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

MEMORANDUM February 4, 2005

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

FROM: ISRP Review Team: Rick Williams (ISRP Chair), John Epifanio, Jack Griffith, Eric Loudenslager, and Lyman McDonald; Contributors: Chuck Coutant and Nancy Huntly

SUBJECT: Preliminary Combined Step Review for *Sekokini Springs Natural Rearing Facility and Educational Center,* Hungry Horse Mitigation, Project #199101903) (ISRP 2005-4)

Background

Per the Council's November 18, 2004, request, the ISRP reviewed 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). 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. The ISRP review focuses on the responses to the Council's Step review elements. Based on the submittal received, the Council does not expect that the project would need additional step reviews unless critical uncertainties are not adequately addressed during this review. The Council based this assumption on the modest degree of anticipated engineering and design associated with the proposed project.

The ISRP previously reviewed this proposed artificial production activity as a discrete task in the much larger Hungry Horse Mitigation Project and visited the hatchery site as part of the Mountain Columbia provincial reviews. The ISRP found the overall mitigation project fundable, but noted that it was difficult to evaluate how well the project was progressing toward attaining the stated goals because the project was an amalgam of many discrete projects. This review is the first time the ISRP has conducted an in-depth review of the proposed artificial production proposal.

Review Summary and Questions/Concerns Needing Response

The Sekokini Springs program appears 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 is well demonstrated and ties are made to the Council's Fish and Wildlife Program and Artificial Production Review. The science is, for the most part, sufficiently sound, but reviewers raise

several questions and concerns that need a response before we can make a final recommendation on the Master Plan. These concerns center around several large themes (indicated by the section headings below), not the least, is 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.

A. Broader and Stronger Biological Justification of the Proposed Initiative

1. Linkages to other regions plans

Sponsors should identify the specific elements of the Sekokini Springs Master Plan that are consistent with, and fulfill the goals and objectives of, other plans, including the Flathead Subbasin plan, the Hungry Horse Mitigation Program, and various westslope cutthroat trout conservation plans. The sponsors assert that the Master Plan is consistent with these plans, but the specific elements that achieve the consistency are not obvious. For example, the goal of the Hungry Horse Mitigation program is to replace "losses of 65,000 juvenile westslope cutthroat trout annually using habitat restoration, dam operation changes, harvest management, and experimental hatchery techniques." Regarding desired end-state conditions, it would be useful to clearly identify what portion of that 65,000 fish were to be attributed to each of these activities, and to identify the portion assigned to Sekokini Springs. What elements of the Conservation Agreement for westslope cutthroat trout and the Flathead Subbasin plan will be met by the Master Plan? If the actions taken within the Master Plan framework achieve their goals, what is the general contribution to Montana westslope cutthroat trout conservation or restoration (i.e. will this represent securing 5%, 10%, 50% etc. of the core genetic legacy for the species).

2. More Thorough Consideration of Alternatives

The Master Plan needs more consideration of alternatives and cost effectiveness. Two options, the Sekokini facility and another facility out of the basin at Washoe Park, are discussed. Other options are not adequately considered including:

- The decision to stock F1 hatchery trout, rather than using the alternative of direct transfer of single or multiple age wild caught individuals from donor streams directly into the "new" streams ready for them. What additional benefits can be achieved through artificial production that cannot be achieved using direct transfer?
- Using Sekokini Springs to house males (or both sexes) collected from streams to obtain milt (sperm cells) to cross into the M012 broodstock could be unnecessary. Fish from streams can often be held stream-side in PVC tubes, spawned, and the gametes used elsewhere.
- Reviewers were concerned with the limited objectives of this project and the length of the time required. One population is to be restored at a time and the first will be "completed" in 2013. If the foremost goal of the project is westslope cutthroat trout recovery, reviewers recommend the project sponsors consider multiple life-stage (age 1 and 2) translocations of wild caught individuals, along with the artificial culture, and whether a more rapid timeline is possible. The culture phase may not be needed at all.

B. Link Hatchery Production Initiative to Habitat Activities

The conservation of a native species using hatchery culture rather than replacing the native species losses attributable to Hungry Horse with a rainbow trout, kokanee, or lake trout sport fishery is a laudable and substantial change of mindset from 25 or 30 years ago, which the ISRP encourages. However, the losses due to Hungry Horse are really habitat changes – modified discharges below the dam and inundation of habitat within the reservoir. The fish are just a method of accounting for those habitat losses. If a goal is to replace the lost natural fish with other natural fish, then eventually additional habitat that can be recovered and restored needs to be identified elsewhere. Stocking hatchery products alone is unlikely to achieve the management goal. See below for comments on habitat improvement and possible alternatives to the extensive use of hatchery products.

In addition to artificial production or relocation alternatives, it is not clear that the investment necessary to develop Sekokini Springs as proposed (i.e., $2.5 million for 35,000 fish produced per year) is cost-effective. Might not use of the funds for habitat rehabilitation, suppression of competing salmonids, etc. be more effective in augmenting cutthroat trout populations?

C. Further Develop the Monitoring and Evaluation Plan

The monitoring and adaptive management portions of the Master Plan are inadequate. More detail is needed on the measures and approaches to protecting the mining of fish from donor streams, the response of recipient streams to introductions, barrier construction, eradication of non-native species, and the protection of other species (bull trout and others?) from eradication efforts. Current sites for monitoring of status and trends of populations in the target area should be augmented with sites selected by a probabilistic sampling procedure.

D. Westslope Cutthroat Trout Biology and Reintroduction Strategies

1. Population Structure

Sponsors should summarize the metapopulation/distinct population segment structure of westslope cutthroat that the Sekokini Springs Master Plan is employing in planning artificial propagation and reintroduction efforts. In various locations, the Master Plan refers to substantial genetic identity of trout populations on the west and east slopes of the continental divide; two metapopulations of westslope cutthroat trout in the Flathead River drainage; and a "nearest neighbor" conservation policy based on evidence that every location is its own population. A succinct summary of the prevailing understanding of westslope cutthroat trout population relationships is needed to reconcile conflicting elements of the Master Plan.

The sponsors indicate that breeders will be collected and used to augment the MO12 broodstock. Given the pattern of genetic variation observed for westslope cutthroat trout throughout its range, why would the sponsor not expect this approach to homogenize important among location genetic variation? If the "nearest neighbor" strategy is appropriate for the Flathead subbasin, why would it not be appropriate statewide? How and where is the "nearest neighbor" criterion applied?

2. Reintroduction Approaches

The Master Plan needs to elaborate on the reintroduction approaches and the preparation of recipient streams.

- There was not a full exploration of the success and use of translocation of natural juveniles and adults of resident *Oncorhynchus* species. Paiute, Bonneville, Colorado, and greenback cutthroat trout, Gila trout, and golden trout have all been translocated – using both hatchery and naturally produced individuals. The literature should have been summarized to justify the alternative they selected.
- According to the limitations analysis (was this based on a formal approach such as QHA or other?), the former introduction of brook trout, lake trout, rainbow trout, and Yellowstone cutthroat trout has created a serious conservation challenge to maintaining or rehabilitating west-slope cutthroat trout in Montana. While the Master Plan indicates that non-native trout eradication will proceed, the document(s) give little evidence that it has been or will be effective. The Master Plan should include a more thorough presentation of the documented track record for eradication efforts – what is the record of success, what difficulties are frequently encountered, and which of these apply to the proposed eradication efforts?
- How will the impact on bull trout be measured and limited from brook and lake trout eradication?
- The "Swamp-out" approach to restoring populations to a non-introgressed state, while intriguing, is untested. In fact, a recent article by Allendorf and colleagues at the University of Montana (Allendorf et al. 2004), makes a strong case that a population derived from mating a hybrid swarm to cutthroat trout would be merely a different hybrid swarm. Regardless, the design and predictions of such a "model" should be more fully detailed, as should plans for implementing, monitoring and evaluation of any experimental applications or tests.
- Does Montana now have official policies in place regarding importation and release of non-native trout in the State (or at least the Flathead Subbasin)? It would be unfortunate to go through a major rehabilitation effort only to reintroduce the threats in the future.

E. Aquaculture Effects on Wild Fish

Reviewers believe that the biggest biological issue affecting success of cutthroat trout production at Sekokini Springs (excluding some infectious disease) is heavy mortality of the juveniles as they are taken from the wild and acclimated to the hatchery. The project sponsors are well aware of this and note a 33% mortality in a large group of fish previously collected and acclimated elsewhere in the state. At Sekokini, acclimation mortality is intended to be kept at 33% or less by having some natural food available, but this plan seems inadequate. It is possible to do much better by providing more natural food while the fish gradually shift to pelletized food. For example, in an Idaho project that one reviewer participated in, scuds (*Gammarus*) were collected by dipnetting irrigation canals as they were being drained in the late autumn. A hundred pounds of scuds could be collected in one person-day's effort and frozen for later use. When thawed, the scuds were immediately recognized as food by wild trout being acclimated for lab testing.

Reviewers are also concerned that the heavy mortality associated with bringing wild juveniles into aquaculture might induce an element of selection on the population cohort that is to be

transplanted. The Master Plan does not discuss this in any detail. Recognition and discussion of the selection, genetic, and potential fitness effects of the juvenile mortality associated with bringing wild cutthroat trout fry into aquaculture needs to be presented.

ISRP Comments on Step Review Elements

The Council has emphasized that an important part of the Three Step Review Process includes an ISRP review of the responses to the technical elements listed below. The Council is looking for a full explanation of how the project is consistent with these elements. The Council revised the original review elements, developed in 1997, to better reflect and clearly refer to the 2000 Fish and Wildlife Program (e.g., artificial production and subbasin assessment protocols). The Council specified that the ISRP apply these elements or similar standards as a reflection of the current state of the science. Some of the questions identified for response in the review summary section above were extracted from the reviewer comments below, so there is some repetition.

A. All Projects

Does the Sekokini Springs Master Plan:

1) address the relationship and consistencies of the proposed project to the eight scientific principles (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section B.2) (Step 1)?

The eight Scientific Principles of the Council's 2000 FWP:
1. The abundance, productivity, and diversity of organisms are integrally linked to the characteristics of their ecosystem.
2. Ecosystems are dynamic, resilient and develop over time.
3. Biological systems operate on various spatial and time scales that can be organized hierarchically.
4. Habitats develop, and are maintained, by physical and biological processes.
5. Species play key roles in developing and maintaining ecological conditions.
6. Biological diversity allows ecosystems to persist in the face of environmental variation.
7. Ecological management is adaptive and experimental.
8. Ecosystem function, habitat structure and biological performance are affected by human actions.

ISRP Comments: Reviewers could not find a section that specifically relates the Sekokini Springs Master Plan with the eight Scientific Principles in the Fish and Wildlife Program, but the Master Plan and the Hungry Horse Mitigation Program upon which it is based, seem consistent with all the principles. Many of the eight principles are covered indirectly in sections of the Master Plan; for example, the Section 5.2 (Life history and population biology of west slope cutthroat trout), and Chapter 6 (Limiting factors) address a number of the principles. Nothing is proposed that seems inconsistent with the eight principles.

2) describe the link of the proposal to other projects and activities in the subbasin and the desired end-state condition for the target subbasin (Step 1)?

ISRP Comments: Other related projects and plans are briefly summarized in Section 1.4 of the Master Plan and are discussed where appropriate throughout other sections. There is assertion in Chapter 2, Section 2.2 that the Master plan addresses or is consistent with the Hungry Horse Mitigation Program, a 1999 MOU "Conservation Agreement for westslope cutthroat trout", and a landscape approach to artificial production. The end-state condition that seems to be desired via this Master Plan is the production of hatchery westslope cutthroat trout to mitigate for the "loss" of 65,000 migratory westslope cutthroat trout per year from the Flathead Lake populations. The Council has apparently approved that loss estimate, and the project sponsors claim an additional 175,000+ juveniles are lost due to Hungry Horse Reservoir. However, it would be helpful if Chapter 2, Section 2.2 specifically identified the "end state" for westslope cutthroat trout in the Flathead Subbasin plan and identified the extent to which this action would further achieving that end state. This section of the Master Plan could be much more informative if it identified what portion of the goals of other plans and actions were going to be met by the production from Sekokini Springs. As an example, the Hungry Horse Mitigation program is to replace "losses of 65,000 juvenile westslope cutthroat trout annually using habitat restoration, dam operation changes, harvest management and experimental hatchery techniques". It would be useful to clearly identify at this point what portion of that 65,000 fish were to be attributed to each of these activities, and identify the portion assigned to Sekokini Springs. Similarly for the Conservation Agreement for westslope cutthroat trout, the specific elements of the agreement that Sekokini Springs intends to meet should be identified.

3) define the biological objectives (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section C.2 (1) and (2), and Technical Appendix) with measurable attributes that define progress, provide accountability and track changes through time associated with this project (Step 1)?

ISRP Comments: Biological objectives are generally defined; however, specific measurable attributes are needed. Fish production goals are spelled out, but the performance assessment of those cutthroat trout released is only sketchily addressed in section 4.7. The monitoring and evaluation is overly general and does not identify measurable attributes that could be used in a decision tree. See the more detailed comments in the monitoring section below.

4) define expected project benefits (e.g. preservation of biological diversity, fishery enhancement, water optimization, and habitat protection) (Step 1)?

ISRP Comments: Expected project benefits are generally defined (e.g., restoration of wild cutthroat trout populations and perhaps their eventual harvest). The Master Plan would be improved if these very general project benefits were developed into specific measurable attributes.

5) describe the implementation strategies (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.2) as they relate to the current conditions and restoration potential of the habitat for the target species and the life stage of interest (Step 1)?

ISRP Comments: The Life History and Limiting Factors sections of the Master Plan address this indirectly. Some implementation strategies are described in the Master Plan that cover collection of juveniles from "donor" streams and their use in hatchery operation. However, procedures are only minimally mentioned for release of fish (eggs and yearlings) into streams. Selection of donor streams and streams for release might be subjective, but the M&E should be on a broader scale, i.e., whole watersheds/subbasins. See above.

6) address the relationship to the habitat strategies (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.3) (Step 1)?

ISRP Comments: Chapter 6, Section 6.2 describes habitat studies, assessments, and provides a table of completed and proposed habitat restoration projects for westslope cutthroat trout in the Flathead drainage. How the fish releases from Sekokini Springs, or how these projects relate to achieving either the Flathead subbasin plan or Hungry Horse Mitigation Program objectives needs to be better described.

7) ensure that cost-effective alternate measures are not overlooked and include descriptions of alternatives for resolving the resource problem, including a description of other management activities in the subbasin, province and basin (Step 1)?

ISRP Comments: The Master Plan has a section describing some alternatives and how the preferred alternative was selected, but the efficacy of alternatives and their respective comparative costs were not well developed. Two options, the Sekokini facility and another facility out of the basin at Washoe Park, are discussed. Other options are not adequately considered including:

- Transplantation of juveniles from donor streams directly into the "new" streams ready for them.
- Holding fish from streams in PVC tubes stream-side, spawning them, and using the gametes elsewhere. If this were done, using Sekokini Springs to house males (or both sexes) collected from streams to obtain milt (sperm cells) to cross into the M012 broodstock could potentially be unnecessary.

There was not a full exploration of the success and use of translocation of natural juveniles and adults of resident *Oncorhynchus* species. Paiute, Bonneville, Colorado, and greenback cutthroat trout, Gila trout, and golden trout have all been translocated – using both hatchery and naturally produced individuals. The literature should have summarized to justify the alternative they selected. References (*see Literature Cited Section below*) that will be helpful on western trout

translocation, reintroduction, and supplementation include Fischer and Lindenmayer (2000), Harig et al. (2000), Minckley (1995), Novinger and Rahel (2003) and Propst et al. (1992).

In addition to artificial production or relocation alternatives, it is not clear that the investment necessary to develop Sekokini Springs as proposed ($2.5 million for 35,000 fish produced per year?) is cost-effective. Use of the funds for habitat rehabilitation, suppression of competing salmonids, etc. might be more effective in augmenting cutthroat trout populations.

8) provide the historical and current status of anadromous and resident fish and wildlife in the subbasin most relevant to the proposed project (Step 1)?

ISRP Comments: The available historical and current status of westslope cutthroat trout is adequately described and the "loss" of fish following completion of the Hungry Horse project is discussed as justification for the proposed project. However, it appears from information available to the reviewers (Shepard et al. 2003, Oswald et al. 1995) that current status of westslope cutthroat trout is based on survey of "index sites" selected by subjective judgment. Monitoring for status and trend of westslope cutthroat trout in the entire target area should be augmented to include sites selected by a probabilistic sampling procedure. A good model is the EPA-EMAP sampling design currently being implemented for status and trend of anadromous species in three subbasins of the Columbia Basin (see the Council's FWP Project #35019 (Chris Jordan, Principal Investigator, NOAA Fisheries, "Develop and Implement An Integrated Subbasin-scale Status and Watershed-scale Effectiveness Monitoring Program for Salmonid Populations and Habitat as called for in the NMFS 2000 FCRPS Biological Opinion")).

9) describe current and planned management of anadromous and resident fish and wildlife in the subbasin (Step 1)?

ISRP Comments: In general, current and planned management of westslope cutthroat trout by MDFWP is clearly described, but, as stated above, specific planned management goals and how this Master Plan and activities will achieve those goals need to be improved/clarified. Management would change significantly if the species should in future be listed by USFWS as Threatened.

10) demonstrate consistency of the proposed project with NOAA Fisheries recovery plans and other fishery management and watershed plans (Step 1)?

ISRP Comments: NOAA recovery plans for anadromous salmon would likely not apply since the project is located above impassable dams. The review team believes the U.S. Fish and Wildlife Service has not yet issued recovery plans for bull trout. The Master Plan should confirm whether this is true. Consistency with the Hungry Horse Mitigation Plan, and various Montana westslope conservation plans is asserted. Sponsors should identify the specific elements of the Sekokini Springs Master Plan that are consistent with, and fulfill the goals and objectives, of other plans including the Flathead Subbasin plan, the Hungry Horse Mitigation

Program, and various westslope cutthroat trout conservation plans. The sponsors assert that the Master Plan is consistent with these plans, but the specific elements that achieve the consistency are not obvious. For example, the Hungry Horse Mitigation program is to replace "losses of 65,000 juvenile westslope cutthroat trout annually using habitat restoration, dam operation changes, harvest management and experimental hatchery techniques." Regarding desired end-state conditions, it would be useful to clearly identify what portion of that 65,000 fish were to be attributed to each of these activities, and identify the portion assigned to Sekokini Springs. What elements of the Conservation Agreement for westslope cutthroat trout and the Flathead Subbasin plan will be met by the Master Plan? If the actions taken within the Master Plan framework achieve their goals what is the general contribution to Montana westslope cutthroat trout conservation or restoration (i.e. will this represent securing 5%, 10%, 50% etc of the core genetic legacy for the species).

11) describe the status of the comprehensive environmental assessment (Step 1 and 2)?

ISRP Comments: There is an environmental assessment for the hatchery site. Reviewers are not sure whether environmental assessments of donor sites or stocking sites are adequate.

12) describe the monitoring and evaluation plan (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.9) (Step 1, 2 and 3)?

ISRP Comments: The M&E plans are minimal for fish performance post-hatchery, and the measures of success (Section 4.4.6) needs work. Specifically, the M&E plans needs to demonstrate evidence of a probabilistic sampling procedure to augment surveys for baseline status conditions and to monitor general status and trend in their entire target area for the future. Anadromous fish hatcheries funded through the Fish and Wildlife Program are held to a high standard, e.g., use of the EPA-EMAP probabilistic site selection procedures for estimation of status and trend of anadromous populations in pilot projects in the Wenatchee, John Day, and Upper Salmon Subbasins. Resident fish hatcheries should be held to the same standards, because this is the level and structure of monitoring needed to test project effectiveness.

Specific site selection protocols and field data collection procedures should either be given in detail or adequate references to published methods should be given. For a good example, project sponsors should refer to the Northeast Oregon Hatchery (NEOH) M&E plans for chinook submitted for funding by the Council's FWP.

13) describe and provide specific items and cost estimates for ten fiscal years for planning and design (i.e. conceptual, preliminary and final), construction, operation and maintenance and monitoring and evaluation (Step 1, 2 and 3)?

ISRP Comments: Reviewers found costs for construction, but none for operation and maintenance, or monitoring and evaluation.

B. Artificial Production Initiatives

Does the Sekokini Springs Master Plan:

1) address the relation and link to the artificial production policies and strategies (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.4 and Technical Appendix) (Step 1)?

Primary strategy: Artificial production can be used, under the proper conditions, to 1) complement habitat improvements by supplementing native fish populations up to the sustainable carrying capacity of the habitat with fish that are as similar as possible, in genetics and behavior, to wild native fish, and 2) replace lost salmon and steelhead in blocked areas.

The APR standards: [ISRP review note: most of these elements are covered by previous questions in the template, but the two elements in italics are not as redundant.]

- The purpose and use of artificial production must be considered in the context of the ecological environment in which it will be used. (See A.1 and A.6)
- Artificial production must be implemented within an experimental, adaptive management design that includes an aggressive program to evaluate the risks and benefits and address scientific uncertainties. (See A.12)
- Hatcheries must be operated in a manner that recognizes that they exist within ecological systems whose behavior is constrained by larger-scale basin, regional and global factors. (See A.1)
- A diversity of life history types and species needs to be maintained in order to sustain a system of populations in the face of environmental variation. (See A.1)
- *Naturally selected populations should provide the model for successful artificially reared populations, in regard to population structure, mating protocol, behavior, growth, morphology, nutrient cycling, and other biological characteristics.*
- The entities authorizing or managing an artificial production facility or program should explicitly identify whether the artificial propagation product is intended for the purpose of augmentation, mitigation, restoration, preservation, research, or some combination of those purposes for each population of fish addressed. (See A.3)
- Decisions on the use of the artificial production tool need to be made in the context of deciding on fish and wildlife goals, objectives and strategies at the subbasin and province levels. (See A.2)
- *Appropriate risk management needs to be maintained in using the tool of artificial propagation.*
- Production for harvest is a legitimate management objective of artificial production, but to minimize adverse impacts on natural populations associated with harvest management of artificially produced populations, harvest rates and practices must be dictated by the requirements to sustain naturally spawning populations. (see B.3)
- Federal and other legal mandates and obligations for fish protection, mitigation, and enhancement must be fully addressed. (See A.10)

See the 2000 FWP for details on Wild Salmon Refuges, Harvest and Restoration Hatcheries, and Experimental Approach.

ISRP Comments: The Sekokini Springs program does a good job of adopting the primary APR strategy. Generally, the Master Plan appears to meet the APR standards. Additional detail would improve the Master Plan for the following APR standards: 1) *Naturally selected*

populations should provide the model for successful artificially reared populations, in regard to population structure, mating protocol, behavior, growth, morphology, nutrient cycling, and other biological characteristics; and 2) *Appropriate risk management needs to be maintained in using the tool of artificial propagation*

1) Naturally selected populations should provide the model for successful artificially reared populations, in regard to population structure, mating protocol, behavior, growth, morphology, nutrient cycling, and other biological characteristics. The proposed program plans to employ protocols that reflect the diversity and dynamics of natural populations. Naturally produced juveniles would serve as broodstock, these fish would be reared in semi-natural ponds rather than raceways, and a "nearest neighbor" approach will be used to select donor and recipient streams. The plan would be improved by a more thorough description of the stock structure of westslope cutthroat trout. There is no comprehensive treatment of this topic in any chapter. In one location (and in an attached Leary and Allendorf report), genetic uniformity between upper Columbia and upper Missouri River populations of westslope cutthroat trout is asserted. In another location, there is a statement that two metapopulations of westslope cutthroat trout occupy the Flathead River, and in another (a Leary et al conservation plan) that every stream with pure fish is a population. It would be very helpful if the current understanding of the stock structure were described, and the proposed donor streams and recipient streams related to this framework.

2) Appropriate risk management needs to be maintained in using the tool of artificial propagation, Chapter 6, section 6.3 has a single paragraph summarizing the "risk" status of the Flathead River westslope cutthroat trout – asserting it is at moderate risk of extinction based on managers' determination. There is no formal risk assessment or risk management plan for the artificial propagation activities. Many elements of a risk management plan are included in the proposed production program (Chapter 4). Examples include the donor population collections, spawning protocols, and disease inspection protocols. Fish health issues seem to be particularly well described and thoroughly considered. One possible risk has not been addressed, and that is possible negative effects on remaining fish in the "donor streams" after up to 25% of their juveniles are removed. The age/size of juveniles to be taken is never stated. Because the removal is one-time only, and because most salmonid populations easily cope with large losses of juveniles as there is plenty of time for compensatory responses to more fully develop that help the surviving fish, such effects might be minor. This issue should be addressed and monitored. Furthermore, collecting 1000 juveniles from a single stream for broodstock should not be equated to a population size of 1000 for genetically effective size considerations. Many of these juveniles could be related. From an inbreeding and genetic drift consideration, collecting across age classes, and mating between ages, may be worth considering. A formal treatment of this in the breeding plan would be useful.

Adding a risk assessment/risk management plan chapter to the Master Plan would be beneficial. It need not be a lot of additional work; much of what is in the production program could be copied and pasted into this section. Having a clearly identified risk management section that duplicates other elements of the Master Plan would be redundant, but would serve to get the hatchery technicians and culturists to think about portions of their activities in a broader "risk" framework.

2) provide a completed Hatchery and Genetic Management Plan (HGMP) for the target population (s) (Step 1)?

ISRP Comments: An HGMP-RF (resident fish) is attached as an appendix. It is not signed by the authorizing agency (Montana Parks) and there is no indication of approval by USFWS.

3) describe the harvest plan (see 2000 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.5) (Step 1)?

ISRP Comments: The harvest information is quite general, but adequately describes westslope cutthroat trout angling programs. For the most part, fishing for westslope cutthroat trout is currently catch-and-release angling only in the Flathead Lake and River system. Section 5.3 page 80 states that "surplus fish will be reared to maturity and then outplanted in closed-basin lakes to provide angler harvest as part of Montana's Family Fishing Program. This topic needs to be more fully developed. How will decisions to produce "surplus" fish be made, and could this production subvert the primary intention of the facility to be used for westslope cutthroat trout restoration?

4) provide a conceptual design of the proposed facilities, including an assessment of the availability and utility of existing facilities (Step 1)?

ISRP Comments: The facility design is provided. An unidentified Rose Creek facility would be used for additional hatching/rearing of westslope cutthroat trout (page J-4) and further clarification of that is needed.

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