



## Independent Scientific Review Panel

for the Northwest Power & Conservation Council  
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**Memorandum (2021-6)**

**June 2, 2021**

**To:** Richard Devlin, Chair, Northwest Power and Conservation Council

**From:** Stan Gregory, ISRP Chair

**Subject:** Follow-up Review of Kootenai River Ecosystem Restoration Project (#1994-049-00)

### Background

At the Northwest Power and Conservation Council's request of April 26, 2021, the ISRP reviewed a response and revised proposal from the Kootenai Tribe of Idaho (KTOI or proponents), regarding Project #1994-049-00, *Kootenai River Ecosystem Restoration*. The intent of the submittal is to address a condition placed on the project, by the Council, as part of the [Resident Fish and Sturgeon Project Review](#) in October 2020: "Manager address ISRP review conditions in a detailed report for the project. Report due no later than March 1, 2021." The submittal date was rescheduled to allow for a response discussion with the ISRP and KTOI on April 17, 2021, which aided our understanding of the project and the proponents' approach to addressing our conditions.

The ISRP's review ([2020-8](#)) raised the following conditions:

- Condition 1. Kootenai River fertilization
- Condition 2. Lake Kootenay fertilization
  - a) Interpretation of zooplankton trend - alternate ecological pathways.
  - b) Predator control program for Gerrard trout and bull trout
  - c) Potential for fertilization to contribute to the unstable kokanee-predator dynamic in Kootenay Lake
- Condition 3. Revised objectives
- Condition 4. Proposed new fertilization facility
- Condition 5. Cyanobacteria
- Condition 6. Synthesis article

The proponents submitted a point-by-point response to the ISRP's six conditions, [Kootenai/ay Nutrient Mitigation Program, Project 1994-049-00, Response to NPCC/ISRP Conditions](#), and a [Revised proposal](#) incorporating the responses. The ISRP's review is organized by the six conditions.

## ISRP Recommendation

### Meets Scientific Review Conditions

The ISRP commends the proponents for presenting thorough responses to previous questions and concerns about the original proposal and its connections to related projects in the restoration program. This is truly an impressive program that is setting a standard to which other restoration/mitigation programs should aspire. Overall, the program is making steady progress toward the long-term restoration and mitigation goals, and they are learning much about approaches that are successful as well as those where the human-modified ecosystem responds in unexpected ways. Some basic uncertainties remain, and thus an ongoing investigation of ecosystem responses is essential for guiding this project and the practice of fertilization more broadly.

## ISRP Comments on the KTOI Responses

### Condition 1. Kootenai River fertilization

The proponents provided an excellent response to the ISRP concerns. Existing questions/concerns have been expertly addressed, and no further issues have been identified.

### Condition 2. Kootenay Lake fertilization

This large and ecologically complex lake ecosystem has been substantially modified by human activities for many decades. The contemporary management challenges are equally complex, if not more so. While no management or mitigation program is perfect, the team responsible for the vitality of Kootenay Lake is responding capably while human-generated pressures and environmental conditions continue to evolve. The team demonstrates a deep understanding of the lake as an ecological system and has many years of experience and substantial analyses to back up their insights.

- a. ***Interpretation of zooplankton trend - alternate ecological pathways.*** The additional information presented, as well as the formation of an advisory team and the Kootenay Lake Action Plan in 2016, makes it clear that the proponents are evaluating zooplankton trends and examining an alternate ecological pathway for the added nutrients. Nevertheless, the alternate ecological pathway appears to be solely focused on mysids, and the zooplankton characterization is focused on *Daphnia*. The ISRP continues to be concerned that these foci may be too narrow in scope, while acknowledging the ecological importance of mysids and *Daphnia*. Trends in all zooplankton community components should be re-evaluated in 2025 once additional data are available.
- b. ***Predator control program for Gerrard trout and bull trout.*** The proponents provide “strong evidence that predators remain abundant, and that they are still eating Kokanee” and from bioenergetics modeling “that they are maintaining predation at high enough levels to sustain the persistence of Kokanee collapse.” The bioenergetics modeling also suggests that before as well as after the kokanee population collapse, predators consumed a large proportion of the available kokanee.

The proponents believe that “to increase the survival of Kokanee, a program that effectively reduces the abundance of piscivorous Rainbow Trout and Bull Trout is clearly a desirable management strategy.” Actions taken to date include direct removal of bull trout spawning in two tributaries and liberalization of harvest rates through angling regulations. The unfortunate reality is that while anglers are keeping more of their catch in recent years, the overall catch and harvest continue to decline as fishing in Kootenay Lake becomes less popular due to the smaller size of predators. The positive aspect of this complicated situation is that the proponents are attempting a management strategy that may restore kokanee and stabilize predator-prey relationships. An angler incentive program has been initiated, and it is expected that overall harvest of piscivores will soon double over what it has been in recent years.

- c. ***Potential for fertilization to contribute to the unstable kokanee-predator dynamic in Kootenay Lake.*** As the proponents are aware, “There is no predictable relationship between nutrient loading and bottom-up foodweb productivity to support maximized Kokanee survival, growth, and egg production in the current ecosystem state.” That said, the ISRP agrees that abundant zooplankton resources are critical in supporting a large size at maturity for kokanee, which would result in increased fecundity and total egg deposition. Nevertheless, it is not certain that increased growth rates will result in larger adults. While it may occur, the assumption is not consistent with salmonid life history information showing that increased growth is often associated with a shift to younger age at maturity, and thus not necessarily larger body size. The rationale to support bottom-up productivity through continued nutrient additions during the ongoing kokanee population collapse is based on the premise that, in combination with reduced predation pressure from rainbow and bull trout, supplemental nutrients would result in improved bottom-up productivity and subsequently enhanced kokanee growth and survival. Further study should inform the project of the benefit of, and need for, spring fertilization as well as the spatial areas benefitting from the fertilization.

***ISRP Recommendation:*** The proponents should continue to investigate the fertilization responses and the effects of trout and char suppression of the South Arm of Kootenay Lake for the next few years. This should also include a more comprehensive investigation of zooplankton community dynamics. The purpose of the continued investigation would be to see if recovery of the kokanee population is realized and/or to verify the hypothesis that kokanee are declining in spite of increased food abundance because they are competing with younger age classes of Gerrard rainbow trout, bull trout, and *Mysis*. The ISRP recommends that the fertilization activities be re-evaluated in 2025 to learn if and why kokanee are recovering. A note of caution: While the proponents adequately document safeguards in place to protect bull trout and Gerrard rainbow trout, the ISRP has strong misgivings – based on an extensive literature documenting ill-conceived management actions – about targeting native species of concern to improve populations of another species, one that may simply have more economic importance. Food webs are complicated, and the proposed management actions may have unintended consequences, ones that may not be reversible.

### **Condition 3. Revised objectives**

Where applicable, the proponents have revised the goals to be more in line with actual activities and have established SMART objectives for each.

#### **Condition 4. Proposed new fertilization facility**

The proponents “agree with the ISRP on the importance of developing a feasibility study/management plan to evaluate potential approaches and efficacy of actions to mitigate the loss of nutrients in the Braided Reach of the Kootenai River.” They have amended the timeline in their original proposal to incorporate development of the feasibility study/management plan in the next 1-2 years. They have provided (1) a draft outline of the current focus and content of the feasibility study/management plan, one that appears to be comprehensive, and (2) provided an estimate of annual operating expenses.

Convincing analyses are presented from the existing (Canyon) fertilization reach to demonstrate the dramatic food web responses from the added P to a nutrient-depleted river.

#### **Condition 5. Cyanobacteria**

The proponents present ample evidence that cyanobacteria are not an ecological or human concern in the reach receiving nutrient (P) additions at this point. They are continuing to carefully monitor the population structure of the periphyton community to ensure that cyanobacteria do not become an issue in the future as environmental conditions change.

#### **Condition 6. Synthesis article**

No response required. Nevertheless, judging from the thoroughness of the response to the ISRP’s questions and concerns, it seems that the proponents already have some key components of a scientifically rigorous synthesis article.