



## Independent Scientific Review Panel

for the Northwest Power & Conservation Council  
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**Memorandum (ISRP 2012-5)**

**March 20, 2012**

**To:** Joan Dukes, Chair, Northwest Power and Conservation Council

**From:** Rich Alldredge, ISRP Chair

**Subject:** Review of a revised proposal and supporting appendices for the *Yankee Fork Salmon River Restoration Accord* project (#2002-059-00)

### Background

On February 17, 2012, the Northwest Power and Conservation Council requested that the ISRP review a revised proposal and supporting appendices for the Shoshone-Bannock Tribes' (Tribes) Accord project, *Yankee Fork Salmon River Restoration* (#2002-059-00). The Yankee Fork of the Salmon River, located in central Idaho in the Salmon-Challis National Forest east of Stanley, is one of the larger watersheds (190 mi<sup>2</sup>) within the Upper Salmon River Basin. The currently proposed habitat enhancement activities focus on creating a connected series of self-sustaining, small ponds and side channels at two locations. These enhancements are designed to provide high-flow refuges and year-round rearing habitat for juvenile Chinook salmon.

According to the Bonneville Power Administration and the Tribes, these two enhancement activities represent a less ambitious approach than envisioned in an earlier Step One habitat restoration master plan that the ISRP reviewed in September 2008 ([ISRP 2008-11](#)). In that review, the ISRP found that the Yankee Fork restoration plan did not meet scientific criteria. The ISRP stated:

Although the Plan's emphasis on restoration of ecosystem *function* merits praise, there remain three major areas of critical deficiency. The ISRP recommends that to address these deficiencies, the following is needed:

1. Completion of missing proposal components – the project sponsors should provide study results on fish populations and fish habitats; establish and justify quantitative biological objectives; outline M&E sufficient for Step 1; and address mercury and selenium contamination. If any elements above cannot be established at this stage because of inadequate information, then that information should be gathered, analyzed, and incorporated in the next Project Implementation Plan submittal.

2. Resolution of land access and conservation easement issues.
3. A benefits analysis demonstrating the proposed alternatives are favorable to fish and wildlife resources.

In response to the 2008 ISRP's review concerns, the Tribes worked with the U.S. Bureau of Reclamation, Trout Unlimited, the U.S. Forest Service, and the landowner to gather information and refine the proposal. With the proposed reduction in scope, Bonneville and the Tribes no longer believe the proposal should be in Step Review, but instead warrant a standard ISRP and Council proposal review. The Tribes' submittal including a cover letter, a memo responding to the ISRP's comments, conceptual plans for the pond work, and nine attachments are available on the Council's website: [www.nwcouncil.org/fw/projectselection/accord/200205900](http://www.nwcouncil.org/fw/projectselection/accord/200205900).

The ISRP's review follows below organized by the three concerns raised in the 2008 review.

## **Recommendation**

### *Meets Scientific Review Criteria (Qualified)*

#### Qualifications:

1. Develop a formal Fish and Wildlife Program proposal for the pond reconstruction actions.

The pond reconstruction identified in the response documents does not adequately provide the material expected in a Fish and Wildlife Program proposal. Since the 2008 Step Review, the proponents and co-managers have obtained additional information, conducted analyses, and modified the scale of the project to such an extent that the previous step document cannot realistically serve as the proposal.

The restoration of the Yankee Fork of the Salmon River is going to be a multi-year, multi-strategy effort. A complete proposal is needed that establishes the baseline status of the focal species, the habitat, limiting factors, explicit improvements in focal species life-stage survival from restoration, and a monitoring plan to evaluate restoration. The analysis of 20 years of fisheries data, currently being completed and due May 2012 by Gregory Aquatics, should be incorporated into the formal Fish and Wildlife Program proposal.

2. Pursue the reach-scale analysis and design work needed to develop justified actions. Do not implement the pond reconstruction elements until the necessary assessment is complete.

3. Make necessary modifications in design specifications for pond series habitat alterations so that they function primarily during base flow conditions in summer and during winter. Re-construction of pond margins to hold juvenile Chinook salmon during high flow conditions in June is not biologically justified and should not be part of the proposed work.

The ISRP should review the revised proposal and supporting documents identified above before pond reconstruction is implemented. Depending on the project schedule, this review step may be incorporated into the Council's upcoming Geographic Reviews.

## **Comments**

There are several positive attributes in the Tribes' response to the 2008 ISRP review:

(1) Adoption of the downscaled approach that is more specifically focused on providing rearing habitat for juvenile Chinook salmon in the dredge-altered reach under consideration. The proponents have significantly reduced the scope from their 2008 proposal, and a more tractable project is proposed. The ISRP concurs with the project sponsors that the narrower scope of the proposal no longer warrants following the Three-Step review protocol.

The main focus is now on the reconstruction of two previously developed, off-channel pond series (Numbers 2 and 3) for juvenile Chinook rearing. This approach seems reasonable and appropriate, especially because the ponds are at the lower end of the Yankee Fork. Thus, juveniles produced from spawning upstream in less altered habitat can gradually move downstream into the ponds as summer progresses (as documented by Richards and Cernera 1989).

(2) Inclusion of excellent supporting documents reflecting very recent analysis by the Bureau of Reclamation (BOR) and the US Forest Service (USFS).

(3) Indications of improving collaboration within the subbasin through the efforts of the Tribes, BOR, USFS, Trout Unlimited, and Simplot Corporation.

(4) Analysis of potential problems with mercury and selenium.

However, a critical problem with the response is an apparent failure to fully support the plans on a science-based understanding of fish needs. The proposed work fails to take advantage of results of past research (Richards and Cernera 1989, Richards et al. 1992) done in the study area itself. Reference to that research was not included in the Biology Appendix of the otherwise excellent BOR Tributary Assessment (TA). Such information should provide the foundation for project activities, or, alternatively, the sponsors should have shown why those studies were inaccurate or irrelevant. The ISRP acknowledges that those studies might have been incorporated into project planning via a report by Gregory and Wood in 2011, but that

report was not available to the ISRP. There was no evidence in the proposal of inclusion of this past research.

Therefore, there is a fundamental problem with the design specifications as given in the Basis of Design Report (BDR). Work is planned primarily to keep Chinook young-of-the-year (YOY) from being swept out of Yankee Fork by spring flows. Discussion of that issue continues under the Fish Habitats topic, below.

The Bureau of Reclamation, along with the Tribes, Trout Unlimited, and US Forest Service has completed a Yankee Fork Tributary Assessment Final Report dated January 2012. This assessment appears to be the primary supporting document for the current project submission. The submission also identifies other supporting documents including a USFS 2010 Level II Stream Inventory Survey, and Idaho Salmon Recovery Plan (NMFS 2011) which summarizes limiting factors. How these later two assessments contributed to the decision to pursue the two pond reconnection projects is not entirely clear. Nonetheless, in the Tributary Assessment, section 1.3 Limitations and Data Gaps (page 12) the assessment states *“The primary use of the TA should be to guide habitat recovery actions toward valley segments and/or geomorphic reaches that have the greatest potential to improve physical and ecological processes that benefit the fish species of concern. This document should not be used exclusively as the basis for project design. Detailed reach and/or site-specific analyses should be conducted to identify the appropriate suite of actions, refine conceptual plans, and develop detailed designs for implementation.”* The submittal appears to use the TA to justify two site-specific reconnection projects within reach 2. However, the additional reach and site specific analyses recommended by the TA seem to be absent from the submission. The project exhibits are single page maps with actions identified to location, and the narrative text consists of only four short paragraphs.

The TA overview concludes with the observation that the ISRP identified eight questions in the 2008 review and the statement that four of those questions are addressed in the TA. The submittal to initiate the two habitat actions in Pond Series 2 and Pond Series 3 does not include enough information on the remaining four questions – especially quantitative biological objectives for proposed actions.

### **1. Completion of missing proposal components**

- **Fish Population Status**

The submittal is too generalized, with Chinook production from a number of years being combined into a total abundance figure. The information does not appear consistent with the TRT analysis. The information should explicitly be compared and linked with the recovery plan and TRT status reviews. The status of the population under ESA recovery remains confusing to the ISRP. At least one TRT and Idaho Department of Fish and Game document indicate that Yankee Fork spring Chinook population viability is not required for delisting of the Upper Main Salmon MPG. Further, the ISRP has raised questions about how restoration of the Yankee Fork independent population can proceed with supplementation using Sawtooth Hatchery spring

Chinook. These topics have been raised by the ISRP in the Crystal Springs Hatchery Master Plan. The hatchery supplementation and habitat improvement in Yankee Fork need to be explicitly integrated.

- ***Fish habitats***

A broad concern of the ISRP is that the approach to date does not lead to an integrated assessment of Yankee Fork potential and a logical sequencing of restoration actions including protection through active channel work and riparian habitat enhancement, long term monitoring, and maintenance.

Several specific concerns are detailed here to provide feedback to the proponents. One concern, introduced in the comments above, is a fundamental problem with the design specifications given in the Basis of Design Report (BDR). As presented there, habitat alteration is planned primarily to keep Chinook young-of-the-year (YOY) from being swept out of Yankee Fork by spring flows, and presumably suffering high mortality. However, the ISRP questions that rationale, because no evidence is provided in the proposal or in its ancillary documents that this has been observed in the Yankee Fork (documentation is needed if it has been). Such a “blow-out” of YOY was not identified as a limiting factor in the TA. Spring Chinook that have evolved in interior, non-coastal rivers are well adapted to normal spring flows. The TA indicates that YOY emerge mid-March to late April in the Yankee Fork and presumably, reviewers feel, are able to cope with peak flows that occur in June. Richards and Cernera (1989) noted naturally-spawned fish emerging from gravel as late as June but made no mention of “blow-out.” If this were to happen, it is unlikely that newly-emerged fry could survive being swept down many miles of stream, in any case, and the proposed new habitat would be of limited utility. Also, most Yankee Fork Chinook are hatchery-origin fish that are introduced at a larger size, although it is important to have good conditions for natural-origin fish if their recovery is to occur. Re-construction of pond margins to hold YOY Chinook salmon during high flow conditions in June is not biologically justified and should not be part of the proposed work.

In the absence of evidence to the contrary, the ISRP believes that the critical problem, seen by Richards and Cernera (1989) prior to the construction of the pond series, continues to be the major outmigration of Chinook during their first year of life, not in spring but in midsummer. This was observed for both natural origin and hatchery fish and was noted both in the dredged habitat and upstream in reaches with better habitat.

Reducing this summer outmigration by providing better rearing habitat was the rationale for initially constructing the ponds and was only successful to a small degree. That rationale should be the primary justification for modifying the ponds now. Design of future work should ideally have started with a critique of existing habitat in the ponds that were built in 1987-88. Richards et al. (1992) did that and found two important trends. Channel habitat received disproportionately heavy use, and fish appeared to avoid water without cover in both pond series. Based on that, the best summer habitat will simulate natural small backwater channels: water of low velocity (less than 1 foot/sec) and depth of 1.5 to 3.0 ft near physical cover

(submerged best, overhead useful). As much as is possible that habitat should be designed to be available during flows in July and August, and in winter as discussed below.

Some portions of the design in the BDR will meet those requirements. Some will probably not, but further engineering evaluation is needed. The proposed design appropriately increases channel habitat, but the design velocity range (to 2 ft/sec) is too high. That excessive velocity might be remedied by addition of additional cover, especially in the form of rock.

The design criterion for depth, to “maintain or increase the aerial extent of habitat-appropriate depths more than 2 feet” (presumably the authors mean *areal* extent) was taken from Maret et al. (2006). However, Maret et al. (2006) dealt primarily with Habitat Suitability Modeling for adult Chinook, and they state that “Because of the concerns about PHABSIM modeling results for juveniles, they are not presented in this report.” The proponents should clarify the derivation and value of the depth criterion used.

The BDR does not place emphasis on providing adequate submerged cover. Placing large wood, especially rootwads is good but using the USFS guideline of 20 pieces of wood per mile at 10 locations, as apparently intended, is inadequate. Portions of the ponds that in future will remain as slow-moving or motionless open water should have rootwads added to them, as appears to be the intent.

The BDR winter habitat discussion is not entirely clear and needs more serious consideration. The ISRP agrees that newly-created habitat should also be suitable for use by Chinook during their first winter and doing so will enhance their survival and production. The BDR states that “refuge from freezing” is required and thus some locations with depth greater than 10 ft will be provided. The ISRP agrees that refuge from anchor ice is needed. The TA Biology Appendix notes that anchor ice forms along river miles 3-7. Anchor ice will not form if surface ice is allowed to form on pond habitat. Young salmonids will survive well under the surface ice but only if dense concealment cover such as rootwads is present. Water depth of 10 ft is not necessarily needed. Half that would likely suffice, but the sponsors should ascertain that from the literature. Further, groundwater feeds into the ponds (Richards et al. 1992), but its extent appears to be unknown. Groundwater-fed side channel habitat is of great value for natural ponds supporting juvenile Chinook salmon (Swales et al 1986). Are there adequate groundwater flows to the ponds? Groundwater inflow has not been assessed but needs to be.

Engineering features to change hydraulics at entrance to ponds, as planned, are important to enhance access to ponds by fish. Having the flow “splits” as designed might possibly be satisfactory, but more critical is that fish entrance to ponds is facilitated at **lower** flows.

It appears that there is no mention of the planned design life of the project nor is there any apparent discussion of maintenance activities likely required to ensure that the project performs as designed over time. It seems likely that issues like sediment deposition at the inlet and outlet points of the ponds and possible beaver activity, especially in the inlet/outlet channels, should be anticipated. Deposition of sediment at the inlet and outlet points of the

ponds complexes seems likely to affect successful, long-term operation of the project. Being low in the watershed, deposition of material in the inlet and outlet channels for the ponds, and possibly in the ponds themselves, should be anticipated. Reviewers did not see any discussion of these possibilities. There was mention of the need to remove beaver dams for construction of the project. Given the significant re-vegetation planned, it seems that some discussion of how beavers will be managed would be useful. At this point, it is not clear if beaver activity is viewed as a beneficial to successful long term operation of the project. Beaver activity seems to have a likelihood of affecting hydraulic function of the pond complexes.

The sediment data included in supporting documents received little discussion in the proposal. It appears residual fine sediment may not be a problem as far as egg-to-alevin survival of Chinook salmon in upper reaches is concerned. The data presented did not seem to indicate an over abundance of fines. It appears that fine sediments are getting transported through much of the system and are being deposited at the lower end of the Yankee Fork or in the main Salmon River. There were some statements about aggradation and increased flooding in and around Challis.

- ***Quantitative biological objectives***

Quantitative biological objectives that can be measured and tracked through time are needed but are not provided. Objectives are needed for both habitat characteristics and for focal species VSP parameters. The biological performance identified on page 7 is not sufficient to evaluate the Yankee Fork population response. Quantitative metrics are needed. Biological Performance item 1, *Increase juvenile Chinook abundance in the activity area relative to control areas after completion*, is not adequate. This measure appears to be evaluating whether fish density or total abundance is larger in the restoration area than in adjacent unaltered habitats (that were not identified). This may be a measurement of interest, but it is not sufficient for determining if the project is a success. The project is intended to increase the total abundance of each focal species at specific life-stages. If fish simply move into this habitat, but total numbers are not increased, then progress toward recovery will not have been achieved. Biological Performance item 2, *Increase survival to Lower Granite Dam for juvenile Chinook that use the activity area compared to juveniles that remain in the YF mainstem*, is similarly a measure of interest but not of overall success. The proposal does note that survival of migrants to Lower Granite Dam has been monitored. Results from previous PIT tagging show 12% survival of juvenile Chinook salmon to Lower Granite Dam (incorrectly given as 0.12% in the BDR and proposal). But the existing baseline is an average across smolt and parr migrant life-history types that reared in different reaches. To make a difference in the recovery trajectory of the population, the average, after restoration, would need to improve, not just a relative improvement in fish from one habitat. Moreover, the proposal needs to establish a goal for Yankee Fork to Lower Granite Dam survival, and indicate how this project is intended to contribute to that improvement. For example, if survival to Lower Granite Dam needs to be 75% and it is currently only 12% then, even if the project could double survival, it might be of limited value.

The sponsors should consider incorporating an approach similar to that of Roni et al. (2010) to estimate how much restoration is needed to measurably increase Chinook smolt production.

- ***M&E Plan***

This portion of the response was insufficiently developed. The two-tiered approach mentioned on page 8 is appropriate. Tier one appears to be habitat assessment and fish response within the improved sites/reaches and tier two to be population level response (see above for why this is essential). However, the specifics of the snorkel surveys and a discussion that they will have sufficient power to detect a difference are absent.

PIT tagging and rotary screw traps should provide useful information but only if tagging is used in a well-designed manner to test specific hypotheses. Moreover, how PIT tagging will accomplish the population level assessment and differentiate supplementation from habitat improvement effects is also missing and needs to be addressed before beginning the work. A power analysis is also required. An important use of PIT tagging in the future will be to compare survival to Lower Granite between juvenile Chinook groups, especially those that exit Yankee Fork in midsummer vs. those that exit in the autumn vs. those that winter in the ponds and exit the next spring.

Specific monitoring plans and performance measures for both Pond 2 and 3 were not provided. How many smolts is each pond expected to produce? The literature review for the success of artificial rearing channels for Chinook is sparse with only one regional reference given (Richards et al. 1992).

The ISRP also suggests the monitoring plan incorporate macroinvertebrate food production and availability from the physical and vegetative habitat components (ISAB 2011-1). Although not considered in the design criteria, the carrying capacity of the ponds may determine how many Chinook remain in them, especially at low flow when their density might be high.

- ***Mercury and selenium contamination***

This issue seemed well addressed. Mercury and selenium have been a concern in the area for many years and several USGS publications were prepared over the years. Regarding metals, the objective is to maintain water quality without detectable increases in mercury and selenium in the aquatic environment. To accomplish this, the sponsors plan to (1) reduce conditions conducive to the methylation of mercury (such as low dissolved oxygen, high sulfur concentrations, high organic carbon, and fine sediments), and (2) maintain mercury and selenium concentrations at levels below those which can cause adverse effects to aquatic resources and upper trophic-level consumers. The ISRP believes the approach is good and useful.

The sources of mercury seem to be the Challis Volcanic episode, but with no evidence of high cinnabar deposits in the region. Other potential sources of mercury include placer mining, hard-



rock mining, and ore processing (mercury was used to extract gold and silver from ore). CH2MHill sampled Pond Series 2 and Pond Series 3 in October 2011. There was no exceedance of Screening Levels (SL1, SL2) for mercury or selenium in sediment, but there was some mercury exceedance using another sediment criterion (TEC: MacDonald et al. 2000) at 5 of 15 sites. All surface water concentrations are well below those considered protective of life. In the absence of measured mercury in fish tissue in Pond Series 2 and Pond Series 3, standard modeling was used to estimate tissue levels. Using a conservative model, levels in fish tissue in Pond Series 3 would slightly exceed (0.44 mg/kg wet weight) a tissue-based criteria (WQC if 0.30 mg/kg, ww). Authors note that Chinook are not permanent residents so would have less time to accumulate mercury. They also point out that between 2000 and 2008 a resident species, mountain whitefish, had less than 0.05 to 0.14 mg/kg wet weight, all below the WQC standard (Rhea 2008).

Based upon weight of evidence, CH2MHill concluded:

1. Potential risks of consuming fish containing bio-accumulated selenium and mercury by humans and wildlife is likely minimal. Based on a conservative model some fish could be above screening levels, but this is less likely for anadromous fish.
2. Concentrations in sediment below screening levels are assumed to be protective of benthic macroinvertebrates.
3. Surface water below screening levels assumed to be protective of aquatic resources.
4. Mercury and selenium concentrations in Pond Series 2 and Pond Series 3 appear to be generally consistent with background levels.

Based on those conclusions, the ISRP believes the area falls in a marginal zone for potential mercury effects. The point initially made above, that project activities would reduce conditions conducive to mercury methylation, perhaps puts this project into the safe zone from a mercury perspective. Selenium did not seem to be an issue.

## ***2. Resolution of land access and conservation easement issues.***

Trout Unlimited's involvement is positive, and it appears continuing progress is being made on the land access and easement issues. However, even a draft agreement for conservation of the restored area in perpetuity is not yet in place, although it is proposed for implementation in 2012. The planned agreements are not permanent conservation easements and are modeled after those used by Trout Unlimited, with a life span of 20 years. This time period will only include 4-5 generations of spring Chinook and thus leave much to be desired.

The ISRP did not find any discussion of long-term management plans for valley bottom lands in the project area. There appears to be a good deal of road and off-road disturbance occurring. In the future, this activity could be detrimental to the success of aggressive re-vegetation efforts that are being planned. It appears that some level of road and access planning/restoration would benefit successful long-term operation of the project and avoid future user conflicts.

Another possible future issue is “re-mining” as is occurring elsewhere, for example, on tailings from previous dredge mining on the upper Powder River near Sumpter, Oregon. Although there is no way of knowing the likelihood of this occurring on the Yankee Fork, it does raise the issue of the status of the tailings in this area and whether such an activity could occur in the future. If it did, it could potentially have major negative effects on project operation. On the other hand, it seems that such future re-processing might offer an opportunity for removing and re-contouring some of the tailings piles and providing long-term restoration to stream function.

**3. *A benefits analysis demonstrating the proposed alternatives are favorable to fish and wildlife resources.***

No real benefits analysis was provided in the response material. Information on how Pond Series 2 and 3 fit into the larger scheme of Chinook salmon restoration for the system is needed. As discussed above, the project sponsors need to define their fish production goals. Juvenile Chinook density of one fish per square meter of quality habitat might be expected based on previous Yankee Fork work and a review of Salmon River tributaries by Sekulich (1980).

**References**

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