



Independent Scientific Review Panel

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Memorandum (ISRP 2010-8)

April 12, 2010

To: Bruce Measure, Council Chair

From: Eric Loudenslager, ISRP Chair

Subject: Follow-up Review of the Yakama Nation's Accord Proposal, Upper Columbia Nutrient Supplementation (2008-471-00)

Background

On March 15, 2010, the Council asked the ISRP to conduct a follow-up review of the Yakama Nation's Columbia River Fish Accord proposal titled "Upper Columbia Nutrient Supplementation" (2008-471-00). The project is intended to assess and characterize nutrient availability, and if needed the project proponents will perform controlled experimental addition of limiting nutrients to enhance natural production of anadromous salmonids and their supporting ecological functions and limnological conditions in rivers in the Methow Subbasin.

The iterative review for this proposal included a response loop, final report, and comments on the final report that identified a mistake in the ISRP review, an updated ISRP review correcting the mistake, and a teleconference to clarify an approach to a response. These steps were critical to reaching the final conclusion in this memo. Specifically, the review began on June 17, 2009 with a request from the Council, and on July 10, 2009, the ISRP released a preliminary report requesting a response on nine specific items ([ISRP 2009-27](#)). On October 26, 2009, the Council submitted the Yakama Nation's response documents that included point-by-point responses to our review comments and an updated project proposal that incorporates the responses. On December 2, 2009, the ISRP completed a final review finding the proposal and response did not meet scientific review criteria ([ISRP 2009-50](#)).

In February 2010, it was brought to the ISRP's attention that our review contained comments to elements not included in the Yakama Nation's nutrient enhancement proposal for the Methow Subbasin but instead applied to the Shoshone-Bannock Tribes' nutrient enhancement proposal for the Salmon River Subbasin (#2008-904-00; see [ISRP 2009-53](#)) that we were concurrently reviewing. After correcting our mistakes we found that the critical and primary points of our review were correctly attributed to the Yakama's proposal; consequently, our final recommendation did not change. On February 22, 2010, we held a teleconference with the Yakama Nation and discussed points that needed to be addressed. In response to our earlier review and the teleconference, the Yakama Nation provided a point-by-point response to our concerns and a revised proposal. Our review of this latest submittal is provided below.

Recommendation

Meets Scientific Review Criteria (in part)

The project proponents addressed a number of ISRP concerns raised in earlier reviews of this proposal, and it is clear from their response that considerable progress has been made since the original proposal was submitted. However, the ISRP continues to believe there are serious deficiencies. Nonetheless, the ISRP also believes a useful nutrient addition experiment can be conducted on the Twisp, assuming a complete study plan is developed.

In the current plan there is a lack of specificity about several critical project components, in particular:

- the form in which nutrients will be added is not yet identified
- a power analyses of the detection of a response in fish production has not yet been conducted
- there is a lack of detail regarding the stable isotope work, and
- there is uncertainty about the methods used to sample fish because permits have not yet been secured.

Most of these problems will require time and some preliminary data to address.

Because these deficiencies are serious, we suggest that the project proponents proceed with the collection of pre-treatment data for two to three years, and then use these data to develop a detailed plan for the five-year nutrient enrichment portion of the study. After it is developed, in two to three years, the ISRP should review the updated study plan.

Comments

Several important issues were resolved in the February 22, 2010 conference call; however, we also recognize that the project proponents' and ISRP's interpretation of the resolution might vary according to the views of individual participants in the teleconference. Therefore, an explicit statement of the project proponents' perceived resolution should have been included for each of the ISRP's concerns. Simply stating "This issue was resolved during the 2/22/10 conference" call without providing a concise synopsis of the proponents' view of the outcome inevitably leads to uncertainty in the ISRP's understanding of what steps would be taken to address our concerns. In parts of the response document (e.g., invertebrate sampling and fish metrics) the details of the study were well described, but in other aspects of the project (e.g., nutrient limitation and algal production) we feel there are still some significant issues that confront the work.

A major concern of the ISRP was whether or not the proposed sampling regime and experimental design would be rigorous enough to detect responses to nutrient additions. The proponents' response provides examples of the magnitude of responses that have been seen in Kootenay River and B.C. nutrient enhancement experiments. As many of the metrics used in these studies are comparable to those proposed for the work on the Twisp, this information is very helpful. However, no information is provided on the ability to detect responses in smolt yield or smolts per spawner. This response variable is arguably the most relevant in terms of understanding the potential for nutrient enrichment to contribute to salmon recovery. The ISRP believes that a more rigorous statistical evaluation, such as a power analysis, should be

conducted for each major metric being measured in the study (especially for metrics related to smolt production). Ideally, these analyses would be conducted using baseline data from the Twisp River, possibly augmented with data collected in nearby watersheds (Methow, Chelan, or upper Wenatchee). The proponents have indicated a willingness to do this, and the ISRP believes this step should be completed, to the extent possible before the project commences, and refined as data are collected during the pre-treatment period.

Nutrient addition research conducted on coastal streams of British Columbia is cited frequently in the proposal, but many of the more recent papers from these studies were not referenced. These later papers report results that differ from those obtained during the early years of this study. Although that work indicated that nutrient addition does cause positive responses in certain aspects of trophic productivity (algae, invertebrates). However, due to low escapement of wild fish (as a result of poor survival at sea) and a lack of contribution by spawning hatchery fish to juvenile salmon and steelhead rearing in the river, densities were low and the fish did not exhibit a response to trophic enhancement – there was no evidence that food supplementation resulted in elevated growth. As a result, smolt yield was not significantly affected. Since wild fish abundance also tends to be low in the watersheds of the Upper Columbia, a similar response to nutrient addition is possible. Therefore, developing a sampling protocol and analytical approach that maximizes the ability to detect responses in juvenile salmon and smolt metrics will be key to the success of this project.

Nearly all of the examples given in the response to show that nutrient enrichment of oligotrophic aquatic ecosystems can stimulate food web productivity all the way up to fish are from lakes or streams where liquid nutrients were added. In most of these case studies the chemical makeup of the nutrient solutions was adjusted after baseline N and P (and micronutrient) levels were carefully analyzed. In their response, the proponents do provide some baseline data for phosphorus in the Twisp River; baseline nitrogen levels are also needed. Project proponents have assured us that the agent(s) of nutrient supplementation have not yet been finalized, but we again emphasize that careful pre-treatment nutrient analyses will be needed to identify the method of enrichment likely to produce the desired effects. The NDS experiments will help in this regard but some consideration of inter-annual variation in nutrient levels and how this variation might affect the level of nutrients added also should be considered. In this regard, the method that will be used to estimate the nutrient contribution made by carcasses of naturally spawning salmon was not described in the proposal. There appears to be a rigorous process for enumerating spawning salmon but determining what effect these fish have on nutrient availability may be important in determining an appropriate level of nutrient supplementation. Examination of the relationship between spawner abundance and nutrient levels during the pre-treatment period may help address this issue.

Given the complexity of this study, the decision to delay the Methow River enrichment experiment until a future date was wise. Thus, Objective (1) in section 10.G Monitoring and Evaluation of the Final Project Narrative [p. 37] should be changed to reflect the focus on the Twisp River and not the Methow.