



Independent Scientific Review Panel

for the Northwest Power & Conservation Council
851 SW 6th Avenue, Suite 1100
Portland, Oregon 97204
www.nwcouncil.org/fw/isrp

Memorandum (ISRP 2013-13)

October 15, 2013

To: Bill Bradbury, Chair, Northwest Power and Conservation Council

From: Greg Ruggerone, ISRP Chair

Subject: Response Review of the *Phase 1: Draft Kootenai River Floodplain Ecosystem Operational Loss Assessment Report* for the Kootenai Tribe of Idaho's project #2002-011-00

Background

At the Northwest Power and Conservation Council's August 20, 2013 request, the ISRP reviewed an updated report produced through the Kootenai Tribe of Idaho's *Kootenai River Floodplain Ecosystem Operational Loss, Protection, Mitigation and Rehabilitation Project* (BPA Project Number 2002-011-00). The report is titled *Phase 1: Kootenai River Floodplain Ecosystem Operational Loss Assessment Report (2013)*. The project sponsors updated the report in response to ISRP comments on a 2012 draft version of the report ([ISRP 2012-18](#)). The sponsors' updated report is intended to complete Phase 1 of the project.

The project's purpose is to provide the foundation to build a Protection, Mitigation, and Restoration Management Plan to guide rehabilitation of the Kootenai River and its floodplain. The project was initiated to assess and mitigate the impacts related to the operation of Libby Dam. As described by the sponsor's cover letter, they developed indices that quantify abiotic and biotic perturbations of the ecosystem and used a standardized scale to compare and contrast between indices. In addition, they note that products developed to build these indices (LiDAR, land cover classification maps, etc.) have provided information to other Kootenai River projects, such as the *Kootenai River Habitat Restoration Project*, the *Reconnect Kootenai River with Historic Floodplain Project*, and *Albeni Falls Wildlife Mitigation Project*.

The ISRP reviews related to the loss assessment phase of the project began in the Wildlife Category Review ([ISRP 2009-17](#); June 10, 2009). The ISRP found that the proposal met scientific review criteria. Specifically, the ISRP stated that the outstanding proposal continued to "model how research can be usefully integrated into more immediate program goals. This project is not only benefiting the subbasin but the Program overall by demonstrating what could be achieved elsewhere in terms of interdisciplinary value, program integration, and community involvement, all to benefit fish and wildlife."

In the Wildlife Category Review, the Council recommended that an ISRP and Council review of the completed operational loss assessment was needed and out-year budgets for capital and expense would be determined based on that review ([NPCC memo, Final Decision Document – Wildlife Category Review, July 27, 2009](#)). As noted above, in 2012, the ISRP reviewed a draft of the loss assessment, found the assessment conceptually sound in providing a framework for documenting past loss of large-scale ecological integrity in the Kootenai, but had questions about whether the approach contained the sensitivity to be useful as a monitoring tool for accurately assessing smaller-scale restoration efforts.

The ISRP requested:

1. A response containing a more thorough evaluation of the accuracy, precision, and sensitivity of the component indices and of the composite Index of Ecological Integrity.
2. A discussion of the rationale for the present method of equal weighting for all metrics and component indices versus preferentially weighting metrics and indices, and under which circumstances equal weighting would be preferred.
3. Information on how the Index of Ecological Integrity approach was selected over other approaches considered in developing the Operational Loss Assessment.
4. A response on the sensitivity of the Index of Ecological Integrity for detecting the more subtle effects on river function and ecological integrity expected from planned habitat modifications.
5. A response on other items as requested in the 2012 ISRP review.

This review is organized by these five requests.

In February 2013, the ISRP met with the loss assessment team to provide feedback for their response concerning the accuracy, sensitivity, and confidence of their various indices. The ISRP appreciated the meeting and the loss assessment team's constructive approach to peer review.

ISRP Recommendation

Meets Scientific Review Criteria (Qualified)

The qualifications are that the ISRP would like to review the multi-year restoration plan, including specific goals and 5-10 year, quantitative objectives for their actions. The ISRP would also like to see documentation of progress at regular intervals of 1-2 years. Development of this plan is presumably the next step in the process after completion of the loss assessment. The sponsors have effectively mobilized experts from several disciplines and may already have annual reviews, so a restoration plan with quantitative goals and objectives and regular updates should be manageable.

ISRP Comments

Overall, the sponsors did a commendable job of directly addressing and responding to most ISRP questions. They provide a reasonable approach for dealing with a very complicated set of ecological, informational, and operational challenges. However, we remain concerned about their ability to detect perturbations from fairly modest treatments in the face of an expansive, highly degraded basin that is affected by dam operations. In addition, future dam operations are linked to US/Canada Columbia River Treaty negotiations. The sponsors acknowledge these uncertainties on Page 6 of their response: *“However, the overall effect of mitigation projects likely would be small relative to the large drainage and the myriad of cascading impacts caused by the on-going operation of Libby Dam.”* Nevertheless, the ISRP acknowledges the solid work that has been done on the project up to this point (i.e., Phase 1).

The sponsors showed the success of their approach for assessing losses, but the ISRP remains uncertain how this will be applied to build the restoration plan and then to effectively monitor specific restoration actions. The sponsors should therefore develop goals and quantitative objectives for their restoration actions that can be effectively monitored and evaluated. The sponsors have taken an ecosystem approach. However, for on-the-ground applications, this ecosystem perspective will be difficult to sustain due to the need to make project planning and implementation decisions for specific sites regardless of how broadly conceptualized the context for the work is. Thus, the advisory team needs to develop a strategic plan guided by a refined model. The progress and component indices associated with this large project should be evaluated at regular intervals of 1-2 years (i.e., along with interim analyses using the current indices) to assess their usefulness in detecting responses to project actions. Although the project will progress one step at a time, it may be 10-20 years before improvements can be observed and documented at a larger scale.

The interdisciplinary, ecosystem approach to estimating operational losses could be a useful conceptual template to apply elsewhere. The approach, i.e., the use of indices associated with ecological integrity, is conceptually sound, although the approach is not at a stage of development where one could apply it in a simple, off-the-shelf manner, to other areas. Operationally, the approach needs considerably more development for effective application within the Kootenai and especially for application in other areas.

1. Accuracy, precision, and sensitivity of the component indices and of the composite Index of Ecological Integrity

The sponsors made a reasonable case for applying their overall index (IEI) and component integrity index approaches to estimate operational losses in a highly altered system. Their candid responses made it clear that they understand the limitations of their methods, analyses, data, and component indices in terms of accuracy, precision, and sensitivity and how they may or may not contribute to an effective composite IEI. They made it clear that the inability to evaluate the accuracy, precision, and sensitivity of several indices (e.g., ILCCA, IFWA, IFA, IFFA, RMI and RFI) precludes their use for project monitoring, at least at this time (Page 2). The

sponsors stated that many of the numerical values from comparisons serve only as a “rough” estimate of effects and that the difference in values were not evaluated with statistics. For example, on p. 49-64, the values are presented with no estimates of standard error and no statistical evaluation but are presented as differences. The values in Table 4-5 and the accompanying radar charts are offered as analyses but are only descriptive. Another example of this type of use is Table 10-1 where reaches affected and indices are listed although the values of the indices are not evaluated statistically. This current situation of having some indices useful in monitoring (I-IBI, A-IBI) and others not useful for monitoring (ILCCA, IFWA, IFA, IFFA, RMI, RFI) may be misleading in terms of its actual credibility and reliability and thus could also inadvertently mislead decision-makers.

However, this difficulty, at the component level, did not affect the plan to use the overall index based on their belief *“that the IEI, whole or its component parts, will be a valuable tool for negotiation, evaluation, and evaluation of the mitigation program. Specific project level monitoring will focus on the indices, and their associated metrics, that are expected to be affected by the project”* (Page 15). They concurred with the ISRP suggestion that *“It is likely that any observable effects of small projects would be obscured at the reach or basin scale, due to the sheer size of the reach or basin”* (Page 15). However, they suggested that *“as management actions accumulate over numerous projects ... some of the indices will be able to capture those effects at a reach scale”* (Page 15). The sponsors seemed to indicate that:

1. Only two component indices (A-IBI; birds) and (I-IBI; terrestrial invertebrates) could be evaluated for accuracy, precision, and sensitivity, and these indices were only moderately successful as monitoring tools. However, their accuracy, precision, and sensitivity are expected to improve as more information became available from planned sampling and as the indices are refined.
2. Other indices were not useful at this time for monitoring, but some indices would probably become useful as more information is collected from management actions along with component index data.

The sponsors thus lay out a well-written, scientifically reasonable conceptual approach for an effective monitoring program (i.e., development of a fully integrated, quantitative IEI), which is a very worthy goal, while admitting that *“the purpose of the IEI is to facilitate communication of the various effects to the system”* and that *“the qualitative aspects of the IEI [at present] are best suited as a communications tool while its quantitative components are more suitable for monitoring reach-level responses as projects are implemented”* (Page 4).

All but two of the indices of integrity evaluated by the sponsors were assessed as not suitable for monitoring restoration activities. For this reason, the ISRP has concerns about the ability of the project sponsors to effectively monitor project outcomes and assess the project’s total and marginal benefits to the fish and wildlife in the basin. The ISRP also had questions about what sampling associated with the indices that are deemed inadequate would proceed in the future and what the expected outcomes would be. How does the proposed future sampling for data

associated with indices that are deemed inadequate differ from what would have been done if they had all been as good as I-IBI and A-IBI? How might sampling associated with these ineffective indices be improved so that they capture responses to restoration activities? The generally sound conceptual approach detailed in the document and the expertise of the sponsors increase the likelihood that substantial information beneficial to monitoring will result. The challenge to the sponsors is to design a monitoring plan that is sensitive enough to demonstrate that project objectives are being met. For this reason, it will be imperative to closely assess progress toward meeting the goals and quantitative objectives of the project.

2. Rationale for the present method of equal weighting for all metrics and component indices versus preferentially weighting metrics and indices, and under which circumstances equal weighting would be preferred

Solid scientific rationale was provided for the equal weighting of components, at this stage of the project. We suggest that experimentally changing component weights could be very useful in better understanding the model and in providing insights into functioning of this system. This approach may in fact be a necessary and time- and cost-saving step which will help identify the relative importance and responsiveness of various model components. It would also provide valuable insights for the development of a strategic approach for locating and selecting a suite of treatments that actually result in meaningful and measureable benefits to fish and wildlife.

3. Information on how the Index of Ecological Integrity approach was selected over other approaches considered in developing the Operational Loss Assessment

The sponsors provided an innovative and thoughtful approach for assessing a large-scale and complex ecological situation. They also provided a solid rationale for this work. Additionally, they are candid in acknowledging most of the likely limitations of their approach, which is designed to quantify past anthropogenic changes and the effectiveness of restoration actions in the Kootenai River Basin. Their graphics make a visually striking case for their conceptual approach. While the IEI is clearly in need of further development and refinement, it is a step in the right direction.

4. Sensitivity of the Index of Ecological Integrity for detecting the more subtle effects on river function and ecological integrity expected from planned habitat modifications

It remains unclear if the IEI will be able to detect likely project-scale effects. This may be a result of the amount and scale of work that would be necessary to effect significant changes. On page 4 of the response, it is stated that “*project level effects will be monitored using the appropriate indices and metrics germane to project level activities.*” On page 8, it says that “*I-IBI and A-IBI are likely to become the monitoring metrics for implementation of terrestrial projects.*” It is not clear how aquatic projects will be monitored. It seems that a clear approach for project level and reach scale monitoring is still “a work in progress” and that it will be a major challenge for the project sponsors. This is noted on page 15, “*As management actions accumulate over*

numerous projects, however, we believe that some of the indices will be able to capture those effects at the reach-scale.”

At this time, the sponsors did not clearly identify criteria and approaches regarding how they would examine, refine, or abandon various component indices in the future. In future reporting, the ISRP requests specifics about the usefulness of the indices for decision making and monitoring actions. The applicability of their effort should be apparent as they move into the restoration planning, implementation, and monitoring phase.

The ISRP suggests, and the sponsor’s response has clearly concurred, that it is asking too much of the IEI technique at this stage of development for detecting subtle changes. However, as the sponsors state in their response, the effects of collective restoration actions may be detectable over longer periods as more data become available and as the conceptual approach is refined. The sponsors have a record of keeping up with scientific developments and have a strong advisory team. We suggest that they discuss the direction of the project with their advisory team and develop a coherent plan for incorporating additional information into the IEI model as it becomes available. Regardless of the components selected for monitoring, strategic selection and focusing of project activities will likely be critical for increasing power to detect ecological changes following any of the planned mitigation work.

It would be useful for the sponsors to provide examples of how the IEI and component indices could be used by decision makers. Currently, the sponsors merely state that decision makers will find the indices useful, without providing additional information on their potential application at the river, reach, and project level scales.

5. Other items from the 2012 ISRP Review

Item 9 on page 14, regarding potential hatchery impacts. This question was not answered nor was any reference to available information provided. Discussion of potential impacts seems like an important piece of information to have in hand before proceeding with a major stream/floodplain mitigation project.

Item 10 on page 14, regarding reach connectivity and interaction. Although the ISRP thought that the five original questions were adequately answered, an additional question came up while reviewing the sponsor’s response. The sponsors stated that “....we agree that upstream reaches set the bounds for the range of physical, biological and ecological conditions in downstream reaches.” This constraint raises an interesting question regarding the strategy to be developed for mitigation. Specifically, should work progress from upstream reach locations and move downstream as results are observed? Although development of the mitigation strategy is presumably part of another phase for this project, it would be valuable to address this issue when such a strategy is developed.

Item 15 on page 16, regarding potential effects of the re-negotiation of the US/Canada treaty. There was no meaningful discussion of potential changes in the operation of Libby Dam and

associated effects to the Kootenai River that might result from ongoing negotiations of a new treaty agreement. Although it is difficult to speculate on the terms of a final treaty, there is the potential to significantly influence future operations at Libby Dam and the success of mitigation strategies based on current operations. It seems that there needs to be some consideration of the range of potential changes that might occur and contingencies evaluated for the planning and implementation of future work.

Index of Land Cover Classification on page 21, regarding the capability of detecting smaller changes than 1934 vs. 2004. The question was answered only by saying: "*As restoration activities take place, land cover conversions will be tracked through time to assess changes in the LCC index.*" More detail is needed to provide confidence in the ability to monitor this important ecological component.

River Fish Index on pages 22-24, item 6, regarding providing an ecological basis for using equally-weighted metrics. The sponsors refer to a published article by Mebane (2003), and state that equal weights were used to be consistent with that methodology. It would have been helpful to summarize the rationale provided in this publication and to comment on the major assumptions and strengths/weaknesses in using the equal-weighting approach.

It seems to the ISRP that some of the component indices of the IEI as drafted will be most appropriate at small temporal and spatial scales whereas others will be more useful at large temporal and spatial scales. Put another way, some indices are useful at the river scale, some at the reach scale, and some are sampled in a way that could allow management actions (projects) to be evaluated using statistics. We suggest that this document provide a chapter that identifies the spatial scale for which each component index is best suited. This chapter could also propose examples of how the indices could be used by managers and researchers. Although such examples would not need to be all-inclusive, a few, clear examples would be very valuable for future users and decision-makers.