) Decision Criteria IERM	Werick (Mackey on phone)
	Noon	Lunch	
3	1300	NBS Sequences (NBS Map, plan statistics)	Fay
4	1400	Plans Formulation Teams and Design Directions	Fay
5	1430	Evaluations, insights and findings	Werick
	1515	Break	
6	1530	Facilitated Board Discussions State of the PIs	Board TWG liaisons

		SVM (Powers) discussion with whole Board Direction to Plan Formulators	Powers Burn/Moin
	1730	End of day 1	

Day 2 – Wednesday, February 23rd, 2011

Item	Time	Topic	Lead
7	0830	Review yesterday, overview of today	Moin/Stakhiv
8	0845	Institutional options for implementing a new regulation plan – legal paper	Leger/Werick
9	0930	St Clair Restoration Framework	Moin/ Stakhiv
	1000	Break	
10	1015	Evaluation of restoration alternatives 77R1 and 77R2	Werick
11	1030	Ecosystem at-site impacts of restoration	Moin
12	1045	Institutional workshop restoration findings	Leger
13	1115	Discussion – Communication issues with PIAG	Stakhiv/Moin
	1200	Lunch Break	
14	1300	Insights from peer review documents: Institutional Hydropower Low water impacts Recreational Boating	Dave Powers Jonathan Bulkley John Boland Allan Chow
		Break	
15	1530	Multi-lake Regulation Update – Simulations and Institutional Workshop Findings	Fay (Tolson on phone)
16	1600	Risk Management Framework Introduction	Brown/Werick/Leger
17	1630	Planning for PIAG Joint Meeting	Moin/Stakhiv
18	1700	To do list, schedules	Eberhardt
	1730	End of day 2	

Board Members Liaison List:

• Coastal –Powers	• Navigation – Bredin and Bulkley
• Ecosystems – Boland, Bredin	• Hydroclimate – Bruce, Burn and Moin
• Rec Boating – Boland and Gee	• PFEG – Stakhiv and Moin
• M&I – Bulkley and Chow	• AM – Stakhiv, Gee, Bredin, Bruce
• Hydro - Chow	• Economics - Boland
• Task team - Burn, Bruce, Boland and Gee	

Action Items from 18th Study Board Meeting – Windsor, Ontario

No.	Description of Action Item:	Action Lead:	Due by:
1	Need for a fact sheet on each of these plan alternatives for Board information.	David Fay	Mar. 31, 2011
2	Propose a final Hydroclimate TWG workshop to develop a common opinion/consensus.	Jim Bruce, Don Burn and Syed Moin will facilitate the discussion; Syed will coordinate with Debbie Lee and Al Pietroniro.	Prior to June Study Board meeting
3	Request LimnoTech to provide a full set of the Georgian Bay wetland changes over time. A meeting will be scheduled with reps of Georgian Bay to discuss actions to address their wetland issue.	Bill Werick with Scudder Mackey	Prior to June Study Board meeting
4	Prior to Study Board meetings, a tutorial will be provided on the SVM.	Bill Werick	Date to be determined
5	Prepare a “white paper” regarding balancing and balancing at the extremes – impacts resulting from balancing/ trade-offs.	Bill Werick and Don Burn	Mar. 31, 2011
6	FIRM actions/follow-up from last workshop.	Jim Bruce, Syed Moin and Tony Eberhardt	Prior to June Study Board meeting
7	Attempts will be made to determine the impact of no future dredging in the St. Clair River.	Syed Moin to coordinate with Jacob Bruxer	Mar. 31, 2011
8	Dave Bennion will be requested to analyze new 2010 bathymetric data.	Tony Eberhardt to coordinate	Mar. 31, 2011
9	The Board asked for some specific analysis in the SVM/Boardroom as follows: <ul style="list-style-type: none"> • Show shore protection as absolutes to compare plans • Consider some kind of sensitivity analysis for complicating factors such as lack of ice cover, increased wind and GIA. • New graphs for rec. boating that maybe 	Bill Werick	Prior to April Board meeting

	<p>show depths at various locations</p> <ul style="list-style-type: none"> • Conduct uncertainty analysis around hydropower prices and changes to ship traffic to determine if these might impact plan rankings • Separate hydropower results for the Soo and Niagara power plants • Spill to be reported as a percentage of the simulation run • Conduct sensitivity analysis around hydropower prices and show results as ranges • Add all coping zones to SVM 		
10	Follow-up with ship captains regarding navigation routing model and sensitivity of St. Marys River	Bill Werick	Prior to June Board meeting
11	Prepare a response to IJC letter	Study Team	Prior to April Board meeting
12	Follow-up with Tom Shillington and Linda Mortsch re: plain spoken narrative on climate change	Syed Moin	Mar. 8, 2011
13	Need to relate Angel and Kunkel model to whole 100 year mean, not just the 1961-90 mean	Casey Brown	Mar. 31, 2011
14	Ask Doug Brown to check to see if 1960 authorization was also decommissioned	Wendy Leger	Mar. 31, 2011