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 2010-18) **June 9, 2010**

To: Bruce Measure, Chair, Northwest Power and Conservation Council

From: Eric Loudenslager, ISRP Chair

Subject: Follow-up Review of WDFW's Fast Track Proposal, *Estimate the Relative Reproductive Success of Hatchery and Natural Origin Steelhead in the Methow River Basin* (#2010-033-00)

Background

At the Council's May 13 request, the ISRP reviewed Washington Department of Fish and Wildlife's (WDFW) revised proposal titled *Estimate the Relative Reproductive Success of Hatchery and Natural Origin Steelhead in the Methow River Basin* (#2010-033-00). This proposal is intended to address high priority research, monitoring and evaluation needs identified in the 2008 Biological Opinion (BiOp) for the Federal Columbia River Power System (FCRPS). These needs were identified for immediate action during the recent Columbia Basin Research, Monitoring and Evaluation (RM&E) Collaboration process and workshops in November 2009. This project is specifically designed to meet RPA 64.3 of the BiOp. The project's purpose is to quantitatively evaluate the relative reproductive success of naturally spawning hatchery and natural origin steelhead in the Methow River Basin over two generations.

An earlier version of this proposal was submitted in February 2010 for the Fast Track proposal review process. The ISRP requested a response for that proposal and completed a final review on April 15, 2010 (ISRP 2010-10). The ISRP found that the proposal did not meet scientific review criteria because it lacked detail and justification in four primary areas:

1. The methods or contrast used to estimate Relative Reproductive Success (RRS).
2. The parr and smolt sample size
3. A suggestion to do AHA modeling and execute the investigation as an evaluation of the AHA assumptions
4. The potential difficulty to interpret the carryover experiment because the history of the stock under investigation is not well defined

The ISRP recommended that WDFW should submit a more developed proposal in the RME Categorical Review and that a point-by-point response to the ISRP's concerns should accompany the proposal. Rather than wait for the RME Categorical Review, the Council recommended that WDFW "respond to the ISRP's request for a revised proposal and a complete response ahead of

the RM&E/Artificial Production Category Review so that the needed actions associated with this project can be implemented in FY 2010 if a favorable ISRP review and Council recommendation is received."

WDFW revised their proposal and included a point-by-point response to our concerns. Our review follows below.

ISRP Recommendation

Meets Scientific Review Criteria

ISRP Comments

This proposed investigation is timely and has the potential to provide improved understanding of the demography and viability of upper Columbia ESU steelhead and the relationship between hatchery and natural fish in this region. There is the potential that the results would apply to steelhead populations with low abundance in other upper Columbia subbasins, i.e., Entiat, Wenatchee, and Okanogan.

The proponent has given due consideration to the ISRP's "preliminary" and "final" comments plus figured out a way to integrate suggested treatments.

ISRP concerns about statistical rigor and power have been addressed by consultation with statisticians and clear articulation of samples sizes (and an expected confidence interval). Sample size issues appear adequate but will need to be confirmed with preliminary data. The assumptions for evaluating random mating will very likely be violated, even after accounting for relative reproductive success differences between hatchery- and natural-origin adults. The proposed analysis assumes that there is equal survival from capture to spawning between hatchery- and natural-origin adults, that mating success is similar among the four categories of parent-pairs, and that fecundity is the same between hatchery- and natural-origin females. However, survival will likely be unequal, mating success will differ, as will fecundity – size alone suggests there will be differences in all three. Some post-hoc testing could confirm this. Kelts might also be examined for size, survival, fecundity, and re-absorption.

The project proponents state they plan to apply AHA modeling once preliminary results are generated, and throughout the study, so this point, along with others, was addressed.

1. The methods or contrast used to estimate Relative Reproductive Success (RRS).

The project proponents adequately address the ISRP concerns raised in the initial and response reviews. The text of the narrative has been modified, and the tests of relative reproductive success now appear consistent with similar investigations.

2. The parr and smolt sample size

The proponents adequately address the ISRP concerns raised in the initial and response reviews. The proponents consulted with H. Araki (Swiss Institute of Aquatic Science) and Yongwoo Lee (WDFW) to assist in evaluation of the ability of the study to determine differences in relative reproduction success in comparisons of groups of steelhead. Contingent on the variance in reproductive success within populations, differences from 10 to 20 percent should be detectable with 80 percent power.

3. A suggestion to do AHA modeling and execute the investigation as an evaluation of the AHA assumptions

AHA modeling has been completed for the Methow subbasin, but not the Twisp. The proponents have modified the management of returning fish. Escapement will fluctuate permitting an evaluation of habitat capacity and the hatchery-origin adults (HOR) and natural-origin adults (NOR) fractions can be manipulated to evaluate re-adaptation.

4. The potential difficulty to interpret the carryover experiment because the history of the stock under investigation is not well defined

The proponents reasonably addressed the ISRP concerns. See comments above. Modifications to the experimental design will be contemplated based on empirical estimates of differences between hatchery and natural-origin steelhead in the first generation.