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Review of the

Cassimer Bar Hatchery Program Master Plan

Project # 2007-21-200

Step One of the Northwest Power and Conservation Council's Three-Step Review Process

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ISRP Step-One Review of the Cassimer Bar Hatchery Program Master Plan

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Background

At the Northwest Power and Conservation Council's December 2008 request, the ISRP reviewed the Confederated Tribes of the Colville Reservation's (Colville Tribes) Cassimer Bar Hatchery Master Plan, Project # 200721200. This is a Step One review in the Council's Three Step Review Process. Step-One is the feasibility stage, and all major components and elements of a project should be identified. This review focuses on the Colville Tribe's responses to the Step-One scientific review elements specified by the Council (Chapter 3, sections 3.1 and 3.4, pages 17 - 31 of the Master Plan provides a reference to the review elements).

The proposal for this project, *Develop a locally-adapted summer steelhead program to supplement natural production throughout the Okanogan River basin,* was reviewed in the FY 2007-09 project selection process. The ISRP's comments were:

> The ISRP recommends funding this project at a base level in order to proceed with the Three-Step process and development of the Step-One documents and analysis. The Three-Step process will provide an opportunity for the review team to examine the proposed project in considerably greater detail than is possible in the FY 2007 process. The in-depth review process by the Three-Step process is appropriate and should lead to recommendations on how and whether to proceed into implementation.
>
> The project has demonstrated some early results of returns to Omak Creek that appear on the surface to be positive. Of course numerous questions arise such as "have these returns led to any increase in natural production?" and other related concerns the ISRP/ISAB have identified with supplementation. Does the OSP have EDT or other analysis that identify major limitations? The sponsors should consider including include AHA modeling in the Three-Step process.

Review Summary and Recommendations

Does Not Meet Scientific Review Criteria

At this time, the Cassimer Bar Hatchery Master Plan does not meet scientific review criteria for the Step-One review process. Based on information presented in the Step-One Master Plan, and information the ISRP obtained from the Upper Columbia Spring Chinook and Steelhead Recovery Plan and Hatchery Scientific Review Group Report, the Okanogan River summer steelhead population is not currently self-sustaining primarily because of limited habitat and capacity for overall productivity. For this reason, an integrated artificial production program is not reasonably likely to produce the desired and expected outcomes – integrated programs require a self-sustaining natural population. Consequently the Master Plan is not scientifically defensible because the goals cannot be achieved due to inadequate habitat capacity in the subbasin.

Generally, the Master Plan needs to be revised and submitted again for Step-One review. The revised plan needs to address data deficiencies and include further research and analysis.

Moreover, the conservation and harvest objectives initiated in the Cassimer Bar Hatchery Master Plan need to be based on the existing and anticipated future environmental conditions in the subbasin to be scientifically defensible. The ISRP recommends developing a plan using rationale similar to that used by this same group for summer/fall Chinook and the Chief Joe Hatchery Master Plan, currently in review. Specifically, the plan must provide the following:

1. Development of a Clear Logic Path

The Cassimer Bar Hatchery Master Plan needs to clearly present a road map for getting from the existing Wells summer steelhead hatchery program to the proposed within-subbasin Cassimer Bar Hatchery program.

There is a need to establish the current and near-term capacity of the subbasin to support summer steelhead, and then use that estimate as the basis to develop any artificial production activities supporting conservation and restoration. There seems to be honest differences in opinion about the status of the subbasin capacity, owing to a paucity of data. The Upper Columbia Spring Chinook and Summer Steelhead Recovery Plan calls for 500 summer steelhead in the United States and 500 summer steelhead in the Canadian portions of the subbasin for a total of 1000 adult steelhead. These are recovery planning goals, however, and not empirical estimates of habitat capacity. More to the point, the recovery plans integration section (Appendix I) concludes that the needed improvement in life-cycle survival to achieve this delisting criteria would require between 467% to 846% improvement, but that harvest, hatchery, and habitat actions are anticipated to yield between 125% and 164% improvement (UCRSRB 2007a). Appendix C of the recovery plan (steelhead run reconstructions) reports an average of 55 (range 1 – 156) adult natural-origin steelhead with productivity of 0.82 to 2.28 if hatchery fish produce no adult offspring when spawning naturally, and with productivity from 0.07 to 0.12 if the hatchery fish produce adult progeny equally as well as natural-origin adults (UCRSRB 2007b). The Hatchery Scientific Review Group (HSRG) reports estimates habitat capacity at 168 adults and productivity at 1.65 (presumably density corrected spawner to spawner production) (HSRG 2009a).

2. Development of a Decision Management Framework

The sponsors need to develop a management decision framework based on an AHA modeling foundation that clearly defines the goals, the alternatives, the expected consequences, and evaluation procedure, and a schedule for implementation and monitoring. Presumably, a scaled or stepped approach to program development, as seen in the AHA modeling results from summer/fall Chinook, should be considered, where an endemic broodstock is developed, PNI values are eventually attained. The time frames for each scale or step of the approach must also be identified. It is unlikely that the adult recruitment from the combined natural and hatchery components would be sufficient to transition from a Wells supported hatchery program to an Omak (Okanogan) integrated hatchery and natural population with a PNI above 0.50 (the minimum threshold for a contributing population). It is not clear from the existing empirical data that a hatchery population could be self-sustaining in the Okanogan River at this time. The current hatchery returns appear to be sustained by ongoing introductions (stocking) from the Wells hatchery program.

3. Steelhead status and reproductive status

A thorough discussion of the recent status of steelhead is needed. It is uncertain from the current Master Plan what the status of steelhead is in the upper Columbia and the Okanagan subbasin. Quality and quantity of existing data need to be clearly presented, and deficiencies (gaps or lack of data) clearly identified, so that future data collection plans can provide a more thorough picture of the status of steelhead in the upper Columbia. For example, from the Master Plan, it appears there might not be any adult steelhead returns back to Omak Creek, but the sponsors should have data from 2004 releases to shed light on this.

A review and discussion of the current limiting factors within and out of the basin is also needed in the Master Plan. Indications are that a viable natural steelhead population does not exist. Apparently, a smolt-to-adult return rate >3.4% is required for recruitment replacement and above, whereas the current average is ~1%. From the data and other information presented, it is not obvious and seems unlikely that a wild population of spawners would be of sufficient numbers currently and into the immediate future (unless ocean conditions improved) to support smolt recruitment at levels needed to provide 1200 returning adults (1,000 adult steelhead for the recovery goal and 200 adult steelhead for tribal harvest).

Answers to questions about current parent-progeny ratios for wild and hatchery returns and whether hatchery returns produce viable offspring, and if so, what is that value relative to the wild population, are central to decisions on defining a scientifically sound Master Plan for the Okanagan Basin summer steelhead. If data are not currently available to answer these questions for Okanagan summer steelhead, modeling in AHA (the All-H Analyzer model) with estimates informed by a number of recent pertinent studies (see the various citations in the Literature Cited for Kostow and for Araki) may be a useful way to move the plan forward. In the absence of Okanagan specific steelhead data, many of the uncertainties in the Master Plan could be explored this way, including the question of the ability of hatchery spawners to generate “wild” smolts, which recent research indicates is unlikely (Kostow and Araki references). Other uncertainties include data on return rates from hatchery smolt releases which began in 2004. Information from these returns should be used to guide modeling and decision process. Information is also required on the fate and return rate of parr releases. The latter may have contributed little, and possibly may have had detrimental impact not only to wild fry and parr (if they exist), but to other species, including Chinook salmon.

Steelhead run reconstruction challenges are obvious because counts from Wells Dam are partitioned between the Okanogan and Methow (UCRSRB 2007a). Sponsors need better data to calculate reproductive success. Currently, it is calculated two ways. First, sponsors calculate with equal and no reproductive success for hatchery fish. This is a wide continuum. If there is no success and some wild fish come back, then stocking should be halted as it would be inconsistent with the ESA. If a wild steelhead population still exists, the sponsors need to recover that element and not cross it with steelhead from the Wells stock. The transition that the HSRG envisions in developing a locally adapted steelhead broodstock for the Okanagan subbasin (HSRG 2009) would be to use some Wells stock mixed into the returning steelhead collected in Omak Creek; however, if the Wells stock is not performing well reproductively, then crossing Wells fish with the remnant wild fish is not scientifically sound. On the other hand, if the remnant fish in Omak Creek and the Okanagan subbasin are just progeny of Wells stock, then

you have an extirpated group and this changes the range of strategies that may be supported scientifically.

The UCRSRB (2007b) described a simple analytical approach to integrating the effects of actions in recovery plans for Upper Columbia Basin salmon and steelhead stocks. Part of the analysis focuses on a "gap" analysis, with the gap defined as the change in survival from current conditions to conditions under which viability would be achieved. The UCRSRB gap analysis uses a 50% relative reproductive success of hatchery fish to wild - USRP steelhead assumption. This needs to be confirmed with data. NOAA came up with this, acknowledging the data limitations.

If the existing empirical data on Okanogan River steelhead are insufficient, then collecting this essential information should be built into the Master Plan and should occur before development of any artificial production plan. A potential first action would be to terminate the releases of Wells hatchery steelhead. This would provide information on whether a remnant steelhead population remains in the Okanogan, or whether the few fish that are present are the natural progeny of Wells hatchery steelhead.

4. Habitat

The Master Plan is particularly weak in this area. Section 5.2.1 discusses habitat management (pp. 48-49), but is extremely general in nature, listing numbers of habitat activities implemented in the Upper Columbia (1997-2006; p. 48) and a set of general objectives (p. 49); however, substantially more detail is needed within the Master Plan on the specific habitat projects that have occurred and those that are planned. Additionally, the habitat actions need to be directly linked to artificial production activities and timelines.

The Master Plan needs to present a complete picture of habitat issues in the subbasin that includes discussion of habitat factors currently limiting steelhead production and the habitat projects that are underway (ongoing or planned) to address these factors. While some of this information may exist in the Okanagan Subbasin Plan and in the Cassimer Bar Hatchery HGMP, it needs to be presented in the Step 1 document itself, rather than merely referred to in other documents.

The Master Plan needs to include more specific detail on what improvements to habitat parameters or water quality parameters have occurred to date as a result of these habitat improvement projects. Future habitat improvement activities need to be described in detail and linked via a table or timeline diagram to proposed actions and timelines in the hatchery program. This is needed because of statements in the Master Plan (referring to the Okanogan Subbasin Plan) that Omak Creek, Loup Loup Creek and Salmon Creek were estimated to have 80% of the United States portion of the subbasin's production potential. It is important to show that improvements to habitat in these systems will have occurred (or is occurring) as the production program develops so that suitable habitat and capacity exists to receive the anticipated increased numbers of returning steelhead adults.

5. Production Program Elements

The sponsors have chosen an integrated hatchery strategy to reach conservation and harvest goals, yet the Master Plan notes that (p. 8) 80% of the potential increase in steelhead production can come from habitat improvements in just three creeks: Omak, Loup Loup, and Salmon Creek drainages. If the conservation goal is 1000 adult fish, then this means that 800 can be expected to come from habitat actions alone. Does the difference of 200 adults justify a hatchery program with its expense and attendant genetic/fitness risks? That assumes there is a viable natural population remaining in the watershed, which there is not! Specific areas that need attention as part of the revision include the following.

a. Incorporate HSRG material.

The HSRG has recently produced several reports that bear on the Upper Columbia salmon and steelhead recovery issues and on the Cassimer Bar Hatchery master Plan (HSRG 2004, 2005, 2009a, 2009b, 2009c). In their review of the Okanagan summer steelhead program (HSRG 2009a) the HSRG concluded that the endemic steelhead stock in the Okanagan had been lost. It then lays out a potential staging strategy to achieve the UCRSRB's recovery goals (UCRSRB 2007c). Is this consistent with what has been proposed in the Master Plan? If not, how (and why) do the plans differ? How do the plans deal with consideration of the ecological interactions between hatchery and natural steelhead?

b. Monitoring and Evaluation of Production Program

The sponsors suggest (p. 78) that their program (and design) will test the hypothesis that by controlling gene flow within and between hatchery and natural environments, they can create a locally adapted steelhead population for the Okanogan subbasin. Near term objectives for the monitoring and evaluation (M&E) associated with this focus on controlling PNI values, which in turn reflect levels of gene flow between hatchery-origin and natural-origin steelhead in the hatchery and natural environments. The sponsors will not be able to test this hypothesis unless they are successful at the pedigree analysis they propose (p. 80, CBMP) and determine reproductive success for progeny (F_2) of NORxNOR, NORxHOR, and HORxHOR crosses.

c. Broodstock Development

The entire program is of questionable merit. If the Upper Columbia Spring Chinook and Summer Steelhead Recovery Plan steelhead abundance and run reconstructions are reasonable, the population/subbasin is unfortunately in a lose-lose situation. The spawning reaches are occupied by 90% hatchery adults and 10% natural adults. If the hatchery adults are producing progeny that survive and return as adults, then overall productivity is extremely low. Under that circumstance there really is no natural population to speak of, just naturally spawning hatchery adults that produce a few progeny. If on the other hand, the hatchery fish produce very few adult progeny, then you have a natural population below replacement at high risk of extirpation. Under that circumstance adding hatchery juveniles is likely to depress natural smolt production, and removal of natural adults for hatchery broodstock is not efficacious because their adult progeny will subsequently produce no offspring. On the other hand, if the Wells stock summer steelhead are not producing natural adults in the Okanogan River, then it would be unwise to use them as a source to interbreed with natural Okanogan fish to develop a broodstock.

The broodstock collection targets (Table 5-12) raise questions about the potential effects of this program on subsequent effective population size. In Loup Loup Creek only four fish are going to be collected for broodstock. When this subset is amplified by artificial production and they return and spawn, a Ryman/Laikre effect could result with consequently very low effective population size (see HSRG 2005). This could result in deleterious inbreeding effects. No justification for the collection of up to 50% of the adults for broodstock is provided.

An appropriate first action would be to cease scatter planting Wells stock summer steelhead in the Okanogan River and tributaries for a decade or so and emphasize habitat restoration. If the steelhead maintain themselves you will have a reasonable assessment of the ecological and reproductive contribution from Wells stock hatchery summer steelhead. If the steelhead disappear, you learn that all you had was feral Wells stock summer steelhead. That information can then inform any future program.

d. Acclimation Practices.
Some of the acclimation practices proposed in the Master Plan are questionable (i.e., the plan that the fish that remain in the acclimation ponds are to be forced into the stream). The sponsors need to provide evidence that acclimation sites are benefiting wild populations and directing hatchery returns to harvest areas. The current practice of emptying acclimation sites of parr and placing them directly into the adjacent areas may result in further disruption and damage to local ecology and natural production. The effect of residualized steelhead (smolts that fail to migrate) on program success and natural parr was insufficiently addressed in the Master Plan.

Parr which are not yet ready to migrate as smolts are believed to be leaving acclimation sites with smolts, but remain in the river. These yearling "residuals" may compete with and displace wild underyearling parr, but die over summer (likely due to physiological reasons). They may contribute little or nothing to subsequent smolt yields, while a few likely mature precociously and spawn with wild fish, thus decreasing fitness of wild spawners, and further confounding relative fitness comparisons. See also the recent discussion on residualism of steelhead in Kostow (2008). The ISRP did not find anything specific in the Master Plan for future monitoring of residual hatchery steelhead or evaluation of the potential consequences to wild parr. Given the displacement risk to wild fish, this monitoring is critical.

e. Kelt Reconditioning.
On the surface, kelt reconditioning is intuitively attractive as a potential means to increase lifetime fecundity of successful individuals; however, data from other studies have not shown this approach to be very successful. Thus, sponsors should re-examine the kelt reconditioning approach in the Cassimer Bar Hatchery Master Plan as the actual link to population re-building is not provided for the kelt program. This needs to be described and justified in the Master Plan.

Evidence is needed that kelt reconditioning has positive benefits for the wild population. Are there rigorously reviewed papers or work from NOAA that justify this approach? The merit of the kelt reconditioning approach needs to be documented. Other concerns include a more thorough discussion of the risks and benefits to the Upper Columbia steelhead population. It is not clear whether kelt re-conditioning is to achieve demographic or genetic goals? The recent 2008 hydrosystem Biological Opinion RPA can be interpreted as proposing kelt reconditioning

for genetic purposes. However, if kelt recondition is pursued to retain genetic resources to maintain population diversity, the approach may be counter-productive for natural spawning fitness in the current environment. The kelt reconditioning is applying artificial selection that may be opposing natural selection. That is, natural selection for adaptation to the modified Columbia River environment could be selecting against iteroparity in steelhead from this region of the basin. Furthermore, even though kelt reconditioning is a BiOp RPA, BiOp steelhead analysis shows no ESA benefits from kelt reconditioning on de-listing criteria for the upper-Columbia and minimal benefits for some stocks in the Snake.

This work seems at the pilot stage and with the potential consequence of reducing effective population size further, justification and evidence for the use of kelt reconditioning and release is needed. A detailed description on technical details was provided in Appendix D, but what is required is evidence of positive benefits from incorporation of expected results into AHA modeling, then pilot testing.

f. Chinook and steelhead plan linkage.
The link between Upper Columbia steelhead and Chinook plans needs to be better described. For example, while a cross-river trap for Chinook may affect the steelhead program, it could be beneficial for broodstock collection and harvest, but detrimental to migration.

ISRP Comments on Step 1 Review Elements

A. All Projects

Does the Cassimer Bar Hatchery Step-1 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: 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:
The sponsors do an adequate job of addressing how the project relates to the Program's eight scientific 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:
The sponsors identify that the project's objectives and subbasin planning provides watershed capacities that are inconsistent with the Upper Columbia Spring Chinook and Summer Steelhead Recovery Plan. The recovery plan suggests it will be uncertain whether life-cycle survival can be improved sufficiently to delist summer steelhead. On this basis, the ISRP is unable to conclude there is substantial likelihood of achieving the projects goals or the desired end-state condition for the Okanogan subbasin.

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:
See comments above. There are short, medium, and long term objectives for natural and hatchery production, but they need to be more clearly presented. Table 5-10 is supposed to provide this, but does not. A decision framework that identifies when the program is not functioning and should be terminated or modified needs to be developed.

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

ISRP Comments:
The project sponsors define the expected project benefits adequately. The expected project benefits (improvements in natural-origin steelhead abundance by natural spawning of hatchery adults and some harvest) are not consistent from one section of the plan to another. In one section 100, 200, and 500 adult fish (presumably NORs) are objectives for Loup Loup, Omak, and Salmon Creeks respectively. In another section 314 NOR adults are the objective with no partitioning into specific streams. Little discussion is given of program effects on resident redband trout populations.

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:
See extensive comments above (and in next item) concerning the need to link habitat improvement actions and their timeline with production actions. Restoration of steelhead in the

Okanogan subbasin will be dependent upon habitat improvements. Habitat actions are briefly summarized in the plan, but there is little in the way of an empirical track record anywhere in the Pacific Northwest to support the conclusion that the goals can be reached. Often the population response is much less than the goals identified in plans.

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:
The Master Plan is very weak in this particular area. Section 5.2.1 discusses habitat management (pp. 48-49), but is extremely general in nature, listing numbers if habitat activities implemented in the Upper Columbia (1997-2006; p. 48) and a set of general objectives (p. 49). Substantially more detail is needed within the Master Plan on the specific habitat projects that have occurred and those that are planned. The information needs to include some specific detail on what improvements to habitat parameters or water quality parameters have occurred to date as a result of these habitat improvement projects. Future habitat improvement activities need to be described in detail and linked via a table or timeline diagram to proposed actions and timelines in the hatchery program. This is needed because of statements in the Master Plan (referring to the Okanogan Subbasin Plan) that Omak Creek, Loup Loup Creek and Salmon creeks were estimated to have 80% of the U.S. portion of the subbasin's production potential.

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:
See comments above in general section. The alternatives presented in the Cassimer Bar Master Plan do not represent a reasoned and thoughtful consideration of realistic biological alternatives and their potential outcomes. Like most documents of this nature, the suite of proposed alternatives do not adequately represent all possible biological alternatives and, as happens in this document, because two of the three alternatives are untenable extremes, this leads inevitably to the selection of the remaining alternative as the preferred alternative. This is a common, if not unfortunate approach. The revised plan needs to present a more thoughtful discussion of potential alternatives.

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:
This section of the plan is also weak, although it may be likely that both historical and present records are insufficient to accurately describe the historical and current status of anadromous and resident fish and wildlife in the subbasin. See extensive comments above.

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

ISRP Comments:
See comments above.

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

ISRP Comments:
The sponsors' plans are consistent with NOAA recovery plans, though the sponsors appropriately question the Interior Columbia TRTs estimates for steelhead adult capacity in the U.S. portion of the subbasin. Their estimate of 1000 adult steelhead is not consistent with modeling done by the tribes in this report and in the Okanogan Subbasin Plan, which suggests a natural production abundance of just over 300 adults, when restored. If the present capacity is 127 adults and the long term capacity is 422 adults (Table 5-7), the population's classification as a primary population may not be justified. In that case the project would provide questionable conservation benefits. The project is consistent with HSRG recommendations to terminate out-of-subbasin releases of steelhead originating from the mixed stock produced from adults returning to Wells Dam. The HSRG does acknowledge that the current conditions do not support an integrated-hatchery program, but nevertheless encourage an effort to transition to a program based on returns to Okanogan subbasin tributaries.

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

ISRP Comments:
No comments.

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 sponsors do a reasonable job on this section, but more detail is needed to ensure that the sponsors are able to evaluate the project's performance adequately, particularly with evaluating reproductive performance differences between wild and hatchery origin steelhead (and their crosses).

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:
Cost estimates for 10 years are provided.

B. Artificial Production Initiatives

Does the Cassimer Bar Hatchery Step-1 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)?

ISRP Comments:
Yes. But, it appears that the program is likely to be inconsistent with the APR standards and primary strategy. The primary strategy involves providing fish up to the carrying capacity of the environment, but the combined hatchery and natural spawning escapement in table 5-10 exceeds the capacity by over 100%. Little consideration is given to ecological interactions between hatchery and natural steelhead juveniles. The HSRG raise this concern as well. Empirical evidence is accumulating that hatchery steelhead negatively affect natural steelhead production.

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

ISRP Comments:
Yes.

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

ISRP Comments:
Yes, but see comments above in general comments section.

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

ISRP Comments:
Yes.

5) provide a preliminary design of the proposed facilities (Step 2)?

ISRP Comments:
Not applicable for this review; this is a Step 2 issue.

6) provide a final design of the proposed facilities, including appropriate value engineering review, consistent with previous submittal documents and preliminary design (Step 3)?

ISRP Comments:
Not applicable for this review; this is a Step 3 issue.

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