

November 6, 2009

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Dear Drs. Pilon and Colosimo,

Subject: Response to IRG Review of “Socio-Economic Sector Evaluation of Lake Superior Regulation Plans for the International Upper Great Lakes Levels Study”

References:

1. IRG Review of Socio-Economic Sector Evaluation Strategy, July 31, 2009
2. Socio-Economic Sector Evaluation of Lake Superior Regulation Plans for the International Upper Great Lakes Levels Study, July 14, 2009

This is the Board's response to the advice and comments provided by the Independent Review Group (IRG) with respect to the socio-economic sector evaluation strategy proposed for the Lake Superior phase of the studies. The IRG met with the IUGLS team at the Crowne Plaza Detroit Metro Airport Hotel, Romulus, Michigan, on July 21 and 22, 2009, to discuss this strategy and also the proposed ecological evaluation methodology. The Board has previously responded to parallel IRG reviews of plan formulation and evaluation strategies. It will respond separately to the parallel review of ecological evaluation strategies.

The Terms of Reference for the IJC IPR state:

- “The overarching charge shall be to evaluate the appropriateness and sufficiency of the work plans, studies, models and monitoring efforts used to inform decisions”
- “The review should focus on scientific aspects connected with the issues, not on the decision-making process within the purview of the Commission itself.”

In response to these directives, the IRG review states that “for the most part, the Review Team finds the methods to be appropriate and sufficient to inform water resources decision makers with a few exceptions” The Review Team also provided some recommendations and suggestions intended to improve the evaluation strategy. The purpose of this document is to review and respond to the IRG's exceptions, recommendations, and suggestions.

1. **Study objective and focus.**--*The Review Team noted the contrast between the “rather sweeping objectives” of the IUGLS and the predictions of “very modest, if not negligible” effects of re-regulation of Lake Superior on water levels. The Team expressed its concern that the scope of the study may raise “public expectations as to the degree to which the regulation of Lake Superior may be modified to meet the competing needs of water users and shoreline interests around Lake Superior and the downstream lakes”*

1. **Response.**--The Study Board is well aware of the need to promote realistic expectations on the part of the public and other stakeholders. The Review Board points to the case where the public may over-estimate the ability of regulation to maintain desired water levels. The Board plans to continue using public information, public meetings, and other forms of outreach to inform interested parties as to the actual impact of regulatory options. The board recognizes that this is a challenging task, since many observers will inevitably confuse normal, climate-driven lake level fluctuations with the less noticeable effects of regulation.

The Review Team also noted:

“The IJC specifically directed the study to examine climate change issues. Feasible climate change scenarios could radically change the inflows to Lake Superior. Detailed site investigations and study of water uses are important to determine the range of lake levels, including those outside the historical range, which pose problems.”

For this reason, the socio-economic strategy has been designed to address two very different sets of effects: (1) the effects of relatively small changes in water level resulting from possible re-regulation of Lake Superior and (2) the effects of potentially large changes in water level resulting from long-term events such as climate change. These large changes may be within the water levels experienced in recent history or they may be outside historical ranges. The “sweeping objectives” noted by the Review Team may prove to be unnecessary in the case of re-regulation, but the Study Board believes that the assessment of long-term effects requires examination of a broad range of issues.

2. **Integration across use studies and the ecological studies, including study criteria.**--*The Review Team argued for “a high degree of consistency and integration across the various studies” In other places in the review document, the Team stated that it found “no systematic integration of methods and criteria among the studies,” “no reference to sequencing of studies,” and the absence of a “research strategy to address key gaps by an early date.” Specifically, the Review Team asked whether the “methodology allows us to say that a 'navigation dollar' is equivalent to a 'hydropower dollar.’” The Team also asked how the development of climate change scenarios would be integrated into the study.*

2. **Response.**--The Study Board recognizes the desirability of the consistent use of commensurate measures, such as dollars, for all performance indicators. However, there are several reasons why universal commensurability cannot be achieved.

- Even where dollar measures are available, some may apply to the entire study area (e.g., hydropower impacts) while others pertain to specific sites (recreational boating studied for 17 discrete sample areas). While these measures can be compared to a limited degree, they cannot be summed or otherwise treated as commensurable.
- Some performance indicators are associated with market goods (e.g., hydropower or commercial navigation) and others are associated with non-market goods that can potentially be measured in dollar terms (e.g., shoreline changes or recreation). But there are still other performance indicators that cannot be expressed in dollar terms (such as ecosystem changes), or where the cost of the studies necessary to obtain a credible dollar measure may be excessive.
- The Study Board is currently identifying decision-making frameworks which may be appropriate given the variety of metrics in which the performance indicators will be expressed.

The Study Board is committed to seeking dollar-denominated measures for all socio-economic performance indicators, provided that development of such measures is feasible, cost-effective, and able to demonstrate the relative impacts of different water level regulation plans. But it must be recognized, as noted, that the dollar values thus obtained are not all comparable due to the use of discrete study sites for measurement of some effects.

Beyond the selection of consistent units of measurement, there is an ongoing effort to improve integration of methods and criteria among the various studies--and among the Technical Working Groups--and to identify and correct any gaps that may be found within the overall study framework. The Study Board has recently developed a new study organization for the purpose of achieving improved oversight and coordination. The Lake Superior Regulation Task Team will now consist of 12 Technical Working Groups (TWGs), covering the development of performance indicators plus integrative and advisory functions.

3. *Climate change stress testing.*--*The Review Team noted that “climate change poses a particular challenge to developing an adaptive management framework.” The Team proposed, for the consideration of the Study Board, an approach to “climate change stress testing.” This approach begins by postulating ecosystem and economic stresses outside of the historic range, then developing climate change scenarios that would be expected to produce the postulated stresses. Early warning indicators appropriate to these events would be defined, as well as candidate management and adaptation measures. Benefits and costs of the management and adaptation measures would be used to develop optimal responses to the postulated events.*

3. *Response.*--This is a timely comment by the Review Team, since it addresses a topic under active consideration by the Lake Superior Task Team. Two approaches have been identified:

- *Climate-down.*--Using GCMs and/or expert elicitation, define a number of extreme climate change scenarios. Determine the impacts of these events, should they occur, and develop and analyze appropriate management and adaptation measures. These data can then be used to develop an adaptive management plan incorporating optimal responses to various events.
- *Impacts-up.*--Identify a number of extreme climate-induced events, such as high or low water levels outside of the historic range. Determine the climate scenarios that could give rise to these events; develop and analyze management and adaptation measures suitable to these events. Using these results, develop an adaptive management plan incorporating optimal responses to the postulated events.

Note that the second approach is very similar to the Review Board's suggestion.

Of course, these outline approaches greatly understate the complexity of the planning process needed to develop an adaptive management plan. But work is proceeding on this topic. The Study Board will adopt the approach that seems best in the circumstances.

4. ***Irrigation water use.***--*The Review Team, while noting that present irrigation water use “is likely ... not particularly relevant to the regulation of Lake Superior” recommended that the Water Uses TWG “be directed to review the current level of irrigation water use and place that use in the context of current water demand in the basin.”*

4. ***Response.***--The water use study, now nearing completion, addresses current irrigation water use to the extent that it can be measured or estimated. It is important to note that many irrigators draw water from private wells and that this use is unmetered and unobserved. Very few irrigators withdraw water directly from the Lakes. This issue will be addressed in the Contextual Narrative as well.

The Review Team also noted that “irrigation may become both a large withdrawal use and consumer of water” under climate change.

The feasibility of projecting irrigation water use under various climate change scenarios has not yet been determined, but this is a topic that will be addressed later in the study.

5. ***Hedonic price model.***--*The Review Team noted that the hedonic price analysis model “will likely not work to estimate potential damages over the range of extreme events.”*

5. ***Response.***--Agreed. Hedonic price analysis is not under consideration for this purpose. It is, however, a possible approach to developing an economic measure of damage due to water levels made slightly higher or lower as a result of re-regulation of Lake Superior. It should be noted that the economic cost of high water events is relatively better understood than low water effects. The Coastal TWG will undertake a phased approach for addressing potential low water impacts. The first step will be a series of focus group sessions with real estate professionals designed to

provide further understanding of the sensitivities to low water conditions by riparian property owners. If sensitivities are identified, the possibility of a benefits transfer approach will be investigated. If it is decided that an empirical valuation study is needed, hedonic price analysis may be considered, along with other methods. Any empirical valuation would be tested at a specific site to confirm its applicability and further analysis would not be undertaken if it was deemed inappropriate.

6. *Secondary benefits and regional expenditures.*--*The Review Team notes that “secondary (negative) impacts on regional economies may be severe if lake level regimes shut down shoreline activities.” The Team recommends “an overview of potentially sensitive communities and disadvantaged groups that could be affected”*

6. *Response.*--The Study Board disagrees in part and concurs in part with this recommendation. With respect to secondary economic effects, which arise because of underused infrastructure, private investment, workforce skills, etc., there is no apparent need to address this in the study. The direct economic effects of alternative regulation plans will be adequately represented by studies already underway or planned by the Board. Furthermore, given the likely small direct effects expected to result from Lake Superior re-regulation, secondary economic effects will be even smaller, probably de minimus. In the case of the much larger direct effects expected from the climate change scenarios, it must be remembered that secondary economic effects are normally expected to be transient. The Board sees no need to explore such effects in a long-range projection.

On the other hand, the long-range direct effects of climate change may result in major structural changes in the basin economy. There is a definite need to identify those communities that are most vulnerable to the impacts of changes to hydrologic regimes associated with climate change and those groups which are most sensitive to the likely changes. The process of identifying these potentially sensitive entities is already programmed as part of the Adaptive Management TWG's Statement of Work. An economic analysis of the possible impacts on these entities, once identified, is planned, although the specific methods have not yet been identified. The Study Board strongly agrees with the Review Panel's recommendations on this subject.

7. *Other detailed comments.*--

“We suggest developing a report section on economic context and policy to frame the analysis assumptions.”

Estimated economic value of tourism, recreational boating, and cruise ships should be presented for context.

The Contextual Narrative for the Lake Superior study, now being drafted, will present current and projected demographic, economic, and other conditions. In particular, it will show the

contribution to the regional economy of the various lakes-dependent sectors, such as tourism and recreational boating.

Estimates will be presented of net losses experienced by marinas when water levels drop up to 3 feet or more or if they rise 3 feet or more. These estimates will be calculated using information from almost 20,000 slip depth measurements and using financial calculations developed by Dr. Ed. Mahoney for a study on Lake Michigan. The calculations/methodology are supported by the U.S. Army Corps of Engineers and various States in the Great Lakes basin.

The Review Team expressed concern about possible inconsistencies in planning horizons and growth assumptions. Three different growth scenarios were proposed.

Planning horizons and growth assumptions are chosen for each study as appropriate to the objectives and purpose of that study. However, uniformity across specific studies is important if those studies are to be used for the same purpose. The Adaptive Management TWG is presently considering various growth assumptions, not dissimilar from those proposed by the Study Team, but for a maximum 50-year planning period.

Changes in the cost of shipping may not capture the total cost of losses to commercial transportation due to low water levels.

Agreed. While the established methodologies being used by the technical working group focus on estimating impacts to transportation costs, as noted elsewhere, the very limited effect of changes in Lake Superior regulation on water levels doesn't warrant attempting to model additional external costs. The contextual narrative will identify various externalities (environmental, safety, infrastructure wear/tear impacts) that could result in additional costs outside the commercial navigation arena. The significance of these additional factors increases when focusing on climate change and adaptive management.

With respect to use of one year of shipping data and potential commodity changes, the transportation cost model has the capability and will be used to show the sensitivity of the results to significant changes in particular commodity areas (such as significant drops in iron ore movements associated with down turns in steel manufacturing, or increases/decreases in coal movements associated with changes in environmental/energy policies, etc.).

“A more convincing argument should be made for considering only intakes and low levels, to the exclusion of outfalls and high levels.”

Agreed. The Water Uses TWG plans to test the assumption that outfalls do not present a major problem under high water conditions by surveying a small number of wastewater treatment plant operators with known high elevation outfalls.

The Review Team noted that the sample sites do not include two important boating sites: Michigan City, IN/Buffalo, MI and Traverse City, MI.

The following describes the method used by the Recreation Boating and Tourism TWG to select the sample areas (Areas of Survey – AOS).

Eighteen locations were chosen by the TWG to represent significant regions of the upper Great Lakes' recreational boating and tourism industries. These eighteen locations acted as the center-points for 80 km diameter circles, referred to as “areas of survey” (AOS). These eighteen circles were represented visually on Google Earth, to be used to identify marinas.

The eighteen AOS were selected according to several criteria: In terms of eco-regions, sites were chosen to provide an even representation of both the Great Lakes Forest Region and the Boreal Forest Region. Geologically, an even representation of both Precambrian Shield (granite) and Escarpment (primarily limestone bottoms) rock formations was desired. AOS selection was also designed to encompass a maximum concentration of ports/marinas, and aimed for equal representation in terms of regional susceptibility to fluctuating water levels. The Chicago area was not selected because that area has very deep waters. The TWG selected areas significantly impacted by historic fluctuations in water level. The TWG also wanted to ensure that at least two sites were selected on each major body of water. One site on the U.S. side was selected at the request of a Public Interest Advisory Group (PIAG) member and another was selected due to its concentration of tourism businesses related to boating and water recreational activities. The eighteenth site added is the area around Sandusky/Toledo.

Members of the Recreational Boating, Cruise Ship and Tourism Technical Working Group have extensive tourism and boating experience around the Great Lakes and sites were selected and agreed to by all committee members based on the above noted criteria.

With respect to the Review Team's specific query, the two named sites were not included as sample areas because in both cases significant numbers of boaters have access to deep water and are thus less affected by water level changes. Michigan City, IN, and New Buffalo, MI, are both commercial harbors and also characterized by near shore deep water. The largest fraction of boating facilities in Traverse City, MI, are in the deep water West Arm bay (the shallower East Arm bay is less used).

The Review Team questioned the apparent intention of the Coastal TWG to consider measuring dollar impacts only for low water effects.

As noted above, all TWGs will use dollar measures for socio-economic performance indicators wherever feasible and cost-effective. The Coastal Zone TWG has initially focused on low water effects because this is the area most likely to require new empirical research. The feasibility of stating low water impacts in dollar terms will be explored through the phased approach described above. The TWG will work with the Study Board to determine whether such valuations are necessary to support the re-regulation decision.

“Could the historical experience of 1978-87 and 1999-2006 be used to estimate actual economic impacts of high/low flows?”

The Task Team has looked closely at these events and will continue to do so, in order to learn whatever lessons may be found. However, based on reviews of these experiences, it is not feasible to rely on these historical periods for measuring economic impacts. This is because the necessary data were not reported at the time and, indeed, could not have been identified in the absence of considerable analysis.

Respectfully submitted,

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