Preliminary Comments from Members of the Chartered SAB on the SAB Draft report *draft Review of Great Lakes Restoration Initiative Action Plan.*

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Comments from lead reviewers

Comments from Dr. Ingrid Burke

1. Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?

Overview:

Each of the charge questions was addressed adequately, resulting in some excellent recommendations to EPA regarding the Great Lakes Restoration Initiative Action Plan. Below, I have some general comments and suggestions, and then some specific ones as well. My general comments here address
1) the request for a science plan; and 2) the tradeoff between the science plan/revision of the Action Plan and the timeliness of the Action Plan.

Science Plan and Evaluation Panel Recommendation:

The letter, the summary, and the full review recommend that EPA develop a Science Plan for the Great Lakes Restoration Initiative Action Plan. I think that a good deal more description of what a Science Plan would entail is needed. The most descriptive statement is "Creating a science plan will support the current efforts and will identify future directions that can take advantage of, and support, development of new restoration technologies, methods, and approaches.".

While the idea of a Science Plan seems like a very good one, and in particular, having frequent cycles of checking outcomes against science, it is not clear what the Panel thinks a Science Plan is. What would an outline of this plan look like, and what would its role be in guiding the implementation of the Action Plan? More guidance to EPA is needed here. Similarly, the role of the standing Science Panel should be elaborated a bit more. This recommendation is a little buried in the document (page 35), and I think it would be good to have it show up in the early sections, under the first few overview Charge Questions.

It seems to me that the recommended 'GIS approach" belongs in the "Science Plan" section. I would probably call this more of a spatial information system to support science (e.g. what's upstream, or downstream, or where did this invasive species start, etc), evaluation, accountability, decision making about key locations for actions, and guiding adaptive management. (Note that "GIS" generally connotes just software).

A strong effort to pull together recommendations from the rest of the review, and put them into the 'Science Plan' or "Overview" section would very much strengthen and streamline the review.

There are two important and good recommendations for changes in the architecture of the Action Plan that do not receive up-front billing in the Summary nor the Letter to the Administrator. The first is the recommendation that education/outreach/evaluation/accountability (aka "Broader Impacts") be infused throughout all foci in the Action Plan, and be part of the overarching program, rather than a separate focus. The second is that the Habitat Restoration Focus should become an overarching theme or program. If these are important recommendations they should appear in the overview, summary, and letter, at the outset, as a separate section entitled something like Architecture of the

Action Plan.

Timeliness and the Recommendations.

There is a bit of a paradox, in my view. The Panel agrees with the Action Plan document that we know enough, that is, that there is enough science in hand to develop an action plan and begin to implement it – that time is of the essence with beginning real action. It agrees in summary sections that the major Actions being planned are the right ones. Then, the review goes on to recommend major changes to the Action Plan document, including a major addition of a Science Plan, a Science Panel, the development of an evaluation plan, an accountability strategy, etc.

Clearly, an Action Plan with a budget this big, and such important goals, needs to be carefully thought through. But if it is true that the major goals and actions are important to start soon, should implementation wait for all these changes to be made in the Plan? Could the review identify, for each of the 5 Foci, which things are worthy of immediate investment and action? I understand that this is not explicitly in the Charge Questions that the Review Panel considered, but it is implicit within each "focus" section. Could the review panel say anything at all about things that can be started, now, that will provide major incremental value, while some of the framework is still being hammered out?

Specific Charge Questions:

Responses to the Charge Question 3 are particularly well framed and organized.

Toxics Charge Questions: The question in the review about whether the goal of delisting has to do with the management actions or the action delisting is excellent. I believe that the suggested inclusion of mercury and PAH's are the foundation for the statement in the Executive Summary section that more targets should be included. It would be good to highlight this recommendation, and to be more specific about this in the summary. It is difficult to find pithy recommendations in the matrix of many criticisms of the Action Plan associated with the Charge Question(s) 5. I suggest pulling out recommendations here and highlighting them.

Invasives Charge Questions: It is difficult to find the key recommendations. Is one on page 19, that "a single, rapid response system should be adopted"? Further, the list of other control technologies is not in any way a set of recommendations, though it is responding to a charge question that specifically requests recommendations. Which are real recommendations? This whole section would benefit greatly from specific and highlighted recommendations. It is possible to find "should" statements, but the highlighted recommendations are very hard to find. "A better understanding is needed", and "management plans should include possible new species" are not quite clear enough.

Near Shore Charge Questions: Again, the recommendations need to be highlighted, so that they can be pulled into supporting the larger framework of recommendations. I think there is one near the bottom of page 23, addressing significant targets associated with bacterial populations, and another just before Question 7b, about research and modeling efforts, though I'm at a loss for what the specific recommendation would be there. Clearly the Panel is wishing for more science to guide the Actions, and I think that connecting these ideas to adaptive management recommendations would be helpful.

Habitat Charge Questions: Issues with the long bulleted list on page 27 and following are already noted in

the Draft. These merit discussion in the teleconference. Where are the recommendations (the one on climate change is the only clear one)? I believe that there is a key overarching recommendation that relates to the science plan, midway through page 29, related to tying together vision, goals, and monitoring elements (ie the science plan). This is a good place to hearken back to the science plan recommendation.

The restoration section, pages 30-32, needs more conceptual context, a clearer big picture, and clearer recommendations that are highlighted, rather than the long list of bullets.

Accountability Charge Questions: I think the recommendation regarding infusing broader impacts across whole Action Plan is very important, as I mention above. That said, it should be highlighted more. The recommendations here are good and mostly clear, particularly the ones related to accountability (page 34). Again, I think the recommendation for the spatial information system, and the science panel should be highlighted at the beginning of the document as well. The hierarchy of recommendations will really help (e.g. in this section, the Panel could make specific recommendations that relate to a general one presented in the Summary and Overview Charge Questions).

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?; 3. Is the Committee's report clear and logical? ; and 4) Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

There are numerous areas where the document is not entirely consistent, from the letter to the Executive Summary to the complete review. This diminishes the major recommendations. Below are several examples (I use Sticky Notes in Adobe to note the others in the document).

The Executive Summary states: "The Plan's actions are consistent, for the most part, with previous plans and strategies, and reflect a continuation of collaborative planning in the region". Then, in the review only a few pages later (page 10), the document reads "In its current form, it is not possible to determine that the Action Plan and Scientific Background documents are based on best available science or that it is consistent with other strategic plans.

On page 12, the review suggests that a reorganization of the focal areas would be good, using the Habitat Restoration focus as an overarching theme, with the remaining focal areas redesigned to support this recommendation. This is a pretty major recommendation, effectively suggesting a complete overhaul of the framework. I can't find it in the Executive Summary or the in the Letter to the Administrator.

On Page 11, the document states: "The Panel recommends a new, focused, and perhaps independent scientific evaluation process. This recommendation is discussed further in specific focus areas, below." It is difficult to find these, except at the very end of the report. Some sort of highlighting of this recommendation in each section would be a good idea.

The major recommendations of the review are difficult to find; it made it difficult for me to see if they were all represented in the summary and in the Letter to the Administrator. I suggest that the recommendations be either bulleted, or put in bold, to achieve both emphasis and to help streamline the organization. Numbering, and a hierarchy would be extremely helpful.

Comments from Dr. Claudia Benitez-Nelson

1. **Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?**

Yes. The Draft report was very clearly organized and well written. I am particularly pleased by the suggestion that the Action Plan integrate a science and adaptive management strategy that ensures that the GLRI continues to use the best available science, while also identifying and meeting specific goals or metrics of implementation and remediation success. I am also pleased by the recommendation that evaluation efforts, e.g. those related to education and outreach be distributed among all of the major Action Plan components rather than as a separate focus area. Numerous studies have shown that such actions must be incorporated throughout major initiatives.

2. **Are there any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report?**

None.

3. **Is the Panel's draft report clear and logical?**

Yes. However, I do have a few comments below that pertain mainly to wording and clarity.

Letter to the administrator.
Please add page numbers for clarity.
Page 1, line 33. There is an extra "s" at the end of the sentence.
Page 2, lines 5-6. This is an awkward sentence and could be deleted entirely.

Report
Page 2. Line 10. Extra "."
Page 2, line 19. Add"," after (e.g. toxics).
Page 4, line 6 Extra ".",
Page 4, line 7. Add "?"
Page 6. Line 27. Remove space before "."
Page 9, line4. Replace "Great Lakes." With "Great Lakes**,**"
Page 9, line 36. Remember to add the date.

4. **Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?**

Yes. The GRLI clearly missed some key issues and the SAB review identifies those issues where appropriate. Given the extent of the recommendations put forth by the SAB review, it would be helpful to place them in context of priority. For example, currently funded or backlogged projects should be initiated, but after that initial recommendation, there appears to be a wholesale reorganization needed that is likely not possible on a year-long timeline. Therefore, it would be helpful if a prioritized list of recommendations be provided to ensure that actions are indeed taken.

Comments from Dr. Terry Daniel

The GLRI panel has done an outstanding job of reviewing and recommending changes to the GLRI Action Plan. A number of very useful specific suggestions are presented, but the greatest contribution of the review is the recommendation and articulation of an integrated science and adaptive management plan for the overall program.

Quality Review questions

1. Were the original charge questions to SAB Panel adequately addressed?
   Yes

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?
   No

3. Is the Committee's report clear and logical?
   Yes, this is a particularly clear and readable report. There was some inconsistency in the level of detail and "prescriptive" suggestions in some of the sections, but that may be justified by differences in the sections of the EPA report.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?
   Yes, especially the recommendation of an integrated adaptive management framework for the overall GLRI program.

Some specific issues/suggestions

Letter to Administrator

P 1, L 40-43

The body of the report seemed more concerned about the inertia of pre-selected projects (especially without a clear system for prioritizing issues/projects for the GLRI program overall) and about possible dampening effects on innovation. The Executive Summary is stronger; "This continuity in planning is good, but such consistency does not guarantee sufficiency" (P 1, L 34-35) as is the statement in the body of the review; "While continuity in planning is good, such consistency does not guarantee sufficiency and, in some cases, it fails to promote the innovation that comes from strong connections between research and action – a connection that is not evident in the Action Plan."

P2
Action Plan. Robust monitoring programs are essential and a key element of adaptive ~~monitoring~~ management.

In the same paragraph, note that some standardization (or at least coordination) of monitoring protocols and data across individual projects will be needed if program level conditions and effects are to be assessed effectively and efficiently. More emphasis is needed in general on the role of the science plan and accountability system viz. the coordination (and control, including budget) over individual projects to assure that program-wide goals are being achieved. This general point is more strongly made in the context of the recommendations for the "accountability, education, …" focus area on P 3, lines 15-24.

P 2, L 23-31

Greater emphasis could be given to the important opportunity of the GLRI program to initiate multi-stressor/cumulative effects studies (including, but not limited to climate change interactions).

P3, lines 15-24
It should be emphasized more that the "distribution" of activities into the specific focus areas requires that there be strong coordination (and control) of these activities from the GLRI program level to assure consistency and efficiency and progress toward program-level goals.

P3-4
The letter needs to end on a stronger note, especially reinforcing the importance of a program-level science plan with a system of "accountability" within an adaptive management framework.

Executive summary

P 2, L 14-24
This is the most important recommendation of the review panel. The recommended process (possibly carried out by the recommended independent science panel) should be strengthened to include some "teeth" in the form of meaningful and impactful peer review of individual project proposals, progress and outcomes and enforcement through significant budget control.

P 2, L 30-39
Regarding endpoints and measures/metrics, it should be emphasized that these need to be developed and adopted and coordinated at the program level. This program (Action Plan) level integration should be extended to all aspects of the research (not just monitoring), including project designs, data base development and management and model development.

P 4, L 9-11
"This is a sound approach," but it should not discourage new assessments of priorities or preclude taking advantage of opportunities for new research and actions.

Also in this context, the scope and scale of the GLRI provides a rare and important opportunity to address multi-stressor/cumulative impacts and to investigate spatial and temporal scale issues, including how monitoring and models can most effectively be developed and applied to so as to support aggregation and disaggregation across sites, systems, focus areas, Lakes and the region.

P 6, l 1-2
Might the panel recommend that the GLRI develop a program-wide "scenario" (or scenarios) to represent (or bracket) possible global climate effects that should be considered consistently by all individual projects?

P 8, L 8-14
It may be worth noting here that the diversity of stakeholders/partners also raises challenges for the recommended program-level accountability system (e.g., are enforcement mechanisms across these many players sufficient).

P 8, L 20-30
In this context, it will be important to coordinate (and control) communications (outreach, education) activities across individual projects to assure consistent messaging between the program and the many stakeholders. Here also is one of the key areas for social science input, including systematic studies of stakeholder understandings, concerns and expectations for the program and what indicators (metrics) of success of the program will be recognized and appreciated as such by those stakeholders.

Body of review

P 9, L 36-37
"Public comments were received and considered throughout the advisory process." Is this the only description/response to public comments in the review? If so, is this sufficient?

P 10
Did the panel find the charge questions generally to be appropriate and sufficient to guide their review? Some statement to that effect should be presented.

P 11-12
The comments and recommendations regarding the GLAS are the central and most important points raised by the review panel. These points should be reinforced wherever possible in the review, and they should be extended to include some specifications/recommendations for how the accountability system should be implemented to assure efficient and effective coordination across individual projects and how cooperation among individual projects will be "enforced." The panel elsewhere recommends a strong peer review process, but this is not explicitly represented as an enforcement mechanism. There was a recommendation for a GLRI-level science plan and a panel of outside experts, but there was no specific mention of what types of control this plan/panel might have over individual projects (such as budget control).

P 12, L 34-43
This core recommendation implies that there would be considerable coordination (and control) across individual projects and perhaps even some "standardization" of methods, metrics and data management and sharing. The GLRI has a rare opportunity to look across projects and identify opportunities for collaborations and sharing of resources to achieve efficiencies and effectiveness beyond the "sum of the parts." Such coordination must be developed prior to the awarding of

individual projects (and clearly stated in any RFPs) and appropriate collaboration must be a requirement for proposals and for funding.

P 13, L 1-2
This statement seems to imply there would be three separate components—the plan, the panel and the "independent entity." It seems that some or all three of these components could be combined (e.g., the science plan is developed and supervised by the science panel, and the independent entity might be an executive committee of the science panel). This aspect of the core recommendation needs to be clear—even if it leaves the determination of how many entities up to the Agency/GLRI.

P 13, L 9-26

In this context it might also be noted that the GLRI has an important opportunity to address "cumulative impacts" and "mixtures" of threats to the GL.

P 14
The "science plan (and panel) and recommendations about a thorough "accountability" system all point toward greater coordination across individual projects (and study sites), across focus areas (and ecosystems/problem areas), and across sub-regions (perhaps defined by the individual Lakes). Ideally, all of these components would be evaluated by their contribution to the overall goals of the GLRI. As noted above, the management and accountability system should strongly encourage synergistic relations among projects/focus areas/coherent sub-regions (and discourage conflict and redundancy). In this context, projects conceived at the program level could emphasize comparative studies across stressors, sub-regions and focus areas, as well as organize important multi-stressor/cumulative effects studies carried out collaboratively among relevant individual projects. Also, strong organization and leadership at the highest level of the program could help to assure consistent messages to and communications with the many stakeholders.

P 14, L 38-45
Examples of possible contributions from social/behavioral sciences include determining what the various relevant publics/stakeholders perceive to be the key problems/issues for GL restoration and protection, articulating stakeholder priorities for issues to address and desired outcomes, and clearly distinguishing and negotiating scientific and political aspects of the issues and opportunities for action.

P 15, L 20-37
These are good mechanisms for assuring that projects (PIs) are held accountable for their contributions to the overall program, but in practice it must have some budget authority to be effective.

P 16, L 1-9
Is "5 to 50%" a useful guide to the GLRI for funding the recommended science plan/panel/entity?

P 17, L34-43

This section exemplifies some of the issues of selecting indicators/metrics for project outcomes and for program evaluations. It will be important to consider public/stakeholder perspectives in this context—often indicators that make sense to biological scientists are not easily appreciated by other stakeholders. Translating important effects and outcomes into terms that stakeholders can appreciate can help to attain and sustain support for the program.

P 19, L 32-33; L 35-38
Note that these points are consistent with increasing concern about multi-stressor/cumulative effects and that the scale and scope of the GLRI offers a rare opportunity to address these effects through coordination and collaboration across existing individual studies (rather than just adding a few additional projects focused on one or another mix of stressors).

P 20, L 34-38
This is another place where social/behavioral sciences could be very relevant and useful. Education as well as systems to support appropriate behaviors could be among the "longest levers" for reducing unintentional introductions of exotic species into the GL (see also P 23, L 45-46; P 24, L 1-6)

P 21, L 1-7
This is a good start on a climate change "scenario" that might be fleshed out for use across all of the focus areas and individual projects.

Section 3.5 generally seems to be more detailed and more prescriptive (and sometimes quite tutorial) than the preceding sections. This may be appropriate to relevant sections of the reviewed document.

P 30, L 5-21
The "tipping point" notion brings into question the heretofore rather linear approach to prioritizing sites for action. Focus on the "worst" sites may decrease success as many of these areas/systems may be past their tipping points and very hard to restore. Alternatively, sites that may appear to be doing "OK" may be approaching their tipping point, so that action is much more urgent there than at worse sites that are past that point. In some cases the biggest bang for the buck might be to protect very good sites. In short, prioritization of sites and issues to be addressed will be a complex task.

P 30, L 34-40
Here is another instance where one or more common "climate change scenarios" might be developed and shared across the focus areas, sites and projects.

P 36, Section 3.6.3
Education and outreach—especially when that involves curriculum development and activities targeted to K-12—is perhaps the most critical place for assuring a high level of program-level management. Careful review of messages and activities will be needed and there must be consistency of all communications between the public/schools and all parts of the GLRI. Failures in this part of the program can have devastating effects!

Appendix B

This is a rather detailed, but useful presentation of principles and suggested methods for achieving the integrated adaptive management program that the panel is recommending. This concise collection of points made in several other places in the review seems justified and useful to the authors of the Action Plan.

Comments from Dr. Amanda Rodewald

The Panel produced a thorough and useful review of the Action Plan for the Great Lakes Restoration Initiative and provided detailed comments on the five major focal areas of GLRI.

1. Were the original charge questions adequately addressed?

   Yes, the Panel did an outstanding job of responding to questions overall. One possible exception was the part of the charge question related to the Great Lakes Accountability System solicited ideas for alternative or supplementary measures of environmental elements, endpoints, or other attributes. Although the Panel discussed general attributes of measures that would be useful, no specific ones were proposed.

2. Are there any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report?

   No. Although the report was thorough, I discuss several areas where additional information would be useful.

3. Is the Panel's draft report clear and logical?

   Yes, as a whole. That said, I suggest several areas below that would benefit from additional explanation. Most important among these is the recommendation for a comprehensive Science Plan.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

   Yes.

Other comments:

Prioritization of the backlog of restoration projects. As noted by the Panel, there are many restoration projects that are ready for implementation if the funding became available. The Action Plan indicates that because these projects do not require extensive additional planning, they will likely be given priority for funding. While this approach is logical in many respects, I was unclear from the Action Plan how projects within this "backlog" were initially developed, the scientific rigor and/or peer review they received, and to what extent they still reflect the most important actions for Great Lakes restoration. This information may have been provided to the Panel, but without seeing it, I am unclear why the Panel agreed that already-planned projects should be prioritized. Additional justification of that position would be helpful.

Ecosystem services. Given the emphasis that the Agency has placed on ecosystem services (broadly framed), I was surprised that the GLRI Action Plan had little mention of them. Aligning some of the goals or priorities with an ecosystem services perspective would promote a productive synergy with EPA-ORD, particularly with the Healthy and Sustainable Communities.

Areas of concern, hotspots, priority watersheds. I did not see in the Action Plan (or requested in the Review Report) a description of how areas of concern were initially selected. Are the areas of concern selected based on actual contaminant loads or on exposure risk to humans or other species? While the two are often closely related, a number of socioeconomic factors,

lifestyle choices, and concomitant environmental stressors can sometimes result in exposure risk that is higher than expected based on simple measures of contaminants. With the recent attention given to environmental justice, I am wondering if that concept was considered in the selection of AOCs. If not and these AOCs reflect historic or legacy areas of concern, might the Action Plan include additional priority areas that capture issues related to environmental justice? I also am confused about their relationship to hotspots and priority watersheds, which also are discussed as priorities. Are these all the same?

Adaptive management framework. The Panel astutely suggested that the evaluation process for the GLRI Action Plan adhere to an adaptive management framework, and they provide several explicit steps to develop such a framework. That said, there remains ambiguity in who would implement the framework (e.g., the PI, a science advisory board, or the EPA) and how it would be funded (e.g., within individual grants or external to individual grants).

Selection process for grants and projects. While the Action Plan identifies focal areas that will presumably receive the most funding, it was unclear to me how individual projects were evaluated and how funding was distributed among focal areas. The Panel report requests that the selection process be made more transparent. In addition, I think that it would be useful to know how (or if) the funding is distributed among focal areas *a priori* or in an *ad hoc* manner. How is it assured that most funding does not fall within one area (e.g., toxic substances and areas of concern)? Also, certain projects may be of high merit on their own but duplicate efforts currently made by other organizations. Is such a situation likely to be identified?

Role of a Science Plan. The Panel recommended the development of a comprehensive science plan that would provide the logic for evaluating how projects support the Action Plan, the availability of monitoring data, and assessment of project outcomes. While this is an interesting and potentially very useful suggestion, I was not clear if the Science Plan was separate from the Action Plan or a part of it, especially given that the Action Plan is intended to include some of the same scientific elements and assessment of outcomes. Would the Science Plan be developed by an entirely different body, or is the intent to simply be more explicit about scientific and monitoring needs?

Evaluation and assessment. Given that a large portion of funds are allocated to governments (in 2010, $255M to federal agencies, $42M to local government, and $54M to state government - (~83% by numbers indicated on the website), it seems important to evaluate the extent to which governments may be simply shifting the funding sources for continuing programs to GLRI funds versus initiating new projects or those that would have otherwise been discontinued. In other words, what was the "net" increase of restoration actions relative to if GLRI funds were not available? I'm not sure if that is possible to know.

Independent Science Advice and Implementation. Who would comprise the Independent Science Implementation Entity and how would that body differ from those administering and implementing the Action Plan? It sounds like some of the same responsibilities.

Aquatic Ecosystem Resiliency. The Panel makes a very good point about the fact that resilience can be high in systems dominated by invasive species as well. This idea of **alternative stable states** and the ecological thresholds that separate them is alluded to, but it could be explicitly described. Also, in the Action Plan, the "actions to achieve progress" for "improve aquatic ecosystem resiliency" sound more like general overarching goals (e.g., improve water quality) than actions.

Great Lakes monitoring (goal 1 of Focus Area 5). Could the GLRI align their monitoring system with other national programs like NEON?

Minor:

- in letter to the administrator there is an extra “s” at the end of line 33.
- Page 5 lines 41-46: the conceptual link between this text and the preceding charge question was not obvious to me.
- The word “laudable” seemed overused in the executive summary.
- On page 10 lines 34-36, the Panel commented that few research, monitoring and integrative assessment needs from previous plans were incorporated into the report. This point might be better highlighted in the executive summary.

Comments from other SAB Members

Comments from Dr. George Alexeeff

1. Were the original charge questions adequately addressed?

The draft report thoroughly responds to the charge questions.

2. Are there any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report?

I did not identify any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report.

3. Is the Panel's draft report clear and logical?

The Panel's report is clear and logical. One major comment that would benefit from greater clarity is the Panel's statement (page 3): "Investments in behavioral, social and decision science analysis of the science-policy interfaces in the region can provide important information to avoid implementation pitfalls and overcome impediments to action. Therefore, the SAB recommends that behavioral, social and decision sciences should be included in the science plan." I was unable to identify any place in the report where this issue is clarified. If the report recommends that the proposed science plan be expanded to include behavioral, social and decision sciences, a little more direction would appear to be helpful.

4. **Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?**

Section 3.4.2 states that climate change needs to be added as a major driving force. The SAB report provides two references for this concern (Walther et al. 2002; Holzapfel and Vinebrooke 2005) yet neither reference appears to pertain to the Great Lakes region. If there are studies on the impact of climate change on the Great Lakes region that would be important to cite. If such studies do not exist the recommendation may need to be modified to incorporate such a study into the analysis.

Comments from Dr. Joseph Arvai

General Comment: I found this review to be exceptionally clear, logical, and concise.

Were the original charge questions to SAB Panel adequately addressed?
Yes. A total of eleven (by my count) charge questions were posed and each was addressed in sufficient detail.

Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?
I don't believe there were any errors or glaring omissions in the report. However, there were a few instances where I (and I suspect the plan's authors) could have benefited from additional detail. For example, on page 4, I wasn't sure what was meant by "defensible metrics of success". An example or two would have been beneficial. Without examples, all we are left with is an unhelpful counterfactual (i.e., indefensible metrics of success). Likewise, there were several places in the report that discussed the need for greater insight from the social, behavioural, and decision sciences. While I agree that these insights would be valuable, the the review could have provide more exemplars of specific questions/issues that would benefit directly from these kinds of insights. A related point: The report mentions (1) a decision framework [p 31] and (2) decision thresholds that might trigger changes in management actions [p 33]. While I am sympathetic to these kinds of issues, it wasn't clear to me what they meant/how they might apply in the context of the report.

Is the Committee's report clear and logical?
Yes, this is a very clear and readable report.

Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?
Yes. I found the recommendation that the GLRI adopt an adaptive management framework very compelling. However, I would caution that adaptive management is not easy to implement in cases like the GLRI. Additional scientific and analytic capacity will likely be necessary in addition to the "science plan". As it's currently written, some readers may be left with the impression that adaptive management is something that can be tacked on whereas, in reality, it requires that an experimental or quasi-experimental framework be imposed upon the GLRI system. As it's currently conceived, the adaptive management plan reads like one of incrementalism (i.e., monitor and adapt) vs. the more forward thinking framework that it's designed to be (i.e., identify a series of plausible management actions, implement--or model--them in sequence or in parallel, learn about outcomes, modify actions, repeat).

Comments from Dr. George Daston

I found this report to be succinct and clear.

We were asked to address four specific questions as part of the quality review.

1. whether the original charge questions to SAB Standing or Ad Hoc Committees were adequately addressed;
2. whether there are any technical errors or omissions in the report or issues that are inadequately dealt with in the Committee's report;
3. whether the Committee's report is clear and logical; and
4. whether the conclusions drawn or recommendations provided are supported by the body of the Committee's report.

Question 1: The charge questions posed to the review panel were all adequately addressed in a very transparent way.

Question 2: I found no technical errors or omissions in the report. In the area of education and outreach, it has been my experience that recreational areas of the Great Lakes (which is a high proportion of the Great Lakes shoreline and nearby areas) tend to have very active land trusts, conservancies and lakeshore owners associations that are very interested in the topics described in the action plan. These groups may be another purveyor of education and community outreach besides the traditional K-12 educational structure, and may be particularly good at adult education.

Question 3: I found the report to be clearly and logically presented.

Question 4: I found the conclusions of the report to be well documented and supported.

Comments from Dr. Costel Denson

General Comments

These comments are concerned with the letter to the Administrator.
(1) In a number of instances, the term "suggests" is used. Is this meant to be a recommendation? What follow up action is required when a suggestion is proposed? See line 45 on page 1.
(2) What is the basis for the suggestion that a science plan be created? This reviewer could not locate, perhaps through oversight, any place in the charge which would lead to this type of suggestion.

Quality Review Responses

1. Were the original charge questions to the Panel adequately addressed?
Yes. Eleven charge questions were presented, with many having subsidiary parts. All were satisfactorily addressed.

2. Are there any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report?
None were identified by this reviewer.

3. Is the Panel's draft report clear and logical?
The report itself is clear and logical. However, as noted in General Comments, the cover letter may require some revision.

4. Are the conclusions drawn or recommendations provided supported by the body of the Panel's report?
The conclusions and recommendations seem to be supported by the contents of the report. This reviewer noted that the term "suggests" was used on occasion. Does this carry the strength of a recommendation?

Comments from Dr. Michael Dourson

Charge Questions:

- Were the original charge questions to adequately addressed? Yes.
- Are there any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report? For the areas that I have some experience, the answer appears to be no.
- Is the Panel's draft report clear and logical? Yes, but see also comments below.
- Are the conclusions drawn or recommendations provided supported by the body of the Committee's report ? Yes, but see also comments below.

General Comments:

I very much like the idea of highly interactive approach to the problems of restoring the Great Lakes, their watersheds, and their associated lands and wildlife species. I also believe that the panel's emphasis on individual lake-wide management plans (e.g., LaMPs) as their own ecosystem makes intuitive sense, especially since this also engages directly many of 200-or so organizations into working on Lake-specific solutions. Rather than trying to integrate all lakes into one plan, a series of related plans (with a little friendly competition thrown in amongst these LaMPs perhaps) might make for a more effective and perhaps more timely restoration of all Lakes.

The collection of recommendations seemed well wrought, but I feel their collective burden on agency staff. Perhaps I missed it, but the panel may wish to offer a sense of which recommendations were unanimously supported, and which were more controversial. This might give EPA staff a sense a better sense of choice or priority when faced with the inevitable limitations in time and treasure that can be used to carry out these recommendations. Moreover, in light of potential future funding issues, I believe that we all would value the panel listing its top 3 recommendations. The stormy financial seas that beset EPA and other federal agencies, Canada, and tribal nations, are all too real. The panel's wisdom is needed here to guide the way forward should choices need to be made.

Specific comments:

On page 4, line 25. What does the panel mean by "scientific defensible metrics of success"? For example, in the human health risk assessment area, would this mean something like the change in the number of posted fish consumption advisories?

On page 4, line 39. What does the panel mean by "further work"? Is this experimental work, such as fish toxicity bioassays?

On page 20, line 28. Is it not also necessary to study the impact of invasive species on the Great Lakes from a longer term perspective? For example, I dimly understand that the zebra mussel is now being consumed by two native species and that the mussel is helping to clarify Lake Erie. So do we have a long term zebra mussel problem? The panel did point out the market potential of Asian carp. This was helpful.

On page 30, line 7. You mean to say "often have much resiliency as they cannot", correct? Or is this an example of why the word "resiliency" needs a rigorous definition.

Comments from Dr. Barbara Harper

1. Were the original charge questions adequately addressed? YES
2. Are there any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report? NO. There is some unevenness in the technical detail between sections of the review.
3. Is the Panel-s draft report clear and logical? YES; there is some duplication between sections.
4. Are the conclusions drawn or recommendations provided supported by the body of the Panel's report? YES

Overall, I thought the review could have emphasized the data collection and data management aspects of the recommended Science Plan and Science Panel a little more directly. As the review pointed out, the Action Plan was written for general audiences, and therefore lacked technical detail about what data would be needed as quantitative measures. However, EPA cannot demonstrate progress unless it has quantitative targets and enough data to measure progress toward them. It might help to summarize the charter and scope of the GLAS, if they are known. Is it supposed to be Data Central, or will it simply pick and choose among publications and data sets to show GPRA progress? Will it actually compile data or just collect a bibliography? Is there a geospatial data management plan? Is there an underlying report on the spatial aspects of contaminant sources – maybe this already exists?

As the review pointed out, some of the goals in the Action Plan are vague. The recommended science plan would have to include quantitative indicators and goals, so the SAB review might be strengthened by defining the science plan concept a little more. The Logic Model might be useful for forcing the identification of endpoint targets (defining success) and developing measures that are directly tied to the performance indicators. The SAB review mentions that there is a difference between outcomes and outputs; this could be clarified.

The Action Plan is vague on organization. There are so many agencies, universities, and other organizations involved that there is a danger of too many cooks. Mega-projects need special attention to organization. Will a science plan solve this? Is EPA the lead agency with the responsibility to demonstrate progress? EPA's role is not clearly stated; perhaps it is given in some enabling legislation, but the reader of the Action Plan and the SAB review may not have them. Is EPA the lead federal trustee taking care of the Great Lakes, or just a principal investigator collecting data?

The Action Plan generally lacks positive or aspirational targets for environmental quality. It focuses more on controlling the negative stressors rather than achieving the positive quality. EPA is not unique in this. Surprisingly, NIEHS does not have an agency definition of environmental health except in terms of the *absence* of stressors such as lead-based paint – many NIEHS initiatives are (rightfully) targeted at removing negative stressors, but the agency does not explain how the absence of some stressors means that environmental health is therefore 'good' enough. Removing stressors is necessary but might not be sufficient to meet a lofty vision, especially if that vision is not clearly articulated. It is harder to develop positive goals and metrics, and easier to critique them if they are not achieved.

Are ecosystem services described? This is an aspect of both the social science and ecological tasks. Beneficial use (p. 21) does not mention tribal nations or tribal natural resource uses, and the plan's introduction omits tribal nations, wild rice, and subsistence. These could be worked into restoration goals and into education, and tied to metrics such as are included in the Millenium Assessment.

Restoration needs to be better defined. The Action Plan says restoration does not mean pre-settlement conditions (p. 8), but it also says it means clean and biologically, chemically, and physically restored only to the extent practical "under present-day chemical, physical, and biological conditions," whatever that means.

The Action Plan will be used in the federal budget process. Given the state of the economy, can some measures be identified as being most cost-effective (not just the cheapest but the best value)? Or have these already been identified through other processes?

Comments from Dr. Bernd Kahn

My quality review answers are yes, no, yes, and yes, respectively. The review is very well prepared. The authors may wish to correct the following:
Letter, p.1, l.33: Delete 's' at end of line.
p.20, l.9-16: Should this paragraph be placed before the preceding one?
p.22, l.37: Delete brackets; also p.23, l.40 and l.41, and p.23, l.5 and l. 13.
p.23, l. 1-16: Adjust both margins.
p.24, l. 1-6: Adjust left margin.

Comments from Dr. Nancy Kim

This is not my area of expertise, but the report appeared to review and respond to the agency's charge questions. In a few places, the executive summary and the report itself gave slightly different impressions (noted below). The letter to the Administrator seemed long, appearing to address all charge questions; the letter would be more useful if it focused on a few of the more important recommendations. In addition, the letter to the Administrator should be reviewed since it uses the words the SAB supports, the SAB suggests, etc. and the Committee may want to use the word recommend (see inconsistency mentioned below).

Were the original charge questions adequately answered?

Yes, for the most part, although question 4b and the last part of question 8a (Does the SAB have any recommendations on actions to increase resiliency?) don't appear to be answered directly.

Are there any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report?

None that I am aware of.

Is the Panel's draft report clear and logical?

For the most part, yes, although in a few instances differences in language between the three sections of the report could be interpreted as inconsistencies.

This statement appears on page 10, line 21 of the report. "In their current form, it is not possible for the SAB to determine if the Action Plan and Scientific Background document provided to the SAB (U.S.EPA 2011) are based on best available science or that they are fully consistent with other strategic plans." The executive summary page 1, line 30, states, "The SAB supports the basic premise that enough is known about the issues confronting the Great Lakes, as well as the underlying causes and potential remedies, to implement initial remedial activities, and agrees that the Action Plan identifies the important actions that should be undertaken. The Action Plan is consistent, for the most part, with previous plan and strategies and reflects a continuation of collaborative planning in the region." These statements could be interpreted as being inconsistent and editing would help to ensure that the reader understands the point the Committee is making. Additional text on pages 10 and 11 should be reviewed when determining the need for revisions.

The report mentions the need to consider the impact of climate change on the restoration initiative in a number of places. Having a paragraph in the letter to the Administrator on the importance of including climate change in the Action Plan may be worthwhile and could combine concepts from the number of comments that mention climate change.

Section 3.1.3 discusses the need for a science plan. The fourth paragraph in the letter to the Administrator mentions the science plan after discussing implementing the backlog of restoration projects. The Committee should revise this paragraph to make the need for a science plan the

topic sentence, expanding on the role of the science plan, and decreasing the emphasis on the backlog of restoration projects. Also, the report recommends the creation of a science plan and the letter to the Administrator suggests creating one.

Page 29, line 3, sentence beginning, "Overall the Action Plan's vision, goals, actions, and performance assessment need to be made clearer." This statement is much broader than Section 3.4.3 Targeting Stressed Subwatersheds. Should it be moved and given prominence?

Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

Yes.

Minor comments.

Letter to the Administrator, first page, line 33. s at the end of the line needs to be removed.

Page 27, line 7. Need to insert is between this and meaningful.

Pages 28 and 29, Section 3.4.3. The Committee may want to consider switching the order of the 3rd and 4th paragraph in the response so that all the paragraphs dealing with watersheds and subwatersheds are together and the paragraph on BMP is last.

Page 31, line 17. This bullet mentions removing hydrological barriers as an appropriate restoration action. Somewhere earlier in the document is a statement about carefully considering the potential impacts of removing barriers since it could cause problems. The Committee may want to make these two statements consistent.

Page 34, line 44. The sentence, "Without an accountability framework, the GLRI will do little to advance coordination and collaboration among Great Lakes partners to address key scientific issues." is a strong statement. Should it be emphasized, perhaps in the executive summary?

Comments from Dr. Cecil Lue-Hing

Specific comments

The Transmittal Letter – The transmittal letter is well written and conveys the message that the Administrator needs to hear.

The Executive Summary – The Executive Summary is structured to be easy to read. Following the obligatory preamble, the relevant Charge Questions are excerpted, and are then addressed in summary fashion, a good feature of the report's format.

The recommendations – All the recommendations are clearly articulated, and free of ambiguity as to whether they are meant to be recommendations. Another good feature of the report's format.

Comments on Quality Review Questions

1 – Were the original charge questions to adequately addressed?
Yes.

2 – Are there any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report?
I did not find any.

3 – Is the Panel's draft report clear and logical? and
Yes.

4 – Are the conclusions drawn or recommendations provided supported by the body of the Committee's report
Yes.

Comments from Dr. Judy Meyer

Page, line number

I wholeheartedly agree with the Panel's emphasis on the need for an adaptive management framework. However, I think the Panel could have provided more specific advice on what is required for an effective adaptive management approach and made it a more central focus of the review. It appears that the Plan gives lip service to adaptive management without truly incorporating it. A simple way to think about the steps in the adaptive management cycle is "plan, do, check, adapt." The Action Plan and its implementation are the initial "plan" and "do" steps. An important aspect of the planning step is a conceptual model that outlines the pathways (e.g., the ecological processes) by which the proposed actions will have the desired effect. Based on the Panel's review, it is not clear whether the Plan has that. To "check" on effectiveness, metrics and performance measures need to be identified up front and monitoring designed so that those metrics and performance measures can be calculated and compared to targets. The term "monitoring" is used a great deal in the Panel's review; yet the central role of monitoring and the type of monitoring appropriate for effective adaptive management is not adequately described. If the performance measures do not meet the targets, then the plan needs to be "adapted" and the cycle begins again. Hence it is critical that there be a mechanism for these assessments to be made (e.g., a group that makes this judgment) and that this group have the authority to alter the plan as needed. The document uses the term adaptive management, yet it does not appear to adequately convey the central role that the adaptive management cycle plays in restoration actions. The need for a science plan and integration are essential aspects of effective adaptive management, yet they appear to be treated separately. The review finally gets to this on p. 32, line 36 and 34, 29, where it is buried. It needs to be highlighted and made a more central part of the review and incorporated more effectively in the letter and ES.

1. Were the original charge questions to the SAB Committee adequately addressed?

In general YES, but …

ES 7, 30: This charge question asks about partnerships and collaboration, but here the document states that EPA is doing the evaluation of success. That doesn't sound like much of a partnership to me. I didn't find that the answer to this question said much about how to enhance effectiveness of partnerships or collaborations.

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

Ltr, 2, 17: Simply monitoring is not adequate for effective adaptive management. As I discussed in my initial comment, adaptive management is a cycle and monitoring is but one part of that. Monitoring in support of metrics that are used to evaluate performance is different than simply monitoring, and the document needs to be clearer that this is what is needed.

ES 1, 40: "ideally using an adaptive management framework" makes it sound as though an adaptive management approach is optional. Did the Panel really feel that way? Personally, I think an adaptive management framework is essential in restoration projects of this scope.

ES 3, 32: An adaptive management plan is not the outgrowth of monitoring. That is putting the cart before the horse. Monitoring should be designed to support the adaptive management plan. (See my comments at the beginning of this review.)

ES 3, 39: The Panel might want to consider also mentioning the Science Program that is part of the Delta Stewardship Council addressing restoration in California's Sacramento-San Joaquin Delta. That program has a well-defined peer review process for evaluating prospective restoration and scientific research projects as called for later in this document (p. 8) and an Independent Science Board that reviews plans.

ES 6, 22: Did the Panel consider whether the impact of multiple stressors was adequately addressed in the Plan? Although it makes perfect sense to focus on SRP, it seems that interactions among SRP and toxics, for example, could alter the extent to which excess SRP impacts the biota and the potential for the biota to respond to changes in SRP loading.

ES 6, 26: I am concerned about how adaptive management is being portrayed in this document. Adaptive management is a cycle, but here it sounds as though there is an action, its success or failure is evaluated and the process stops there. That is not effective adaptive management!

ES 7, 1-3: What the Panel is calling resilience here, I have usually heard called resistance. Can they provide a reference for this use of the term?

ES 7, 34: The "strategic assessment and management plan" is an integral part of adaptive management. The Panel confuses the issue by calling for something separate. I remain concerned that the Panel has not provided an adequate description of what is meant by adaptive management.

10, 23: This provides a VERY different impression than what was conveyed in the Exec Sum. The ES implies that the Panel thought the Plan was consistent with other strategic plans, but here it says the Panel did not have adequate information to make that assessment. Which is it?

11, 5-7: This is a specific and important recommendation that belongs in the ES.

14: The call for integrating restoration at the Lake level is another specific recommendation that should be more clearly stated in the ES.

32, 9-12: Here is another place where a clearer explanation of the central importance of monitoring as a part of the adaptive management cycle could be incorporated.

3. Is the Committee's report clear and logical?

In general, YES, but …

Ltr, 1, 23: "toxic substances and areas of concern"; to the uninitiated, it is unclear what is meant by areas of concern; it sounds vague. Could a phrase be added (maybe parenthetically) to clarify what this means or maybe say geographic areas of concern.

Ltr 2, 13 & ES 2, 17: I am confused by the Panel's call for measures of outputs in addition to outcomes, and I think those terms need to be clarified. My understanding is that outputs are essentially products (e.g., papers published, kg of PCB-laden sediment removed) whereas outcomes refer to improving ecological conditions (e.g., reduced contaminant concentration in fishes). It is usually much easier to measure outputs than outcomes (although outcomes are what society usually really cares about), so I don't understand the logic behind the Panel's call for more emphasis on outputs. Now that I read the section of the report elaborating on this point (p. 12), I think the terms are just reversed in the letter and ES.

ES 2, 42-43: The recommendation for investment to increase understanding of ecological processes seems inconsistent with the earlier comment that enough is known to identify issues and begin restoration (ES 1, 30 – 31). Perhaps something could be said to the effect that although enough is understood to begin to take action, increased understanding of ecological processes will enhance the effectiveness of restoration actions. This is particularly relevant to the adaptive management cycle where initial actions are planned based on current understanding, but as understanding develops and effectiveness of actions are evaluated, then more effective actions can be planned. This is another place where the central role of the adaptive management <u>cycle</u> should be made apparent.

ES 3, 2: I think it should say "adaptive management" rather than "adaptive monitoring."
ES 3, 5: I would change to "monitoring and evaluating the success" because I think it is important to distinguish and call for both a monitoring program and evaluation of effectiveness of the restoration actions.
22, 41: In several places this selection refers to recommendations from the Ballast Water Advisory Panel (BWAP). I thought all recommendations were supposed to be SAB recommendations, so I advise changing BWAP to SAB throughout the selection.
26, 45: It is not clear what is meant by the "parameter's universe." My guess is that it means the geographic extent over which the parameter is measured, but that is just a guess. Or does it refer to natural variability? The term needs clarification.
37, 14: The recommendation to use NSF criteria here is somewhat confusing. Is the intention to use these criteria only for educational and outreach projects? That is what it sounds like. If the intent is to use it for all projects, I think the criteria are not adequate for a program where adaptive management is an organizing principle. There need to be criteria addressing how the research will contribute to adaptive management.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?
In general, YES, but …
15, 32: The need for the Independent Science Implementation Entity is not explained or adequately justified. Also this does not appear in the ES.

Editorial suggestions
Ltr, 1, 33: an extraneous "s"
Does something need to be noted in the usual SAB list that Deb did not serve as chair for this review?
ES 4, 7: final "?" missing.
ES 4, 28: should be "… completed. Assessing…"
ES 5, 37: "subwatersheds" plural
ES 6, 17-20: This sentence grammatically incorrect – "effects … impact"
ES 8, 13: need a semicolon not a comma after described
ES 8, 16: "restoration" rather than "restore"

Comments from Dr. James Mihelcic

• Were the original charge questions to adequately addressed?
All eleven charge questions were adequately addressed.

• Are there any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report?
I observed that the issue of environmental justice was only briefly addressed by the Panel in the review in regards to charge question 11 (outreach and education). I think the Panel should point out to the Administrator whether the Action Plan addressed this important topic, or did not address it. Several charge questions appear to places where environmental justice issues should have been mentioned. This includes the two charge questions related to Toxic Substances and Areas of Concern. Environmental justice could also be an important consideration when prioritizing efforts related to legacy or emerging contaminants.
I am very supportive of the SAB recommendation that EPA, within the science plan, include efforts to explicitly consider the potential impacts of climate change on restoration over the lifetime of the projects in the Action Plan. My question to the panel is why not also recommend to EPA to consider potential impacts of land use and population growth in the watershed over the lifetime of the projects in the Action Plan? In terms of land use, this should include urbanization and also potential impacts future land use issues could have that could include the potential mining boom" of precious metals in northern locations of the Great Lakes.

• Is the Panel's draft report clear and logical?
The draft report is clear and logical. Two very minor comments
1. Line 33 of letter to Administrator Jackson appears to have typo "s"
2. Page 37, line 8, I suggest that the word "eco-curriculum" be replaced with "science curriculum"

• Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?
Yes

Comments from Dr. H. Keith Moo-Young

1. Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?
   The report adequately addresses the charge questions.

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?
   No technical errors or omission were seen by this reviewer.
3. . Is the Committee's report clear and logical?
   Yes, the report is clear and logical. I was extremely pleased with the recommendations of the committee to provide adaptive management systems, enhanced monitoring networks, and increased emphasis on education and outreach. As the committee indicated in the report, I strongly suggest that EPA set up a peer review panel to establish the data quality and management objectives for the monitoring networks that will be created to establish the monitoring and management plans.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

The conclusions are well drawn and support the body of the report.

Comments from Dr. James Opaluch

1. Were the charge questions to the Panel adequately addressed?

   The Panel did an excellent job addressing the charge questions. I particularly appreciated that the Executive Summary was organized around the charge questions.

2. Are there any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report?

   I don't see any technical errors, omissions or issues that are inadequately dealt with in the report.

3. Is the Panel's report clear and logical?

   In general, the report appears to me to be clear and logical.

4. Are the conclusions drawn or recommendations provided supported by the body of the Panel's report?

   The recommendations are well supported by the body of the report. But I am rather surprised that there is no discussion of the importance of systematically considering costs in setting priorities for restoration programs. This despite the fact that the report concludes that "[o]ver the past decades, the record of delisting Great Lakes AOCs is poor … due in part to the large cost…" (page 17).

   Hence, limited budgets have been an important impediment to achieving the goals of the Great Lakes program. Yet as far as I can tell from the SAB Report, there appears to be no systematic attempt by the Great Lakes Restoration Initiative to consider project costs in setting priorities for actions. Approaches such as cost effectiveness analysis can be used to provide guidance on how to get the greatest environmental benefit from a limited restoration budget. Such approaches are especially important in cases where inadequate funding is a primary barrier to making progress towards achieving program goals.

   It is a major oversight of the Great Lakes project if they are not systematically considering project costs as part of the process for prioritizing restoration actions. A discussion of systematic consideration of project costs in setting priorities would fit naturally on the bottom of page 1 and the top of page 17. And a discussion of the importance of systematic consideration of project costs as an integral part of a scientifically sound framework for prioritizing restoration actions is sorely missing from Appendix B, pages B-1 through B-2.

Comments from Dr. Duncan Patten

1. Were the original charge questions to adequately addressed?
The report separates the charge questions into appropriate "sub questions" and adequately addresses these.

2. Are there any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report?

The review appears to cover most topics very well, but some (e.g., toxics in lakes) are outside my area of expertise.

In the letter to Admin. should "indicators of successful management actions" be mentioned as part of the accountability system discussed in line 10 page 2 of letter?

Not sure this is where the following comments go but this seems most appropriate place.

a. The report recommends a Science Panel that would have Social Scientists and Scientists. It then lists the appropriate Social Sciences that should be represented on this panel but does not list appropriate non-social scientists (e.g., ExSum pg 3, lns 33-36). Is the list of appropriate scientists (e.g., aquatic ecologist, etc.) so obvious that a recommended list was omitted? The report would be improved with better guidance here.

b. Biological indicators were mentioned (page 18, ln 6) but there appears to be little emphasis, if any, on developing these indicators as part of the adaptive management framework. On the other hand, human health indicators and environmental indicators (very general term) were discussed, if only briefly and it was pointed out that these types of indicators were not evaluated in the 2009 SOLEC. The review should have a much stronger recommendation on development of appropriate indicators relative to all aspects of the Great Lakes system and Action Plan. This should be part of Adaptive Management Framework and doesn't seem to obviously be.

c. There is constant reference to an "adaptive management framework" for the program. The recognize that the Action Plan proposes adaptive management (ExSum pg 7, ln 7) but appear to brush this aside initially.
On pages 32 and 33 the review finally describes adaptive management, but detail of the adaptive management process which is critical to the overall recommendations is placed in Appendix B (page B-3). I could not find either explanation of AM or reference to page B-3 when adaptive management framework is discussed several times in the body of the review as an important component of the Action Plan (perhaps I missed it).
Relative to adaptive management which, as mentioned throughout the report, should be a major structural aspect of Action Plan, it is surprising that only a reference by Hershner (2011) was cited as a foundation reference when the review might have used, for example the following seminal books on AM (also related papers by these authors):

> Holling, C.S. (ed.) (1978). Adaptive Environmental Assessment and Management.
>
> Chichester: Wiley.

Walters, C.J. (1986). Adaptive Management of Renewable Resources. New York, NY: Mc Graw Hill.

3. Is the Panel's draft report clear and logical?

The order of presentation was very well done and allowed the reader to step through the Charge Questions responses.

A very good discussion of resiliency as this seems to be an "endpoint" of some of the protection and restoration processes of the Action Plan and apparently was not well developed in the Plan.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report.

The recommendations follow very well from the lead-in discussions and overall report content.

Comments from Dr. Peter Thorne

1. Were the charge questions adequately addressed?

The charge questions and their answers were clearly articulated in the review.

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the draft report?

One issue I did not see in the report regarding AOC and Question 4b is the problem of navigational dredging of waterways, harbors and canals releasing deep sediments that contain higher levels of legacy pollutants deposited in the 1930-1970 era. This is certainly an issue for PCBs and could increase rather than decrease the level of Great Lakes contamination.

3. Is the draft report clear and logical?

Yes.

4. Are the conclusions drawn or recommendations provided supported by the body of the draft report?

Yes. I strongly support the suggestion that the GLRI Action Plan include expanded monitoring and a comprehensive, science-based evaluation framework.

Comments from Dr. John Vena

1. Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?

I extend my compliments to the Panel for the comprehensiveness and thoroughness of their review. In my opinion each of the eleven charge questions were adequately addressed. It is noteworthy that they developed well articulated responses and complemented them with very detailed feedback with superb comments and recommendations

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

None that I can tell based on my expertise.

3. Is the Committee's report clear and logical?

The cover letter is concise and the text very effectively highlights the major recommendations. The letter captures the sentiments of the full review report. A few minor points on cover letter:
Page 1 line 33 remove s.
Line 38-39 It states that a number of comments and recommendations… State the number and where they are outlined in the report.
Page 2 line 16 clarify what is meant by "the Government Performance Results Act measures" (measurements?); line 20 sufficient funding? Define or state recommendation.
Page 3 line 27 NSF review criteria are mentioned... what about NIH review criteria?

The executive summary is well done and provides an excellent overview of changes in recommendations to the report based on responses to each of the charge questions.
On Page 2 line 24 Explain what is meant by "scientific evaluation process".

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?
Yes. In my opinion the report is very well written and comprehensive in responses to the charge questions.