



**Independent Scientific Review Panel**  
for the Northwest Power & Conservation Council  
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**Memorandum (ISRP 2007-16)**

**October 23, 2007**

**To:** Tony Grover, Fish and Wildlife Division Director, Northwest Power and Conservation Council

**From:** Eric Loudenslager, ISRP Chair

**Subject:** Combined Step Review for Sekokini Springs Isolation Facility, Hungry Horse Mitigation, Project #199101903

### **Background**

At the Council's July 2007 request, the ISRP reviewed Montana Fish, Wildlife and Parks' (MFWP) revised Master Plan for the Sekokini Springs Isolation Facility (previously called the Sekokini Springs Natural Rearing Facility and Educational Center), Hungry Horse Mitigation, Project #199101903. The ISRP reviewed previous versions of the Master Plan and participated in direct discussions with the project sponsors regarding the ISRP's scientific concerns with the proposed project (see ISRP 2005-10, May 13, 2005<sup>1</sup> and ISRP 2005-4, February 4, 2005<sup>2</sup>). MFWP revised the previous Master Plan to address the ISRP's concerns and the Council's Three Step Elements. The revised Master Plan is intended to address release of westslope cutthroat trout (WCT) produced at the Sekokini Springs Isolation facility as mitigation for operating the Hungry Horse hydropower facility.

In the preliminary Master Plan review (ISRP 2005-4), the ISRP found that the Plan met criteria for mitigation; however, reviewers raised several questions and concerns with the Plan's scientific basis that needed a response before the ISRP could offer a final recommendation. Those concerns related to the efficacy of removing non-native threats (primarily other *Oncorhynchus* species or hybrids); the genetic effect of releases on historical levels and patterns of genetic-level variation; uncertainty of structure and composition of hybridizing populations; the efficacy of the "genetic swamping" approach; and the overall thoroughness of the monitoring and evaluation (M&E) protocol.

In the review of the subsequent draft (ISRP 2005-10), several additional questions and potential inconsistencies emerged. These, along with a partially satisfactory addressing of previously

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<sup>1</sup> Interim Reply: Combined Step Review for Sekokini Springs Natural Rearing Facility and Educational Center, Hungry Horse Mitigation, Project #199101903 (ISRP 2005-10, May 13, 2005):

[www.nwcouncil.org/library/isrp/isrp2005-10.htm](http://www.nwcouncil.org/library/isrp/isrp2005-10.htm)

<sup>2</sup> ISRP Preliminary Review of Sekokini Springs Master Plan (ISRP 2005-4, February 4, 2005):

[www.nwcouncil.org/library/isrp/isrp2005-4.htm](http://www.nwcouncil.org/library/isrp/isrp2005-4.htm)

raised concerns, led the ISRP to judge that the Master Plan failed to meet scientific criteria. Moreover, the logic pathway, including examination of alternatives, was not readily transparent. The ISRP recommended re-crafting the Master Plan toward a more exploratory project to rigorously test the proposed methods while in progress rather than a broad implementation of artificial and captive production followed by assessment after the fact.

The latter review also resulted in the convening of a teleconference to provide sponsors and reviewers an interactive feedback loop to present additional information and seek common understanding of the proposed activities. The meeting notes from this teleconference are available on Council's website: [www.nwcouncil.org/library/isrp/isrp2005-10.htm](http://www.nwcouncil.org/library/isrp/isrp2005-10.htm).

The issues identified, which were to be addressed in a full recasting of the Master Plan, included the need to:

- 1) clarify the intent and approach associated with choosing a geographical "nearest neighbor" population,
- 2) clarify the intent and approach associated with "genetic" v. demographic swamping,
- 3) focus on the current and "enhanced" M012 brood line,
- 4) consider habitat improvement and direct translocation of brood or sub-adults from suitable sources as an alternative,
- 5) develop and structure a thorough Monitoring and Evaluation program, and finally,
- 6) recognize the time-sensitive urgency for moving forward smartly and quickly.

## **ISRP Recommendation and Summary**

Overall Recommendation: Does Not Meet Scientific Review Criteria.

The project proposed in the current Master Plan has evolved over the past two-plus years. Even with the ISRP's ongoing examination of the project goals, actions proposed, measurable objectives, approaches and alternatives, we are unable to conclude that a transparent logic pathway or framework exists to achieve the project's primary purpose to re-establish non-hybridized populations of westslope cutthroat trout (WCT) in locations where existing hybrid populations threaten the status of adjacent non-hybridized WCT because they are expanding their range. Some portions of the Master Plan were strengthened or otherwise clarified in response to previous reviews or the teleconference (e.g., improved articulation of linkages to other related plans and activities). Ultimately, however, the ISRP concludes that the Sekokini Springs Isolation Facility Master Plan as yet *does not meet scientific review criteria* largely because the proposed benefits to fish and wildlife continue to be unquantifiable. Specifically, the plan does not establish what success is or describe a timeline for achieving it. As a result, M&E is only broadly described and thus ill-defined relative to a specific set of measurable objectives. Consequently, the project and facility have an undefined period of operation.

Ultimately, the Sekokini Springs Master Plan fails to provide sufficient information for us to conclude that the totality of actions proposed – from chemical removal of hybrid trout populations from lakes and streams (conducted under Hungry Horse Mitigation) through WCT

collection followed by either translocation or progeny production and release – is likely to succeed at re-establishing non-hybridized populations. The ISRP does appreciate that there is a potential for removal of hybrid individuals by chemical or physical means and replacement by genetically pure westslope cutthroat trout propagated at Sekokini Springs. The Master Plan, however, does not lay-out a clear set of tasks to get from the current state of the resource to the desired future state, with specified time frames. In sum, the essential details are missing regarding the strategies and locations of chemical treatments and locations of barriers to stem/reduce hybridization threats from rainbow trout (RBT) and Yellowstone cutthroat trout (YCT). M&E is not adequately described to be able to determine levels of success from actions.

The central goal to the project is to reestablish and restore a secure enclave (as one of five identified as critical in the multi-agency conservation agreement) of wild aboriginal and monophyletic populations of WCT in tributaries of the South Fork of the Flathead River, near and around Hungry Horse Reservoir. Along with degradation of historic habitat, a primary direct and proximate-level threat to the Flathead River meta-population is from introgressive hybridization with now-ceased transplantation of non-native *Oncorhynchus* species, especially RBT and YCT, into headwater lakes. Hybrid trout are emigrating from the lakes into outlet streams and from these sites could spread throughout the watershed.

The primary actions proposed in association with the project will be a mix of 1) eradication of hybrid swarms and strongholds of RBT and YCT adjacent to targeted stream reaches; 2) on-going habitat rehabilitation where needed and appropriate; 3) reintroduction of WCT transplants or propagated progeny from a tested and confirmed monophyletic and local gene pool, which are also disease-free; and 4) installing barriers to reinvasion by hybrids or other non-native trout species where feasible. The sponsors propose to renovate and operate the Sekokini Spring Isolation facility to directly support the third action described above.

The Sekokini Springs facility can produce and handle about 110,000 smolt-size progeny per year. Some number of direct transplants will be collected from candidate sources within the South Fork Flathead Subbasin, brought to the Sekokini Springs facility, and tested for phyletic identity and health status for pathogens of concern. Those with desired phyletic identity and health status can be maintained in the facility for direct release into rehabilitated stream reaches or lakes. Moreover, additional propagated progeny of M012 brood interbred with monophyletic local stocks will be maintained for release with occasional inclusion of gametes from the 3-4 identified monophyletic strongholds.

The current draft of the plan partially addresses several issues identified in the previous ISRP reviews. First, in regard to the removal of non-native threats; we specifically asked whether the current draft of the Master Plan provided evidence “... 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)?” Here, the Master Plan articulates a proposal aimed at a rotation of chemical or mechanical removal in two to three lakes per year followed soon after by repopulation/reintroduction with WCT. The ISRP acknowledges that reducing the threat to westslope cutthroat trout posed by hybrid subpopulations is daunting because the success of removing the hybrids is uncertain, the success of reintroducing westslope

cutthroat trout is uncertain, and the geographic locations of hybrid subpopulations are expanding yielding an increased sense of urgency to the project. On page 89 there is some discussion of experience with chemical treatment of lakes, but none with streams. This discussion needs to be more thorough in providing the number of lakes that have been treated in the recent past, what is the proportion of successful treatments, how often multiple treatments may be needed, and how these will be determined.

Second, in regard to composition and structure of the introgressed populations, the ISRP asked does the current Master Plan present information on "... the composition and structure of introgressed 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)?" Here, reviewers we were unable to glean additional information on this subject. Available, perhaps, from existing data and results, this information would provide key insights about the chances of success from removals as well as key baseline information prior to treatment.

Third, in regard to the uncertainty of genetic effects from the proposed actions, does the Master Plan address "how broadcasting the young from a generic M012 brood across watersheds and populations would 1) prevent homogenization of important divergences among populations in the short term and 2) interfere with local adaptations?" Here, the sponsors clarify why a greater number of local, drainage-specific stocks could not be constructed - ultimately because of the absence of suitable monophyletic stronghold populations. Along with the intent to rotate in allelic diversity from gametes of three to four known sources uncompromised by introgression with RBT or YCT. Evidence is not provided, however, that the sponsors have had success with westslope cutthroat trout reintroduction using the M012 broodstock maintained at the Washoe Fish Hatchery.

Fourth, in regard to the utility of a "gene-swamping" approach, does the Master Plan address "...the efficacy of the "genetic swamping" approach to restoring native biodiversity?" While this approach has been greatly toned-down in this draft (based on discussions in the teleconference notes), a related concept of demographic "swamping" has been substituted (e.g., page 69). This approach suffers from a similar concern as the original genetic swamping in that as presented it is an intriguing hypothesis, but no summary data or references are provided as to its overall efficacy as an effective measure to combat problems by the persistence of brook trout as competitors or RBT and introgressants as breeders following an incomplete eradication in targeted locations.

Fifth, we identify a set of related issues regarding the monitoring and evaluation protocol. For example, the Master Plan would benefit from a clearer presentation of the specifics. In the present draft, the M&E plan is largely very generally presented. A key exception has been the considerable front-end genetic surveys to identify monophyletic WCT populations. The technology of collecting and testing trout for direct translocation or producing progeny for subsequent translocation to renovated streams and lakes is feasible and appears consistent with the Council Fish and Wildlife Program. Needed even here, however, will be some post-release effort to assess whether the releases succeed in establishing a self-sustaining population and whether hybrids were effectively removed or isolated. Fundamentally, the M&E should answer

the question of whether (or not) renovated lakes or streams support self-sustained populations of WCT following eradication and repopulation.

More generally, the M&E plan as outlined in Chapter 8 suggests that some variables will be measured, but no real information is provided as to what specifically will be monitored as indicators of success (or not) relative to explicit, measurable objectives. We reiterate our previous recommendation that M&E plans should include methods, protocols, as well as the kinds of data collected, and specific hypotheses to be tested. We do not recommend measuring everything but rather those variables that can permit judgment as to whether the treatment(s) have worked or not.

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. The ISRP recognizes the considerable logistical challenges associated with this undertaking, especially the effect and legacy of former trout introductions; however, the sponsors need to articulate a logic pathway that links specific measurable objectives with proposed treatment. The objectives require measured variables or indicators that will be collected in a manner that permits detection of treatment effects. From this, future actions can be adapted to account for such real world responses.

Finally, the Master Plan failed to address a few issues previously identified as well as instances where some internal inconsistencies are significant. For example, in the notes from the teleconference between the ISRP and sponsors, the ISRP identifies that the Sekokini Springs facility is needed to create distinct local populations for reintroduction, and that this would be done on a rotating basis. Also in the teleconference notes, the ISRP indicates there needs to be an explanation that the proposed tasks can achieve the program goals using the Sekokini Springs facility within a realistic time period. This has not been incorporated in the Master Plan. In fact, this draft of the Master Plan does not state how many different stocks (or strains) can be simultaneously reared at Sekokini Springs and how a production schedule at Sekokini can meet the needed stocking schedule for the lakes identified in Table 4-5 on page 71.

Also, the Master Plan appears to choose streams for renovation more on their accessibility than on their strategic importance. For example, the plan proposes reintroduction in Abbott, Haskill, and Rabe creeks and Gooderich Bayou without providing a rationale for the selection of these sites or identifying the source population for translocation (except in the case of Haskill Creek which will involve a reintroduction from non-hybridized individuals isolated within Haskill Creek itself). Page 31 of the Master Plan indicates that Haskill Creek will be the source of the first genetic strain to be collected, reared, and spawned for reintroduction. The benefits to westslope cutthroat trout conservation from this renovation is not transparent and reinforces our uncertainty about the Plan's capacity to achieve the primary benefit of protecting the non-hybridized populations in the Southfork Flathead from colonization by hybrid individuals.

The Master Plan indicates that four lakes in the South Fork Flathead River watershed will use the Sekokini Springs facility to produce trout for restocking once hybrid eradication is completed. Three of these lakes, Koessler, Lick, and George are in the Gordon Creek watershed. Gordon

Creek is identified in one section of the Master Plan as a source of parental fish to produce trout fry for restocking these lakes (page 53, section 4.3.1). However in section 4.3.2 Genetics and Fish Health Status of Donor Stock Streams (page 61), the sponsors identify that samples from Gordon Creek collected in 2005 included hybrid individuals and that Gordon Creek was no longer being considered a potential source of parents. The sponsors identify that Doctor Lake will be tested to see if it can be used as a source to collect juvenile trout to rear at Sekokini Springs. These inconsistencies within the Master Plan need to be reconciled in any revision.

## Peer Review Questions for Three-Step Review

### Attachment I: Program Language Regarding Master Planning Requirements

#### 7.4B.1 Master Planning

Because of the need to address potential conflicts among increased production, mixed-stock harvest, gene conservation, consistency with other plans and other objectives, the Council calls for detailed master plans where there is not a National Environmental Policy Act document that provides enough information to evaluate new artificial production projects. Below, the Council provides a suggested list of master plan elements. This list is intended to offer guidance, not to impose requirements. Not all of these elements may be relevant in all projects, and some unlisted elements may be important. In general, however, the following elements should be considered in the course of master planning:

- project goals;

ISRP: Project goals are consistent with Council requirements – specifically to restore and secure a core set of native and self-sustaining westslope cutthroat trout populations within the South Fork Flathead subbasin (as one of five core units identified in multi-agency conservation documents).

- measurable and time-limited objectives;

ISRP: Objectives that are measurable and time-delineated are not explicitly stated. This remains a critical omission in the plan. See main body of Memo for specific comments.

- factors limiting production of the target species;

ISRP: The factors limiting natural production of monophyletic westslope cutthroat trout in the project area are well understood by the agency, are clearly discussed in the Flathead Subbasin Plan, and summarized in the Master Plan. The Master Plan describes the loss of aboriginal species identity through hybridization with introduced rainbow trout and Yellowstone cutthroat trout as immediate threats.

- expected project benefits (e.g., gene conservation, preservation of biological diversity, fishery enhancement and/or new information);

ISRP: Securing a core set of WCT populations in the Flathead subbasin would have significant benefits and value in regard to maintaining genetic level spatial biodiversity if restored populations reflect historical levels and patterns of diversity in the 21 problem lakes. Additional benefits would accrue from eliminating the expanding pockets of non-native trout. The description of where secure enclaves of WCT could be established, however, as well as the strategy and time frame for reaching this objective is not specific enough within the Master Plan to establish benchmarks for performance or amendable to peer review.

- alternatives for resolving the resource problem;

ISRP: The problem is two-fold. 1) expanding hybridization (threat) and 2) loss of native WCT (consequence). First and foremost, the source(s) of the threat needs to be halted – primarily through eradication and perhaps barriers. Once achieved, the second part of the problem can be addressed. The Sekokini Springs Isolation Facility could be used both to rear replicate trout and play a critical role in direct translocations. The situation that faces the sponsors has been inherited as a legacy of historical activities, which have no easy answers for which results will be achieved quickly. Thus, a deliberate and cautious approach is warranted to avoid potential pitfalls such as those being experienced currently with greenback cutthroat trout in Colorado.

- rationale for the proposed project;

ISRP: There is a sound rationale for the project based on some basic assumptions, but the specific actions and the manner of evaluation beyond the physical refurbishing of the Sekokini Springs facility is inadequate to evaluate whether the project could achieve its intended benefits. Specifically, there are no quantified goals – for example – securing WCT in X number of enclaves by 2020. Moreover, a timeline for production and meeting objectives is not described. This project may require 10-12 years to complete the cycle of eradication and repopulation, although this is not explicitly stated.

- how the proposed production project will maintain or sustain increases in production;

ISRP: The project is a re-introduction effort where increases in cutthroat populations would be sustained by natural reproduction following project activities (that include removal of non-native trout and habitat restoration if appropriate). There may be cases where follow-up efforts would be needed to address either incomplete eradication or unsuccessful re-introduction.

- the historical and current status of anadromous and resident fish in the subbasin;

ISRP: The plan addresses the status and trends of WCT in the Subbasin (and project area) adequately.

- the current (and planned) management of anadromous and resident fish in the subbasin;

ISRP: Management of westslope cutthroat trout in the subbasin is complicated considerably by potential conflicts between the interests of biodiversity conservation (which is the primary reason for this project) and some recreational angling interests. At this time many of the locations that are inhabited by hybridized populations of “trout” are available for recreational angling. At least a portion of the anglers do not really care whether they are fishing for westslope cutthroat trout, hybrids, Yellowstone cutthroat trout, or rainbow trout. To generate public support for using piscicides to remove hybrid populations the specific tasks need to be organized to minimize impacts to recreational activities. This makes achieving the project benefits more difficult and less likely. For example, in locations with several lakes with hybrid

fish populations that are producing fish that are colonizing down stream habitats, not all lakes will be treated in a given year, so fishing in the general vicinity will be maintained. This has the effect of maintaining the likelihood that hybrids will continue to colonize the stream after the initial effort to remove hybrids.

- consistency of proposed project with Council policies, National Marine Fisheries Service recovery plans, other fishery management plans, watershed plans and activities;

ISRP: The concept of removing hybrids and replacing them with non-hybridized westslope cutthroat trout (monophyletic identity) is consistent with Council policy, the Montana westslope cutthroat management plan, and the Flathead subbasin plan. The Master Plan discusses the general linkage between this project and management plans. How this project specifically will meet the objectives of those plans is not sufficiently detailed. The ISRP is aware that removal of hybrid individuals from Jewel Basin lakes is underway. The support the Sekokini Springs Isolation Facility provides for this effort is not adequately addressed in the Master Plan.

- potential impact of other recovery activities on project outcome;

ISRP: The effectiveness of the chemical eradication efforts in the 21 lakes will have a significant influence on whether this project can succeed. These efforts are critical to remove the primary direct threat to WCT. Moreover, the effectiveness of preventing re-colonization by hybrids or non-natives will influence the longer term prognosis. Thus, maintaining barriers (where feasible and appropriate) to re-colonization and preventing angler-based (illegal) transfers will be vital.

- production objectives, methods and strategies;

ISRP: The production objectives are inadequate. The production capacity of facility and the number of stocks (strains) that can be developed over time is not presented. How the production plan can meet the overall management objectives for reintroduction of non-hybridized WCT is inadequate.

- brood stock selection and acquisition strategies;

ISRP: The methods of collecting fish, testing them for identity and disease status is sufficient. The use of the M012 brood will remain a source of contention. The history of the brood (primarily Flathead populations with some Clark Fork populations, as well as several generations of captivity) indicates that it carries some significant risks in this case. The absence of an observed hierarchical pattern of population relationships is presented as justification for using M012 as a generic brood with proposed rotation of gametes from local monophyletic sources. Ultimately, this brood may prove to be the “best” or only source; however, no direct experimental comparison with other more local sources is proposed to demonstrate this proposition.

- rationale for the number and life-history stage of the fish to be stocked, particularly as they relate to the carrying capacity of the target stream and potential impact on other species;

ISRP: The production numbers for each strain are given in table 3 – 1 on page 30. How these fish are used to meet the stocking schedules for streams (Table 4-4) or lakes (Table 4-5) is not clear. Sponsors point out that the numbers of fish at different life-stages that are appropriate to stock in streams and lakes are unknown. Consequently, this aspect of the project should be subject to risk assessment and management. The long-term research monitoring and evaluation plan (Chapter 8) states they will evaluate various reintroduction strategies but presents no hypothesis to be tested, basic strategy or design of evaluation, or metrics to be measured.

- production profiles and release strategies;

ISRP: Release strategies are adequately discussed. The numbers of fish release, and how they are produced and related to the fish production plan (Table 3 – 3), is not clear.

- production policies and procedures;

ISRP: Feeding juvenile trout at the facility remains a serious unresolved issue – how to supply “natural” food that will induce newly captive fish to feed, and then to sustain good growth. Artificial feeds and other departures from more natural stream/lake conditions have established records for reducing success of releases.

- production management structure and process;

ISRP: The selection of donor streams (lakes) and how they relate to producing fish for tributary watersheds that are of high priority for the creation of secure enclaves is inadequately covered in the Master Plan. The discussion of management for genetic and disease background is adequate.

- related harvest plans;

ISRP: Some harvest might occur in future if program is successful. The constraints that ongoing recreational angling creates are not thoroughly discussed in the Master Plan. The role of harvest as a management objective is discussed adequately in the Master Plan.

- constraints and uncertainties, including genetic and ecological risk assessments and cumulative impacts;

ISRP: The Master Plan did not adequately discuss the constraints and uncertainties attendant with the project. Specifically, they did not present any review of similar efforts with greenback and Bonneville cutthroat trout, Gila trout, Arizona trout, or Golden trout, and identify how they had considered the mixed success of those efforts into the planning process for the selection of donor populations and recipient watersheds for reintroduction. The Master Plan did not adequately discuss the experience sponsors have had with chemical removal of fish populations and their experiences (as well as data/results) with demographic or genetic swamping.

- monitoring and evaluation plans, including a genetics monitoring program;

ISRP: Most issues are more extensively addressed in ISRP summary comments. An additional comment not addressed in those comments, however, focuses on the need to focus monitoring (whether genetic, disease, etc.) not only at the isolation facility but in the recipient waters.

- conceptual design of the proposed production and monitoring facilities, including an assessment of the availability and utility of existing facilities; and

ISRP: The concept of using artificially produced native trout to recolonized treated habitats is scientifically sound, although it has a mixed history of actual success. The assessment of Sekokini Springs as a rearing site that meets disease isolation standards in Montana is adequate. There was no assessment that demonstrated that fish production and stocking could actually achieve the objects of creating secure enclaves of westslope cutthroat trout.

- cost estimates for various components, such as fish culture, facility design and construction, monitoring and evaluation, and operation and maintenance.

ISRP: Cost estimates for refurbishing Sekokini Springs are provided.

## **Attachment II: Questions Identified in the September 1997 Council Policy Document for FY98 Project Funding**

- Has the project been the subject of appropriate independent scientific review in the past? If so, how has the project responded to the results of independent review?

ISRP: Modifications to the Master Plan were made in a manner generally responsive to reviewers concerns.

- Have project sponsors demonstrated adequately at earlier stages that the project is consistent with the Council's policies on artificial/natural production in Section 7 (the specific concern of the Panel)? If not, can these points be demonstrated now?

ISRP: Yes.

- Is the final design of the project consistent with any master plan and preliminary design?

ISRP: Not applicable.

- If not, do the changes raise any underlying scientific questions for further review?

ISRP: Not applicable.

- Has information about the project or its purposes changed in such a way to raise new scientific concerns?

ISRP: Not since the last ISRP review.

- Has the underlying science or the way it is understood changed so as to raise new scientific issues?

ISRP: Not since the last ISRP review.

- How technically appropriate are the monitoring and evaluation elements of the project?

ISRP: The monitoring and evaluation elements are overly vague. It is not possible to determine whether the M&E is sufficient to determine the efficacy of the tasks or the overall benefits of the project.

- Are there ways to obtain the same production benefits with facilities that are lower in cost or less permanent, should monitoring and evaluation later indicate that the effort be abandoned?

ISRP: None that are known.

### **Attachment III: Program Language Identified by the ISRP**

- Measure 7.0D: Comprehensive environmental analysis assessing the impacts on naturally produced salmon of hatchery produced anadromous fish.

Measure 7.0D of the Council's 1994 Fish and Wildlife Program calls for a comprehensive environmental analysis assessing the impacts on naturally produced salmon of hatchery produced anadromous fish. The primary question we would like to have addressed with regard to the project is, does the environmental assessment adequately deal with the question of interactions of hatchery-produced salmonids and naturally spawning salmonids and steelhead in the Columbia River Basin? If so, how? If not, what are the potential or posited interactions and impacts?

ISRP: The project does not involve anadromous fish. Ecological interactions could occur between re-introduced WCT and bull trout; however, both species are native to the basin such that interactions are not expected to be novel or deleterious. Other ecological interactions are adequately discussed in the Master Plan.

- Measure 7.1A: Evaluation of carrying capacity and limiting factors that influence salmon survival.

Measure 7.1A of the Council's 1994 Fish and Wildlife Program calls for a basin-wide study on the ecology, carrying capacity, and limiting factors that influence salmon survival. The primary question we would like to have addressed with regard to this measure is how does the project

intend to address the issue of carrying capacity within the watershed(s) into which fish will be placed? Do these fish originate from the most appropriate native stock? Specifically, how will the artificial production which is proposed, impact natural production? What are the impacts on mainstem and ocean harvest? How are these impacts addressed?

ISRP: The sponsors recognize carrying capacity as an uncertainty. They propose to evaluate different reintroduction strategies but did not appear to have M&E to assess stocking protocols as a function of carrying capacity.

- Measure 7.1C: Collection of population status, life history and other data on wild and naturally spawning populations of salmon and steelhead.

Measure 7.1C calls for the collection of population status, life history and other data on wild and naturally spawning populations of salmon and steelhead. The primary question we would like to have addressed with regard to this measure, especially with regard to listed species is, what biological baseline information on naturally spawning populations of salmon and steelhead have been collected, and what high priority populations and “provisional population units” have been identified? Does this baseline information include a profile on the genetic and morphological characteristics of wild and naturally spawning populations? What characteristics are to be maintained by management actions? What are the limiting factors for wild and naturally spawning populations? What is the natural carrying capacity for the identified populations? What monitoring of identified populations of salmon and steelhead is identified as part of the project? Are these efforts being coordinated with NMFS? If so, how?

ISRP: The Master Plan adequately summarizes life-history information on WCT. There is also adequate discussion of genetic diversity and the status of populations based on relative abundance in various tributary location. Since this is a resident fish species above the “blocked area” the ISRP understands that NMFS (NOAA Fisheries) would not be involved in coordination. There is a westslope cutthroat trout management plan that involves a number of federal, tribal, and state agencies. The Master Plan discusses the general linkage between this project and those management plans. How this project specifically will meet the objectives of those plans is not sufficiently detailed. That is, how are priority enclaves established in those management plans, and then how are they reflected in the Sekokini Springs Master Plan?

- Measure 7.1F: Systemwide and cumulative impacts of existing and proposed artificial production projects on the ecology, genetics and other important characteristics of the Columbia River Basin anadromous and resident fish.

Measure 7.1F calls for a study to address the system wide and cumulative impacts of existing and proposed artificial production activities on the ecology, genetics and other important characteristics of Columbia River Basin anadromous and resident fish. This study is to be coordinated with the genetic impact assessment of Columbia River Basin hatcheries called for in measure 7.2A.2 of the Council’s program. How does the projects environmental assessment address the direct, indirect and cumulative effects of the proposed production activities on

anadromous and resident fish? Have those effects commonly associated with cumulative hatchery releases -- density dependent, competition, predation, disease transmission and genetic effects on other fish in the mainstem and oceanic environments been addressed? If so how? Have the genetic effects of the project on fish within and outside the Columbia River Basin been specifically addressed?

ISRP: The Master Plan discusses demographic and genetic considerations in the selection of donor sites and demographic considerations in broodstock collection protocols. Demographic and genetic monitoring is outlined in the Master Plan.

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