Questions for GLAB Regarding Duration or Longevity of GLRI Project Impacts

Report by the Science and Information Sub-Committee

April 4, 2016

Purpose: As the GLRI agencies make more headway in achieving "measures of progress" under GLRI Action Plan II, the agencies seek advice for project selection that will have long lasting ecosystem benefits. These charge questions are submitted to the Great Lakes Advisory Board (GLAB) to provide input on how to compare and prioritize proposals for GLRI funding that have significant differences in the duration or longevity associated with their ecosystem benefits including both outputs and outcomes[1]. The purpose of these questions is to inform future decision-making, not to revise GLRI Action Plan II.

Background: GLRI Action Plan II includes measures of progress that are time-sensitive and others that are less time-sensitive. Measures that are less time-sensitive will generate the same level of ecological benefits regardless of whether the action lasts one year, ten years, or forever (e.g., number of studies, number of projects, number of beneficial use impairments eliminated, etc.). There are other measures for which the duration of the project is highly significant when comparing or assessing the benefits. These include actions that have time-based metrics (e.g., pounds per year of phosphorus reduction achieved) or have measures of progress (e.g., miles/acres restored) where the level and duration of outputs or outcomes from the proposed actions are critical to establishing a sustainable change or improvement.

Using GLRI Action Plan II, comparisons of proposals for GLRI funding include consideration of their outputs (measures of progress) within the timeframe of the five-year action plan. Outputs and outcomes that occur beyond this timeframe do not always contribute to the achievement of Action Plan II targets and, therefore, are not as easily factored into the priority setting for funding. Using this practice, lower cost proposals that deliver outputs only within the Action Plan II timeframe (5 years or less) may be ranked as a higher priority than more costly proposals which deliver outputs that last much longer (e.g., 50 years).

To compare and prioritize proposals for GLRI funding, federal agencies need a technically-sound method for comparing proposals that have different longevities. Without such a framework, it is difficult to consistently compare proposals for an action lasting five years with those of another action lasting 50 years. This is especially relevant for measures where the actions must be in place for extended timeframes to deliver the desired outcomes (e.g., invasive species prevention measures; nutrient reductions in a watershed which result in diminished algae blooms in downstream lake).

[1] The term "output" means an environmental activity, effort, and/or associated work products related to an environmental goal or objective, that will be produced or provided over a period of time or by a specified date. The term "outcome" means the result, effect or consequence that will occur from carrying out an environmental program or activity that is related to an environmental or programmatic goal or objective.

Charge Questions for GLAB:

1) What are the most significant kinds of challenges that can impede the duration or longevity of ecosystem benefits from GLRI-funded actions, and how should they be addressed in GLRI processes?
2) For which of the GLRI measures of progress is the duration or longevity of ecosystem benefits from a GLRI-funded action most critical?
3) How should the duration or longevity of ecosystem benefits be considered when comparing various proposals for GLRI funding?
4) What level and type of documentation on the duration or longevity of ecosystem benefits should accompany GLRI funding proposals?
5) Are there any models or other tools that the GLAB would recommend for estimating the duration or longevity of ecosystem benefits from GLRI-funded actions?

Response from the Science and Information Sub-Committee (SIS)

Process: The SIS met in person (and by telephone) at the U.S. EPA offices on March 9, 2016. Following a robust discussion, committee members submitted notes to SIS co-chairs Allan and Rose. The following document is a first draft synthesis of those thoughts.

General considerations: Before responding to individual questions, we point to a number of concerns regarding interpretation of the charge and charge language. Our efforts to interpret the charge language are intended to lead to further discussion with EPA staff, GLRI agencies, GLAB members and others to further clarify the issues to address.

The request is for the GLAB "*to provide input on how to compare and prioritize proposals for GLRI funding that have significant differences in the duration or longevity of their ecosystem benefits including both outputs and outcomes*". Further, the charge question document states that: *"Outputs and outcomes that occur beyond this timeframe* [five year Action Plan timeframe] *do not always contribute to the achievement of Action Plan II targets and, therefore, are not as easily factored into the priority setting for funding*". Unpacking these sentences, we note that:

- Duration/longevity is difficult to define, but implicitly is longer than the one year of project funding cycles and five years of action plans. USACE has project duration language extending to 50 years. A possible categorization of time frames for measuring project outcomes could be on the order of short-term (1 to 5 years), mid-term (10 to 25 years) and long-term (25+ years).
- We assume that long-duration projects are those where agency actions will have to continue beyond five years and/or improvement is not likely to be seen within five years. The resources needed for monitoring these longer term benefits and who will do the monitoring are not clear and this may become problematic.
- Outputs are equated with measures of progress as listed in Action Plan II. In general, measures of progress (outputs) as used by the GLRI refer to project completion metrics summed across each year's GLRI-funded projects (e.g., number of nutrient reduction projects). Many of these have implied, broader benefits – less phosphorus, more habitat,

fewer BUIs etc.; but they are not measures of outcomes (also referred to as ecological benefits, and perhaps most generally as improvements in lake ecosystem condition).

- SIS members strongly agreed that outcomes should be the measure used. However, outcomes are not well defined under the GLRI Action Plans, which instead uses outputs (measures of progress). We assume an outcome is a measureable improvement in lake condition. We also recognize that defining feasible, measureable outcomes for all GRLI objectives and actions is an important, unmet challenge. In the near future the SIS will review current measures of progress to assess whether they can be viewed as outcomes, and undertake two or more case studies in an effort to show how outcome measures might be used.
- The GLAB is asked to provide guidance for including duration/longevity in priority setting. SIS members were strongly of the opinion that a scoring rubric should be developed to assist in prioritizing projects. However, we have not been informed of current priority setting, and it would help to know whether a rubric already exists that could be modified; and if not, how a rubric for this one aspect of priority setting would interface with current project selection.

1) What are the most significant kinds of challenges that can impede the duration or longevity of ecosystem benefits from GLRI-funded actions, and how should they be addressed in GLRI processes?

The Laurentian Great Lakes are a system undergoing change from population growth, land use change, species invasions to climate change, and it is clear that any number of challenges exist each with a set of specific factors playing a role in the changes seen in the Great Lakes system. The nature of each problem affects the duration but may be multi-faceted.

Taking phosphorous for example, in some cases these rates of change may be rapid such as with dreissenid mussels which profoundly changed biogeochemical processing of P in the Great Lakes; or phosphorus export by rivers may decline more slowly than expected in certain watersheds due to legacy storage.

However, it is recognized that *climate change* is one which is the most challenging, with potentially long term impacts on the ecosystem to the point that it might negate any ecosystem benefits that are achieved. For example, warming of Lake Erie could create the situation where warmer hypolimnetic waters hold less oxygen, oxygen consumption rates are increased and prolonged mixing in spring prior to thermal stratification would create a shallower hypolimnion – all these factors would contribute to a greater extent of hypoxia even if primary productivity in the lake was reduced through successful GLRI-funded P reduction efforts.

Multiple stressors may impede system recovery when only one stressor is ameliorated. Management actions may decline in effectiveness over time, for example if an invasive plant adapts to control measures. Climate change, land-use change and population pressures may degrade management actions. These challenges may vary by Focus Area and Objective.

Efforts to create beneficial changes in a system that is undergoing transformations not controllable on the same temporal scale have the risk of being viewed as ineffective or misguided. The GLRI process should recognize that there is inherent value in undertaking (funding) efforts designed to bring about positive ecosystem change. Due attention to the possibility of uncontrollable ecosystem change that can have impacts on the desired outcome of the GLRI-funded effort will help the EPA and IATF anticipate these situations and allow for the public to be prepared to understand why an outcome has not apparently been achieved

Lack of GLRI funding for monitoring is an over-arching issue, as it may take decades to demonstrate restored ecosystem services (beyond the grant period). Funding of monitoring pre- and post-implementation during the grant period, and in some instances longer-term post-project monitoring, should be considered for high importance/significant projects implemented under GLRI[1]. More routinely, project proposals could be required to identify whether an existing federal, state, or local monitoring program might be relevant.

2) For which of the GLRI measures of progress is the duration or longevity of ecosystem benefits from a GLRI-funded action most critical?

As discussed above, ecosystem benefits are related to outcomes of actions, not program outputs. Outputs (measures of progress) have a critical role in demonstrating tangible results of GLRI investments, but are not contributing directly to the ecosystem. It may be a useful exercise for the SIS to review each of the measures of progress and determine whether it can be considered an outcome, and has a duration beyond the end of project funding. We suggest that more outcome-oriented measures, quality and temporal aspects missing from these measures of progress could be explicitly considered.

We do not have more specific responses to this question at this time and this will need further discussion.

3) How should the duration or longevity of ecosystem benefits be considered when comparing various proposals for GLRI funding?

Here is where a scoring rubric might be useful. At a minimum project proposals could be asked to address the following questions: (a) will the completed project be self-sustaining or require on-going maintenance (and if the latter, for how long, at what cost effort, by whom, etc)? (b) What is the anticipated response time following project completion for the identified benefits to be realized?

[1] see, for example, 2016 Sustain Our Great Lakes Request for Proposals Evaluation Criteria: "Evaluation and Maintenance: Monitoring: Project includes a plan for monitoring progress during and after the proposed project period to track project success and address new challenges and opportunities. Long-term sustainability: Project will be maintained to ensure benefits are achieved and sustained over time; plans described in the proposal include how future funding will be secured to implement necessary long-term monitoring and maintenance activities."

The total cost to achieve *and maintain* an ecosystem benefit will often extend well beyond the timeframe of an individual GLRI-funded project. Many projects will require continuous, meaningful maintenance expenditures (e.g. incentives to maintain farming practices; repeated treatment of invasive species). Others may require little maintenance (e.g. dam removal to reconnect a tributary). Proposals could include estimates of these maintenance costs and supporting rationale over a stipulated (long-term) timeframe.

4) What level and type of documentation on the duration or longevity of ecosystem benefits should accompany GLRI funding proposals?

Our response is similar to #3) above. The SIS recognizes that project proposals may not be able to provide precise, detailed answers but believes that a requirement to address the longevity/duration issue will be useful to all. Efforts to acknowledge uncertainties and risks should be viewed as a positive.

Clear guidance is needed on how to the duration/longevity is to be addressed in the Proposal including maintenance and monitoring. One could also ask applicants to point to existing monitoring programs/data sources or offer a sustained plan for new monitoring that can help demonstrate and track the longevity of benefit.

Definitions as part of the guidance will be needed. If Investigators are requested to include a statement of length of time outcomes are expected to materialize and show how they pertain to measures of progress then a definition of short, medium and long-term duration for project outcomes is required: eg.

a. Short term: occurring within the GLRI finding cycle. (< 5 years)
b. Medium term: occurring within 1 human generation time (5-25 years)
c. Long term: occurring over multiple human generation times (>25 years)

5) Are there any models or other tools that the GLAB would recommend for estimating the duration or longevity of ecosystem benefits from GLRI-funded actions?

A scoring rubric may be helpful here. Depending on the type of project, models may be another approach. Established long-term monitoring programs may be another (e.g., National Coastal Wetland Assessment Program; federal, state or local established long-term monitoring programs). The SIS may gain further insight into how to respond to this question after considering case studies.

The SIS would like to know of any other projects that have already been funded through GLRI that work towards modeling cumulative impacts of different restoration projects or best management practices. Any models or tools that are already in development could be summarized.