Independent Scientific Review Panel
for the Northwest Power & Conservation Council
851 SW 6th Avenue, Suite 1100
Portland, Oregon 97204
isrp@nwcouncil.org

May 13, 2005

TO: Doug Marker, Fish and Wildlife Division Director, Northwest Power and Conservation Council

FROM: Rick Williams, ISRP Chair

SUBJECT: Interim Reply -- Combined Step Review for *Sekokini Springs Natural Rearing Facility and Educational Center*, Hungry Horse Mitigation, Project #199101903) (ISRP 2005-10)

Background

This is an interim reply by ISRP to Montana Department of Fish, Wildlife and Parks' (MDFWP) Master Plan for the Sekokini Springs Natural Rearing Facility and Educational Center (*Hungry Horse Mitigation*, Project # 1991-019-03). This review considers both the Sekokini Springs Master Plan and MDFWP's response to the ISRP's preliminary review of the Master Plan (see ISRP 2004-5, February 4, 2005[1]).

The Master Plan is intended to address artificial production activities at Sekokini Springs and the subsequent stocking of westslope cutthroat trout (WSCT) produced at the facility. While the modest degree of anticipated engineering and design associated with the proposed project would normally dictate little need for additional step reviews beyond the Master Plan review, some additionally critical uncertainties are not adequately addressed during this review.

In the preliminary review, the ISRP stated that the Sekokini Springs program appeared to be an integral part of a multi-faceted program to mitigate Hungry Horse/Flathead Lake cutthroat trout losses and would be a proactive step to bolster cutthroat numbers, helping avoid the need for ESA listing. The mitigation need was well demonstrated and ties were made to the Council's Fish and Wildlife Program and Artificial Production Review. The ISRP found that science was, for the most part, sufficiently sound, but reviewers raised several questions and concerns that needed a response before we could make a final recommendation on the Master Plan. These concerns centered around several large themes (indicated by the section headings below), not the least, was whether the project's goals can be achieved in a timely and cost effective manner by alternative means that focus on population transplants and habitat restoration activities rather than the proposed artificial production initiative.

[1] ISRP Preliminary Review of Sekokini Springs Master Plan (ISRP 2005-4, February 4, 2005). www.nwcouncil.org/library/isrp/isrp2005-4.htm

ISRP Recommendation

While we were initially prepared to support the Sekokini Springs project, details about the level and distribution of westslope cutthroat trout (WCT) diversity and the approach proposed to conserve this diversity made it become increasingly clear that sponsors did not provide some vital scientific information, provide sufficient justification relative to apparent alternatives, or eliminate critical uncertainties regarding the project. Ultimately, given the uncertainties that emerged during our review, the ISRP judged the Master Plan to not be scientifically sound in its present form. In sum, the Master Plan and responses do not satisfy the scientific and biological elements requested in the Council's Step Review process.

The ISRP recommends a recrafting of the proposal toward a more research-driven project. Such a project could, in fact, rigorously test the methods proposed rather than a broad implementation of artificial and captive production. While our deliberations initially pointed toward the inclusion of a substantially fortified Monitoring & Evaluation component, as we intensified our discussions and dug into the literature, we quickly recognized that there were insurmountable uncertainties that required basic research *a priori* rather than M&E *a posteriori*.

Monitoring and evaluation activities should be designed and carried out in both donor and recipient watersheds for artificial production and release projects. M&E plans should include general methods and protocols as well as the kinds of data collected and the hypotheses to be tested. At a minimum, the sponsors should provide references to published protocols for the monitoring of defined indicator variables. Designing an adequate long term monitoring program with sites selected by a probabilistic procedure to strengthen conclusions may take some time and consultation with an expert statistician.

As part of this recommendation, we offer the sponsors an opportunity to assemble their technical team (including genetics experts) to convene a conference call with an ISRP subgroup and walk us through the project. In this format, the sponsors will have an opportunity to present evidence or information not included in the proposal as well as an interactive feedback loop to clarify any of our potential mistaken conclusions. Moreover, such interplay may overcome any of the critical uncertainties or concerns we have identified.

Major Themes in the Sekokini Springs 3-Step Review

Several issues pervaded the ISRP's deliberations about the project. In the preliminary review, the ISRP listed a set of issues organized by general theme. The MDFWP's response followed the same format, addressing the ISRP concerns point by point. We follow the same organization below, evaluating whether the MDFWP adequately addressed our major concerns. To provide sponsors with specific information about our concerns, we offer the following.

1) Removal of non-native threats

The ISRP was not convinced that the primary proximate-level threat of ecological and reproductive interference from rainbow trout or their hybrid descendents has been adequately addressed as a fundamental precursor to restoring viable WCT populations. Release of propagated fish aside, we are unconvinced that any treatment aimed at recovering or conserving WCT can be effective or long-term without the eradication of these non-native or introgressant

populations. To be clear, we did not seek guarantees that total eradication or isolation with stream barriers will occur throughout the state, but rather we searched for a bona fide and aggressive approach to isolating or eliminating these ongoing genetic-level threats from rainbow trout in *those systems* that are targeted for WCT restoration (core populations).

2) Composition and structure of introgressed populations

While the legacy of historic trout management actions remain problematic for current efforts to conserve or restore remnant elements of native trout diversity, we also noted that a key set of information was not presented – the composition and structure of introgressed populations. We suspect that such data (to address a critical uncertainty) may exist within databases held by the sponsors or the labs that work with them. Information was provided by sponsors in a table that included various levels of allelic introgression (a% WCT alleles + b% RBT alleles) for populations. Buried within these data, however, is a more salient characterization of these populations as to whether they are hybrid swarms (all or nearly all individuals are of hybrid origin) or a mixture (x% WCTs + y% RBTs + z% hybrids & introgressants). Such data will assist in answering two basic questions. Are there remnant pockets of historically monophyletic WCTs? Or are all populations essentially hybrid swarms? If the answer to the first question is "yes," there is a set of risks and concerns similar to that for any supplementation program. If the answer to the second question is "yes," there will be a risk of merely "resetting the clock" and creating a different hybrid swarm in a few generations. Ultimately, we return to the problem caused by rainbow trout or their hybrid descendents remaining in the population and continuing to interbreed with WCT.

3) Uncertainty in genetic effects of proposed action

The ISRP remained unconvinced that the focus on a large-scale, generic "M012" broodstock is a prudent approach to retain the very important pattern of among-population differences observed within the range of this species. The repeatedly observed pattern of distribution (from allozyme and DNA markers) sends a rather strong signal of reproductive isolation and local adaptation among locations. In fact, some of these "divergences" are as great or greater as those observed among major distributional divisions (e.g., eastside/westside). It is unclear how broadcasting the young from a generic brood across watersheds and populations would 1) prevent homogenization of important divergences among populations in the short term and 2) interfere with local adaptations.

The intent to rotate in or breed in allelic diversity from other local populations (from "nearest neighbors") may preserve those alleles in the short run, but ultimately disrupt the genomic combinations unique or adaptive among those populations ultimately leading to further imperilment of local stocks over the long run. This assumes that the choice of a nearest neighbor donor is based on recent or shallow evolutionary divergence within a reasonably defined meta-population rather than some physical distance that has little relationship to divergence (i.e., is the nearest neighbor determined as the "crow flies," as streams or glaciers flow(ed), or as genes flow). This uncertainty begs the question as to why a greater number of local stocks would not be used to seed reestablishment of locally adapted WCT stocks.

4) Efficacy of "Gene-swamping" approach

A lengthy discussion among the more genetically and evolutionarily inclined ISRP panelists intensified the concerns regarding the efficacy of the "genetic swamping" approach to restoring native biodiversity. While such a proposal remains an intriguing approach (at best, however, it should be viewed as experimental, not a validated technique), certain elements and assumptions of the approach caused us some concern absent presentation of a demonstration model or example of how it might work. Some recently published literature summarized by Allendorf et al. (2004; and including earlier work by Epifanio and Philipp 2001, Huxel 1999, Rhymer and Simberloff 1996) indicates that even in the presence of a strong reproductive penalty in hybrids, positive fitness may well lead to a hybrid swarm.[2] Thus, in cases where the fitness of hybrids and backcrosses is positive, we have no *a priori* reason, nor examples from the published scientific literature to suspect hybrids can be easily "bred" out of existence or even ecologically displaced.

Moreover, the sponsors indicate that direct translocation of individuals from donor locations to recipient locations is not a viable alternative because removal of brook trout (competitors) or rainbow trout (hybridizers) might not be 100% and overwhelming the recipient location with stocked individuals is a way to suppress the non-native population from recovering from low abundance owing to removal attempts. While this is plausible on the surface, no empirical examples are provided for such an assertion.

The other reason stated for avoiding translocation of wild caught individuals was State of Montana restrictions on fish transfers because of disease transmission concerns. Disease risks represent a valid concern. However, agency administrative "rules" are likely more flexible to change by the overseeing commission if there is a compelling reason. Ultimately, we trust this decision would be based on "best practices" recommended by fish disease and pathology experts, not on administrative regulation that can be changed. Disease issues are covered by the ICUCN reintroduction specialty group guidelines. We urge review of these guidelines. For example, Gila trout, Gila topminnows, and desert pupfish are translocated routinely - surely there are disease concerns with these species/examples that have been overcome.

5) Completeness of monitoring and evaluation protocol

Even if we ignore the above proximate genetic-level threats and concerns, we cannot adequately judge the completeness of project-level M & E. The sponsors indicate M & E will be conducted through other work and activities. While we applaud broad level monitoring and evaluation, we specifically assert that such activities must be designed and carried out in both donor and recipient watersheds for artificial production and release projects.

As such, we can only evaluate and comment on the effectiveness and sufficiency of such approaches from a technical perspective if we are provided such background. This would

[2] Allendorf, F. W., R. F. Leary, N. P. Hitt, K. L. Knudsen, L. L. Lundquist, and P. Spruell. 2004. Intercrosses and the U.S. Endangered Species Act: should hybridized populations be included as westslope cutthroat trout. *Conservation Biology* 18:1203-1213. Epifanio, J. M. and D. P. Philipp. 2001. Simulating the extinction of parental lineages from introgressive hybridization: the effects of fitness, initial proportions of parental taxa, and mate choice. *Reviews in Fisheries and Fish Biology* 10:339-354. Huxel, G. R. (1999) Rapid displacement of native species by invasive species: effects of hybridization. *Biol. Cons.* 89:143-152. Rhymer, J. M. and Simberloff, D. (1996) Extinction by hybridization and introgression. *Ann. Rev. Ecol. System.* **27:**83-109.

include general methods and protocols as well as the kinds of data collected and the hypotheses to be tested (here, the primary treatments are releases of propagated trout).

Broader and Stronger Biological Justification of the Proposed Initiative

1. Linkages to other regions plans

The sponsors did provide some basic linkages to the Flathead Subbasin Plan and the Hungry Horse Management Plan to justify the need for restoring and conserving WCT. The sponsors also provided some basic but incomplete crosswalk linkages to the MOU and Conservation Agreement for Westslope Cutthroat Trout in Montana (Conservation Agreement, MFWP 1999a) and South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program (MFWP 2003). Connection to these two plans are vitally important to document and clarify, especially as to why westslope cutthroat trout to be produced at Sekokini Springs are absolutely necessary (no other reasonable or prudent alternative) to accomplish the tasks for these plans. What is missing from the Sekokini Springs Master Plan is the numbers of lakes and streams identified in these conservation plans to be restored, the priorities for restoration, and which of the Sekokini Springs stocks will be the primary source of fish.

2. More Thorough Consideration of Alternatives

The ISRP remains unconvinced that hatchery production must be a required element for restoration and conservation relative to direct translocation. We recommend a major shift in the project as a research venture to assess and test alternatives rather than a well-evaluated and monitored implementation project.

Link Hatchery Production Initiative to Habitat Activities

In the preliminary review, the ISRP noted the MDFWP's' goal to conserve a native species rather than "mitigating" the native species losses (attributable to Hungry Horse) with non-native species (i.e., rainbow trout, kokanee, or lake trout) as a laudable and substantial change of mindset from 25 or 30 years ago. Yet, the stresses on the resource due to Hungry Horse are in reality habitat changes – modified discharges below the dam and inundation of habitat within the reservoir. The production and release of fish represents a method of accounting for those habitat losses by focusing on one element of stress on the ecosystem – degraded trout populations. If the project's goal is to replace the lost natural fish with other natural fish, then eventually additional restorable habitat needs to be identified and fixed. Moreover, other biological stressors, such as non-native rainbow trout, need to be removed. Stocking of hatchery products alone is unlikely to achieve the management goal.

While the sponsors acknowledge ongoing efforts to restore degraded habitat, they apparently have not evaluated its biological or cost effectiveness relative to a large-scale and continuous release of propagated trout.

Further Develop the Monitoring and Evaluation Plan

The ISRP found the response to be largely superficial. The sponsors indicate that HHM is responsible for the large-scale monitoring. Yet, if we are to provide a review on the rigors and robustness of the science behind the monitoring and evaluation, we will need greater detail.

Monitoring and evaluation based on appropriate indicator variables is the linchpin of adaptive management.

At a minimum, they must provide references to published protocols for the monitoring of defined indicator variables that they claim HHM is doing or going to do. This document should include definitions of indicator variables that are being or will be measured on "established stream reaches" within donor and recipient steams. References should be given to published documentation for locations of "established stream reaches" and monitoring on those reaches should be immediately augmented with monitoring on additional sites selected by a probabilistic procedure.

The response includes a promise to augment the surveys with sites selected by a probabilistic sampling procedure in the future. Currently, they are only monitoring site-specific responses to specific mitigation actions. Trend in donor streams will "…be monitored by HHM using electrofishing apparatus and the extinction method population estimates in established stream reaches." They should immediately augment those "…established stream reaches" with sites selected by a probabilistic procedure.

Merely stating that the sponsors have plans for evaluating the response of recipient streams to introductions is not adequate. A brief comment is made concerning redd surveys in streams and gill net surveys in lakes that may be conducted by HHM, but no references are given to published protocols for field data collection. Plans for monitoring trends in recipient streams should include detailed field data collection methods or adequate references to published documents for at least the same level of monitoring effort as in donor streams including augmentation of "established stream reaches' with sites selected by a probabilistic procedure.

Sponsors must include a detailed design for a long term monitoring program naming reference and treatment streams because this is apparently not currently being done by HHM. The objective of the long term monitoring program should be to evaluate steam/subbasin-wide and basin-wide responses to the program using a defined probabilistic sampling procedure.

Westslope Cutthroat Trout Biology and Reintroduction Strategies

1. Population Structure

The response partially summarizes the metapopulation/distinct population segment structure of westslope cutthroat that the Sekokini Springs Master Plan is employing in planning artificial propagation and reintroduction efforts. The response only partially justifies the "nearest neighbor" strategy for the Flathead Subbasin, because we do not know the basis for defining "nearest" (i.e., as the crow flies or the glacier flowed).

The maps provided in the response were very helpful in showing the level of population study that has been undertaken, specifically to identify reaches with pure and hybrid WCT. A list of matching donor and recipient streams/lakes drawn from the WCT management plans prioritizing the restoration sites and which can be implemented using M012 and which require developing a drainage specific stock should be added to the Master Plan.

2. Reintroduction Approaches

The response partially elaborates on the reintroduction approaches and the preparation of recipient streams for receiving reintroductions. However, there is still some confusion regarding the introduction of fish from Sekokini into lakes vs. streams and the response did not clear that up. Certainly the case is well made that the biggest challenge in restoring westslope cutthroat trout is dealing with headwater lakes holding rainbow, brook, or Yellowstone cutthroat trout that are continuously bleeding fish into outlet streams. After these trout are reduced in abundance by active eradication program, Sekokini fish would be released as the final component of the campaign. However, given concerns over hybridization, in particular, a greater element of certainty or at least approaches to test effectiveness of the removal are needed.

The response was illuminating, and raises as many questions as were answered. 127 fish removal projects were listed in MFWP Region 1. Removal projects in ten sites (all lakes) appeared initially successful, with two sites subsequently having non-native fish reappear. These were attributed to additional illegal reintroductions. A summary about the other 117 fish removal projects, particularly the experience with streams, would benefit the Master Plan

Also, what is not clear is if Sekokini fish would be used in other ways (e.g., into streams without lakes) such as intended from the initial description of the program. It remains unclear to the ISRP why direct translocations are not an option and why an intermediary and large scale artificial production program is needed. The response is incomplete in terms of how culture effects can be minimized or dismissed.

Literature Cited

Allendorf, F. W., R. F. Leary, N. P. Hitt, K. L. Knudsen, L. L. Lundquist, and P. Spruell. 2004. Intercrosses and the U.S. Endangered Species Act: should hybridized populations be included as westslope cutthroat trout. *Conservation Biology* 18:1203-1213.

Fischer, J., and D. Lindenmayer. 2000. An assessment of the published results of animal relocations. *Biological Conservation* 96:1-11.

Harig, A., K. Fausch, and M. K. Young. 2000. Factors influencing success of greenback cutthroat trout translocations. *North American Journal of Fisheries Management* 20:994-1004.

Minckley, W. L., 1995. Translocation as a tool for conserving imperiled fishes: experiences in western United States. *Biological Conservation* 72:297-309.

Novinger, D., and F. J. Rahel. 2003. Isolation management with artificial barriers as a conservation strategy for cutthroat trout in headwater streams. *Conservation Biology* 17:772 -781.

Oswald, R.A., R.F. Leary, B.B. Shepard, J.A. Brammer, M.D. Enk, W.P. Dwyer, D.H. Kampwerth, B.W. Sanborn, and A. Tews. 1995. DRAFT - Sampling Protocol for Westslope Cutthroat Trout *Oncorhynchus clarki lewisi* in the Upper Missouri River Basin. Upper Missouri Westslope Cutthroat Trout Technical Committee, Montana Fish, Wildlife and Parks.

Propst, D. L., J. A. Stefferud, and P. R. Turner. 1992. Conservation and status of Gila trout, *Oncorhynchus gilae*. *Southwestern Naturalist*. 37:117-125.

Shepard, B.B., B.E. May, W. Urie. 2003. Status of westslope cutthroat trout in the United States: 2002. Report on the westslope cutthroat trout conservation team. 88p. Available online at www.fwp.state.mt.us/wildthings/westslope/content.asp

Other References of Note:

Van Eimeren. 1996. Westslope cutthroat trout, *Oncorhynchus clarki lewisi*. In Duff (technical editor). Conservation Assessment for Inland Cutthroat Trout Status and Distribution. US Department of Agriculture, Forest Service, Intermountain Region, Ogden, UT.

Liknes and Graham. 1988. Westslope cutthroat trout in Montana: life history, status, and management. AFS Symposium 4:53-60.

Leary, Allendorf, Phelps, and Knudsen. 1988. Population genetic structure of westslope cutthroat trout: genetic variation within and among populations. Proceedings of the Montana Academy of Sciences 48:57-70.

Allendorf and Leary. 1988. Conservation and distribution of genetic variation in a polytypic species, the cutthroat trout. Conservation Biology 2:170-184.

w:\em\ww\isrp projects and reports\1 final isrp reports\isrp 2005-10 sekokini response review.doc