Independent Scientific Review Panel
for the Northwest Power & Conservation Council
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Review of the

Crystal Springs Fish Hatchery Program Master Plan

Project #2008-906-00

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

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Contents

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Background

At the Northwest Power and Conservation Council's April 19, 2011 request, the ISRP reviewed the Master Plan prepared by the Shoshone-Bannock Tribes (hereafter Tribes) titled *Crystal Springs Fish Hatchery and Programs for Snake River Chinook Salmon and Yellowstone Cutthroat Trout*. The Master Plan is proposed through BPA Project #2008-906-00, *Crystal Springs Planning and Operations/Maintenance*. This is a Step 1 review in the Council's Three Step Review Process. Step 1 is the feasibility stage, and all major components and elements of a project should be identified. This review focuses on the Tribes' responses to the Step 1 scientific review elements specified by the Council.

The Executive Summary of the Master Plan describes the intent of the program as follows:

> The Crystal Springs program is designed to help restore two native fish species of cultural and economic significance to the Tribes: Chinook salmon (*Oncorhynchus tschawytscha*) and Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*). Restoration will occur in geographically distinct regions of Idaho. Chinook salmon produced at Crystal Springs Hatchery will be acclimated and released in the Yankee Fork and in Panther Creek, both tributaries to the upper Salmon River. Yellowstone cutthroat trout produced at Crystal Springs Hatchery will be released in various streams on or near the Fort Hall Reservation.
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> The proposed Chinook program is also designed to contribute to the recovery of the Snake River spring/summer Chinook Evolutionarily Significant Unit (ESU) by restoring a locally adapted hatchery and natural spawning population to the Yankee Fork and Panther Creek. While contributing to recovery is an important objective of the Tribes, regional efforts to recover the Major Population Group (MPG) have been largely directed at other systems in the upper Salmon. With other populations being the focus of species recovery, Yankee Fork and Panther Creek are suitable locations to establish populations that can support treaty-reserved tribal harvest, a very important Tribal program objective.
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> The Tribes' goal for its proposed Yellowstone cutthroat trout program at Crystal Springs Hatchery is to (1) conserve the Yellowstone cutthroat trout population on tribal lands, (2) increase the abundance and range of pure Yellowstone cutthroat trout, and (3) provide hatchery fish for tribal and non-tribal harvest, thereby reducing human impacts on this species. The program will implement a small-scale hatchery action to increase the distribution and abundance of Yellowstone cutthroat trout within a portion of the upper Snake River Basin. It is designed to produce fish that are as genetically and behaviorally similar to natural local populations as possible.

The ISRP reviewed the proposal to develop the hatchery program in the Research, Monitoring, and Evaluation and Artificial Production Category Review (ISRP 2010-44B). In that review, the ISRP wrote:

> The ISRP determined that this proposal is not applicable for scientific review at this time. The ISRP anticipates reviewing a draft Master Plan for the project in Step One of the Council's Three Step Review, so that they can provide comments and enable changes to the plan before it is finalized. The addition of the Chief Joseph consulting team is promising.
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> The proposed hatchery project should be developed in conjunction with the Supplementation, Monitoring, and Evaluation Program (SMEP, Project #2008-905-00). The effort should describe its relationship with Idaho Supplementation Studies (ISS), including supplementation of the ESU in the Imnaha, Johnson Creek, and Grande Ronde. Evaluation of the suitability of the Crystal Springs site should be based in part on evaluations of other supplementation projects, including the Northeast Oregon Hatchery Master Plan (Project 198805301). Kevin Myer's (IDFG) research on Yellowstone cutthroat trout should be used to inform, evaluate and justify the use of hatcheries to produce cutthroat trout.

The ISRP (ISRP 2011-16) recently reviewed the Tribes' response to earlier ISRP comments on the proposed Supplementation, Monitoring, and Evaluation Program (Project #2008-905-00). The ISRP provided a number of scientific comments on the program that should be incorporated into the Master Plan for Crystal Springs Hatchery. The ISRP also offered the following suggestion:

> An alternative that the Shoshone-Bannock Tribes may want to consider is developing artificial production at these locations with the primary objective of creating terminal harvest opportunities to meet tribal harvest goals. These programs would need to be conducted with protocols that would ensure they do not interfere with restoration of adjacent independent populations to viable status. As the Tribes continue habitat rehabilitation efforts in Yankee Fork and Panther Creek, along with appropriate monitoring, they could consider active re-introductions when habitat and fish survival conditions improve sufficiently to allow a self-sustaining natural population.

Review Summary and Recommendations

Response Requested

Overall, reviewers found the Master Plan and supporting documents to be very well organized, free of typographical errors, and prepared with excellent detail in some sections, especially those related to hatchery design and operation. The plan in general does a good job of presenting material regarding two fish species, three different field settings, and a proposed hatchery in a clear and professional manner.

However, while the policy basis for the proposed hatchery and relationship to subbasin plans and U.S. v. Oregon are thoroughly presented, the *scientific* justification for the proposed hatchery is lacking. The Master Plan does not present a convincing case that existing environmental

conditions are adequate to achieve the primary objectives in the foreseeable future, which is what the ISRP is called upon to evaluate. Additional information and consideration of several key issues are needed before the Master Plan moves to Step 2. As currently presented, reviewers do not believe the conservation goals of the Yankee Fork (and probably Panther Creek) can be achieved given current conditions, and believe that additional development is required for the Yellowstone cutthroat trout restoration effort to meet scientific criteria. These limitations are listed and discussed below. Comments are categorized into proposed programs for Chinook salmon and Yellowstone cutthroat trout.

Chinook Salmon Program

Several specific major items need a response regarding the Chinook salmon component:

1. Provide a more thorough discussion of the need for additional hatchery facilities for spring Chinook production to meet goals of the Tribes' enhancement programs.

   Although the Master Plan notes that the Tribes' requirement for Chinook salmon production has low priority at Sawtooth Hatchery relative to other production goals, please provide additional information on the extent to which this low priority would impact the Tribes' production goals and whether expansion of the Sawtooth Hatchery was considered and dismissed. Reviewers suspect these options have been effectively considered and objectively dismissed, but request confirmation.

2. Critically evaluate whether re-introduction and supplementation efforts in Yankee Fork and Panther Creek have a reasonable probability of success at this time given degraded habitat conditions in the watershed, passage issues in the mainstem, and survival at sea.

   The following information is requested: 1) current and past habitat quality, ongoing efforts to improve habitat and a trajectory indicating the degree to which salmon survival might be improved in the near future, 2) evaluation of recent re-introduction and supplementation efforts in the Snake River and Columbia River basins and a comparison of habitat quality in those watersheds versus habitat in Yankee Fork and Panther Creek, 3) evaluation of adult returns per spawner (R/S) among natural origin spring Chinook salmon in the Snake River basin as a means to assess development of a self-sustainable population.

3. Critically evaluate brood stocks that might be used in the Program, including use of natural origin salmon from the upper Salmon River rather than the segregated Sawtooth Hatchery stock.

   A thorough discussion is needed of the status of the extant Yankee Fork independent spring Chinook population, the potential fate of that population, and its significance, as a consequence of introducing fish from other independent populations, and a critical evaluation of how the proposed effort may or may not contribute to recovery and delisting of Snake River spring/summer Chinook.

4. Provide estimates of adult returns and harvests based on actual data from the Snake River basin, including information recently documented by the Lower Snake River Compensation Program. How many hatchery origin and natural origin salmon might be harvested if the goal is to develop a self-sustaining natural population? Although a terminal fishery was not identified by the Tribes, this approach should be discussed along with information on whether the Tribes might consider this approach combined with periodic attempts to re-establish self-sustaining natural production.

   The AHA analysis that provides some boundaries on harvest expectations is based on limited empirical information, and the uncertainties of life-stage survival, including SARs, are not well described or adequately addressed. Productivity (R/S) and harvest rate values from existing programs in the Snake River basin should be used to predict more realistic outcomes from the program. If not, the metrics currently in the Master Plan need to be better justified, and a discussion is needed of how the program would respond and adapt if those metrics prove to be unrealized.

5. Evaluate the effect of releasing 200,000 to 600,000 large smolts on natural origin smolts within and downstream of the release watershed.

   The risks to natural origin Chinook have not been adequately evaluated. A standard of 5% or less straying has been established, but risks from competition, predation, and disease are not considered. A discussion of the ramifications of releasing hatchery fish twice the size of wild smolts is needed in terms of impacts to wild juveniles and to the ecological fitness of the hatchery fish themselves, including density effects.

   Recent observations indicate that high jack and mini-jack percentages are proving to be a major concern at some Chinook salmon hatcheries (e.g., 52% in Lookingglass Hatchery, 2006 and 2007: Larsen et al. 2010) and are linked to the release of rapidly-growing pre-smolts. What is the expected risk of such a problem in the proposed program?

Yellowstone Cutthroat Trout Program

Specific major items to be addressed in a response regarding the Yellowstone cutthroat trout component:

1. Provide a plan and schedule for restoration of Yellowstone cutthroat trout in Fort Hall Reservation waters.

   To be consistent with Council's Artificial Production strategies, the goal of Yellowstone cutthroat trout restoration should be establishing viable populations in some number of streams or stream miles, not numbers of fish released. Potential options for achieving this restoration goal should then be considered. For the artificial production options, the number of years of stocking that are required, and how many fish need to be stocked to accomplish restoration needs to be presented and justified. It is not entirely clear to the

ISRP that artificial culture is needed for restoration. Would translocation of wild fish be sufficient and if not, why not?

2. Incorporate key information on habitat conditions, genetics, and population status (especially recent published reports by Meyer et al. 2006, IDFG 2007) that is relevant to the Fort Hall Reservation and to this Step 1 Draft.

3. Reviewers anticipate that larger adfluvial cutthroat trout might be most desired for harvest by tribal members and fee-paying non-tribal anglers in Fort Hall bottoms streams, but this aspect of the Master Plan was not emphasized and minimally described. A more thorough description of this aspect of the program is needed. Such activity would be justified and consistent with the Council's program and should be discussed in more detail if anticipated.

Major Comments on the Spring Chinook Salmon Program

Key justifications are lacking regarding necessity of the hatchery facilities. An effective quantitative justification for the hatchery would be based on a clearly shown quantitative lack of adequate rearing opportunities at Sawtooth hatchery, given present capacity or minor expansion.

The Master Plan does not adequately analyze the risks to natural origin fish and populations. The proposed alternative establishes a 5% stray rate into adjacent streams as a genetic risk management limit. How might the program reduce straying if it exceeds 5%? There is no discussion of ecological impacts on adjacent or lower river populations (natural and hatchery) from adding 200,000 to 600,000 spring Chinook smolts to the Salmon/Snake/Columbia River systems.

The status of habitat in Yankee Fork and Panther Creek (under restoration) has not been adequately described, nor has the unpublished literature and reports of activities been appropriately reviewed. The program needs to develop a standalone, comprehensive monitoring, evaluation, and research plan that identifies uncertainties, provides a formal decision process for adaptive management and is well integrated with past and ongoing habitat improvement efforts and with supplementation efforts in adjacent watersheds. Major gaps/issues remain regarding post-release instream production and ecology of Chinook in Yankee Fork and Panther Creek (such as the ramifications of releasing very large numbers of pre-smolts twice the size of wild smolts).

Also needed is a discussion of plans for steelhead supplementation (if anticipated) in Yankee Fork and Panther Creek and how that would affect rearing capacity of Chinook.

The Yankee Fork spring Chinook artificial production program has conservation, harvest, and Tribal cultural objectives that should be more effectively integrated with existing ESA recovery efforts within the upper Salmon River MPG of the Snake River spring Chinook ESU.

The Master Plan attempts to balance conservation and harvest objectives. The conservation objectives appear to have first priority. Before extensive harvest will take place substantial adult production is required. This intent and the tribes' conservation philosophy are well presented in the Master Plan. However, the choice of the source stock for translocation (essentially reintroduction) into Yankee Fork is not thoroughly discussed. The Master Plan identifies that a viable spring Chinook independent population is not required in Yankee Fork for recovery of the upper Salmon River MPG, and delisting of the ESU. The Master Plan places the conservation objective first in priority (see page 32), but then uses the existing segregated Sawtooth stock as the source for reintroduction without discussing the possibility of using upper Salmon River natural-origin returns as the source stock (or returns from the "supplementation" stock that is under consideration for development at Sawtooth through the Lower Snake River Compensation Plan). There is no discussion of whether a viable population in Yankee Fork derived from Sawtooth Hatchery segregated upper Salmon River spring Chinook will reduce the overall risk assessment for the upper Salmon MPG.

Achieving the conservation benefit (i.e. establishing a viable "basic" population with TRT recommended NOR abundance = 500 and productivity 1.9) in the foreseeable future is highly unlikely. The Master Plan does not incorporate empirical results from spring Chinook translocation and reintroduction efforts elsewhere in the Columbia River Basin – Hood River by the Warm Springs Tribe and ODFW, Umatilla River by the Confederated Tribes of the Umatilla Reservation and ODFW, and Nez Perce Tribe (NPT) and IDFG efforts in the Clearwater River (NPT– Lolo Creek, Newsome Creek, Meadow Creek). The ISRP has the impression from conversations with IDFG and NPT that spring Chinook in the Clearwater (derived from Rapid River stock) are largely hatchery supported and have not developed meaningful natural production. To the ISRP's knowledge there is not a single spring Chinook reintroduction/translocation that has produced a viable natural population. There are ongoing supplementation programs for spring Chinook in the South Fork Salmon River (Johnson Creek), Tucannon, Imnaha, and Grande Ronde (Lostine River, Catherine Creek, and upper mainstem Grande Ronde).

Harvest opportunities for the Shoshone-Bannock Tribes are legal and policy obligations, negotiated through U.S. v. Oregon, and incorporated into the Fish and Wildlife Program. Further, the Council, through its Program, permits the use of artificial production for harvest mitigation, as a policy decision. Consequently, the harvest objectives of the Master Plan stand on their own merit, regardless of conservation benefits. The scientific issues attendant with using artificial production to provide harvest include estimating the range of harvest opportunity that may actually be realized from a program, and the scale of a program that can be implemented without undue impact on natural populations from both genetic (interbreeding with hatchery strays) and ecological interactions, both direct (predation) and indirect (disease, space, food-web, competition).

The Yankee Fork and Panther Creek programs have not yet used the full spectrum of empirical survival data from the Lower Snake Compensation Plan program for spring Chinook to estimate the likely yield for tribal and sport fisheries. It would be helpful if the plan would indicate a harvest level desired by the Tribes and the portion of the harvest they would hope to achieve with the Yankee Fork program. Then it would be useful to summarize the harvest that is

currently achieved with similar spring Chinook programs in the Snake River basin. How much tribal harvest is being realized in the Grande Ronde, Imnaha, Tucannon, Clearwater, and Salmon River systems that can inform the near-term goals for the Yankee Fork?

The AHA analysis that provides some boundaries on harvest expectations is based on limited empirical information, and the uncertainties of life-stage survival, SARs, etc. are not well described and addressed. For example, the analysis uses an SAR of 0.29% (or 0.30), but this appears to be based on a single year release of Sawtooth smolts (broodyear 2004: SAR 0.28%; page 21 appendix A). The actual SARs for Sawtooth Hatchery are highly variable and appear to include a regime change from the 1994 to 1995 broodyear. The HGMP identifies (page 20/21) that from 1986 through 2000, the average SAR was 0.259%, and the geometric mean only 0.068% at Sawtooth Hatchery. From 1986 through 1994, the geometric mean SAR at the hatchery was 0.02% and from 1995 through 2000 the geometric mean SAR was 0.41%. The essential question for the Tribes is whether the harvest opportunity from operating an artificial production program with survival equivalent to Sawtooth Hatchery (25 miles away, same stock) would satisfy tribal needs for the effort expended. The scientific question is how large a program could be conducted using the Yankee Fork watershed, and how large a program is compatible with recovery and delisting of Snake River spring Chinook, steelhead, and bull trout?

The Master Plan needs to summarize the important uncertainties – including SARs and straying and establish an experimental fish culture/release program that will parameterize those uncertainties over time using a sufficient monitoring program. That is, should the annual production of the program be 200,000 or 400,000 or 600,000 smolts? As the program gains information the boundaries on a reasonable design are likely to become more evident. However, the best available estimates should be developed at this time.

To develop the phases of the program AHA was used with a productivity assumption of 1.45 and adult capacity of 600. These were taken from the HSRG (2008) analysis. Inspection of the HSRG population report does not provide any justification for this assumption. The TRT viability report for the Yankee Fork (data presented in Table 8 in the HGMP) concluded information to estimate a year Beverton-Holt productivity relationship was not available for the Yankee Fork, and that the 20-year recruits/spawner was 0.68 with a 10-year geometric mean adult abundance of 13 fish. The extant natural population is not replacing itself.

The Master Plan used an AHA modeling exercise that primarily modifies the size of the program. Based on the empirical observations from Sawtooth Hatchery and the TRT analysis of Yankee Fork viability, a more effective exercise would be to vary the life-stage survivals, population productivity, and capacity and provide the distribution of likely harvest and conservation benefits that might be achieved during a 25 or 50 year period. For example, how much improvement in survival is needed to provide a given level of harvest? These analyses would facilitate an assessment of whether the program could be self-sustaining, and the scope of harvest and conservation benefits.

The Master Plan describes a three-phase approach for Chinook salmon with specific triggers leading to each successive phase. Each phase marks further improvement toward rebuilding a locally-adapted natural run. Given the low productivity of existing natural Chinook salmon (R/S

< 1), the program may not reach Phase 2 unless there is substantial improvement in overall productivity of natural salmon in the watersheds. The modeling assumptions seemed overly optimistic and not well justified. Numbers and sizes of smolt released were not based on an analysis of available habitat to support the releases. The program must continue to improve habitat quality and in-river survival if they are to produce a self-sustaining population of Chinook salmon. At present, a hatchery program appears to be needed to maintain fish returning to the Yankee Fork and Panther Creek.

In addition to the elements above that apply to both Yankee Fork and Panther Creek, at this time the source of fish to provide broodstock for the Panther Creek program has not been decided.

Major comments on Yellowstone Cutthroat Trout Program

Similar improvement in the analysis, presentation, and use of available scientific data are needed in the second half of the Master Plan, the Yellowstone Cutthroat trout portion. For example, on page 128, IDFG's Fisheries Management Plan was identified; the plan described "the known status of Yellowstone Cutthroat trout populations in Idaho within 13 Geographic Management Units (GMUs), with respect to abundance, trends, genetics, and an evaluation of existing threats. Finally, the plan presents IDFG management strategies and conservation actions based on habitat conditions, genetics and population status." Even though the Fort Hall Reservation was not considered in the plan, there is undoubtedly some important information on habitat conditions, genetic and population status (especially recent published reports by Meyer et al., IDFG) that is relevant to the Fort Hall Reservation and to this Master Plan. But none of it is presented. For example, what does the regional metapopulation structure look like? Is there a need to be concerned about hatchery introductions into streams with stable wild populations? Are there any down sides to stocking hatchery catchables over wild juveniles at some localities? These scientific questions seem not to have been thoroughly addressed in the Master Plan. Similarly, as one of numerous possible examples, on page 135, it is stated, "The program will require between 100 and 200 adults to produce the juvenile release numbers identified for the program (fecundity varies widely by fish size). No data or references were provided to support this number. The data may be available but are not presented. The conservation goal needs to be changed from annually producing 10,000 fry at 250 fish/lb to re-establishing a specific number (or range) of putatively non-hybridized populations of Yellowstone cutthroat trout.

Genetic swamping by planting pure Yellowstone cutthroat trout on hybrid rainbow x cutthroat trout populations is included as one of the techniques to be employed in restoration. The hope is that reproduction by an abundance of non-hybridized individuals can overwhelm the hybrid individuals and consequently decrease the proportion of non-native genes in the population. Genetic swamping was conceived and implemented by Montana Department of Fish, Wildlife, and Parks in the mid-1990s as a restoration strategy in hybridized populations of west-slope cutthroat trout. The ISRP is unaware of peer-reviewed analysis evaluating whether there is a benefit to population status using this methodology. A review of the results from Montana is needed to support using the strategy.

Collecting individuals from hybridized populations for genetic screening, with putative non-hybridized individuals retained for broodstock is more complicated than it would appear. What would be needed is an analysis of whether the hybridized population was at genetic equilibrium, and some effort at evaluating the "status" of each individual (see Kalanowski 2010). The problem is that there are several thousand genes in a trout, but only a couple dozen genes are typically evaluated (one hundred or so SNPs either are, or should be available soon). If a population is at genetic equilibrium there will be an apparent distribution of "levels" of hybridization within individuals described by a binomial distribution. However, because of the low proportion of genes actually screened, many individuals that are homozygous at screened loci will be heterozygous at unscreened loci – consequently they are hybrids.

There needs to be a summary presentation on the Distinct Population Segments organization of Yellowstone cutthroat from recent biological status reviews, and the Idaho Yellowstone cutthroat trout plan. The Tribes' program on the Fort Hall bottoms should be presented in sufficient detail to demonstrate consistency with the Idaho plan.

The statement that Yellowstone cutthroat trout are not native to the Snake River between Palisades Dam and Jackson Lake Dam is incorrect.

A map is needed to show the locations of streams identified in Table 6-1. A risk assessment is needed for each stream, evaluating the potential of removing hybrid populations, and preventing natural colonization from adjacent centers of hybridization. The streams can then be prioritized for restoration with putative non-hybridized trout. Population estimates for the donor populations are needed, with an indication of the number of individuals that can be removed for direct translocation or for establishing hatchery stocks. Only three streams (30-day, Big Jimmy, Midnight) are identified for restoration and four streams (Birch, South Fork Ross, Moonshine, Little Toponce) are identified for enhancement. A justification is needed for enhancement. In order to meet the goals of the Fish and Wildlife Program, the Tribes should use the comprehensive survey that began in September 2010 as a means to justify stocking levels in each stream. Trout are highly productive in streams with appropriate environmental conditions. The habitat is more important to long-term natural production status than is fish stocking. In order to justify the cutthroat program as a conservation effort, in addition to providing harvest, the plan should also link habitat efforts noted in the plan with proposed stocking of each stream listed in Table 6-1.

A schedule is needed for restoration. How many years of stocking are required, and how many fish need to be stocked to accomplish restoration? It is not clear to the ISRP that artificial culture is needed for restoration. Could translocation of wild fish suffice, and if not why not?

A review of the other efforts to removal of non-native western trout populations and translocation of hatchery or natural fish for recolonization is needed to justify the approach. The material presented is too brief for the ISRP to fully understand how the approach will unfold through time. It is also not possible to establish that the approach that is going to be used by the Tribes fully incorporates what has been learned in Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Nevada, and California when reintroducing cutthroat, Gila, Apache, and golden trout.

ISRP Comments on Step 1 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 ISRP comments on how the Master Plan addresses the Step Review elements follow below.

A. All Projects

Does the Crystal Springs Hatchery Program Master Plan:

1) Address the relationship and consistencies of the proposed project to the eight scientific principles (see 2009 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.

The extent to which the project is believed by the Tribes to be consistent with the Principles is specifically addressed in a few pages of text, where brief but pertinent comments are made. The initial statement under principle 1 is that success of the program is highly dependent on the quality and quantity of habitat available for each life stage of Chinook salmon. Reviewers concur. But despite that statement, there is no demonstration that an analysis of biological carrying capacity in terms of juvenile rearing was conducted or considered. The number of smolts to be released is a function of hatchery capacity and program goals, not habitat capacity, for Yankee Fork and Panther Creek.

The plan recognizes that habitat in the Yankee Fork and Panther Creek has been severely altered by mining and other human activities, but notes that efforts have been made to improve habitat. More detail is needed, including a thorough review of any existing unpublished studies by mining companies and any other entities

Regarding Principle 7, adaptive management, section 4.7 of the plan is weakly considered and inadequate. The only item specifically identified for evaluation is survival to Lower Granite Dam of direct release vs. pond-held groups, something that has been evaluated elsewhere for a decade. The section needs considerable strengthening to be able to take advantage of the opportunities to increase our knowledge being provided by the project (such as evaluation of straying, as

described immediately below). Throughout this review the ISRP has suggested several alternatives worth considering.

For Yellowstone cutthroat trout, management, and control/removal of non-native rainbow and brown trout needs more detail and focus with regard to Principles 7 and 8.

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)?

Although the Master Plan specifically addresses links of the proposed Chinook project with that of other projects in the watershed and in the Salmon River basin, the discussion is incomplete. The plan generally describes the link of this program to other projects and studies in the Yankee Fork subbasin in Table 4-19, and describes how this program relates to the Idaho Supplementation Studies program (Proj. #s 1989-098-00 and 1989-098-03), the ESA Habitat Restoration Project (#2008-903-00), and the Salmon River Habitat Enhancement Project (#1994-050-00). However, it needs more detail of how this program will draw from results of habitat rehabilitation efforts by the Tribes on Yankee Fork.

With regard to the ongoing and recent supplementation program, the plan should provide more information on how it will transition from the use of Sawtooth Hatchery to Crystal Springs, including how this transition and use of broodstock may alter the findings of the ongoing supplementation project. The Master Plan needs to be better integrated with existing supplementation projects. The Master Plan should evaluate existing supplementation projects in the region as a means to learn what has and has not worked well. These findings should be integrated into the Master Plan.

The Master Plan noted (P. 101) that the Idaho Supplementation Studies (ISS) program uses the West Fork of the Yankee Fork as a control stream. It appears that field evaluation of ISS in Yankee Fork will be completed prior to supplementation from the Crystal Springs Hatchery. Is this the case, or would it impact the study design and results of the ISS study?

Many hatchery salmon will be transported to acclimation ponds on the Yankee Fork and Panther Creek prior to release. These fish might have a relatively high propensity to stray to other watersheds in the Salmon River basin. The plan states (P. 42) that its goal is to maintain a stray rate of less than 5% to streams outside of Yankee Fork. Is the 5% value the fraction of Crystal Springs Hatchery adults that stray, or is it the percentage of hatchery adults on spawning grounds outside the watershed? Significant field effort is needed to evaluate whether 5% of the adults stray to other watersheds. Efforts to enhance imprinting and homing back to the natal streams should be considered. Monitoring strays from upper versus lower river releases may facilitate this evaluation.

3) Define the biological objectives (see 2009 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section C.2 (1) and (2)) with measurable attributes that

define progress, provide accountability and track changes through time associated with this project (Step 1)?

The Master Plan describes a three-phase approach for Chinook salmon restoration and identifies specific triggers that need to be met in each phase before switching to the next phase. The phases are 1) colonization, 2) conversion to locally adapted broodstock, and 3) development of an integrated harvest program consistent with HSRG guidelines for a "Contributing" population. Each phase marks further improvement toward rebuilding a locally-adapted natural run.

The trigger for switching from Phase 1 to Phase 2 is based in part on the total return of 1,000 spring Chinook, but the statement did not indicate whether or not this metric was for a single year or multiple years (P. 42).

Phase 1 is simply a hatchery program that encourages hatchery adults to return to the river and spawn so that they may produce juveniles that may eventually colonize the watersheds. The report notes that hatchery strays have kept some level of adults returning to the watersheds. Ideally, the habitat programs noted in the plan will lead to improved salmon habitat and survival of salmon in the watershed. However, even if Phase 1 can be met, Phase 2 and Phase 3 may not be achieved unless there is substantial improvement in overall productivity of natural salmon in the watersheds. In the near term, successful transition from Phase 1 to Phase 2 will likely depend on favorable ocean survival conditions that allow many fish to return.

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

The Master Plan describes the project benefits in its three-phase approach for Chinook salmon. Section 4.10 provides expected program benefits, fishery enhancement, from AHA modeling runs. Phase 1 is simply a hatchery program to enable Chinook salmon to colonize the watershed. Phase 2 would attempt to enhance local adaptations of the salmon to the project watershed.

The modeled expectations for the project, especially for Phases 2 and 3, seem unrealistic unless there is substantial improvement in survival throughout the life cycle. For example, the assumed R/S for natural origin Chinook in the Yankee Fork is 1.45 (Table 4-3), even though it is currently < 1. The assumed harvest rate on these fish is 54%, which means that hatchery fish (HOR) must contribute to the spawning population, otherwise the natural population would decline. Why is the harvest rate the same for fish in Yankee Fork and Panther Creek given that productivity of Panther Creek is assumed to be higher?

The assumed R/S of hatchery fish is 4.0 for the Yankee Fork and 6.1 for Panther Creek. The reason for different assumptions in the two watersheds is not clear. R/S will depend on the level of spawner abundance (lower when higher number of spawners). What level of spawners was used? How were the capacity estimates derived (e.g., 600 adults, 1200 adults)? Are these assumptions consistent with observations made in nearby watersheds in the Salmon River basin, or Snake River basin?

5) Describe the implementation strategies (see 2009 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.1) 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)?

The Master Plan describes environments in Yankee Fork and Panther Creek that have been severely compromised. Habitat projects have attempted to improve habitat quality, but R/S of natural Chinook remains below 1. The biological potential of Chinook in these disturbed watersheds seems to be low, as least in the near term, and therefore the ongoing and proposed supplementation strategy is consistent with the Columbia River Basin Fish and Wildlife Program.

Implementation strategies for the Chinook program are described as aligned with Salmon River Subbasin Plan goals and actions, and the proponents are working with habitat improvement projects to achieve restoration objectives. But current status of restoration efforts and a timeline are not provided Yankee Fork. Adequate linkages are provided (and the issue is less critical) for Panther Creek.

6) Address the relationship to the habitat strategies (see 2009 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.1) (Step 1)?

The Master Plan notes that it is tied to the ESA Habitat/Restoration Project. However, aspects of habitat restoration and effectiveness were not described in detail, although it was mentioned that water quality is no longer lethal as a result of contaminants from mining.

Successful transition of the proposed project from Phase 1 to Phase 2 and 3 and development of a self-sustaining natural population will be highly dependent on whether habitat conditions can be significantly improved in the coming years.

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)?

The Master Plan described four alternatives, including elimination of hatchery production, for Yankee Fork and three for Panther Creek. The no-hatchery alternative is inconsistent with the need to provide harvest opportunities for the Tribe and for maintaining salmon in the two watersheds. Additional clarification on whether Sawtooth Hatchery can provide space for spring Chinook production is requested. Additional modeling is needed to develop an improved estimate of the harvest and conservation benefits from a range of proposed smolt releases (i.e. 200,000 versus 600,000).

For Yellowstone Cutthroat trout, many issues remain regarding alternative measures, as discussed above.

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)?

This information was well presented for all three situations, except as mentioned above for Yankee Fork rearing. Historical information was provided, including the presence of other fish species.

A typo in an otherwise cleanly written document was the inclusion of two chubs, two dace, and a shiner in the trout family in Table 5.3.

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

Although harvests are currently exceptionally low, the Master Plan should better describe salmon harvest management in the Yankee Fork and Panther Creek. What are the triggers for allowing or restricting harvest?

The plan notes the proposed sliding scale harvest approach. Please clarify whether the harvest rate will be 8% or less until escapement needs for the stream (e.g., 500 in Yankee Fork) and hatchery (358 adults) are both achieved, or whether harvest rates will increase beyond 8% when the return exceeds 500 fish as implied on page 42?

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

The appendix of the Master Plan described the status assessment by NMFS/ICTRT, who classified the Yankee Fork population as a “basic” population based on the historical habitat potential. Some of this information should be described in the primary report.

The lineage of Sawtooth Hatchery Chinook salmon should be described in relation to Yankee Fork and Panther Creek.

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

A brief presentation is made of an assessment that would be developed for Step 2. A very brief assessment of habitat conditions was provided. Although the Master Plan noted that improvements had been made to habitat and water quality, it tended to be too optimistic when describing habitat as “restored.”

12) Describe the monitoring and evaluation plan (see 2009 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.9) (Step 1, 2 and 3)?

The concepts and general M&E methods are presented in tables for the Chinook program in Section 4.6 for both adult and juvenile monitoring, but the specifics are lacking regarding specific protocols, actual target values for performance standards, sample sizes, action triggers for risks to natural fish from HOR fish, etc. The material provided consists primarily of a list of performance standards, indicators, and one sentence about methods.

An M&E plan description for cutthroat trout (sec. 6.5) entails annual monitoring in streams to assess success/failure of hatchery production. Monitoring will be integrated with IDFG efforts. Details are lacking at this stage of the process.

For Step 2, the program will need a comprehensive, standalone document that describes the plan for monitoring, evaluation and research. The document should describe methodology. This is a critical component that is needed for evaluating the overall success of the program.

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)?

Cost estimates were provided for Step 1 and will be refined through remaining Steps. The ISRP did not evaluate costs for appropriateness.

B. Artificial Production Initiatives

Does the Hatchery Program Master Plan:

1) Address the relation and link to the artificial production policies and strategies (see 2009 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.3) (Step 1)?

The Master Plan describes a three-phase approach for Chinook salmon with specific triggers before switching to the next phase. The phases include colonization by Sawtooth Hatchery Chinook, conversion to locally-adapted broodstock, and development of an integrated harvest program consistent with HSRG guidelines for a “Contributing” population. Each phase marks further improvement toward rebuilding a locally-adapted natural run. But the reality is that Phase 2 and Phase 3 may not be achieved unless there is substantial improvement in overall productivity of natural salmon in the watersheds. This would require much improved habitat quality and survival during downstream migration.

Phase 1 is simply a hatchery program that encourages hatchery adults to return to the river and spawn so that they may produce juveniles that may eventually colonize the watersheds as adults and provide some harvest opportunities. Based upon program goals as modeled through AHA, a

total juvenile production of 600,000 would be required for Yankee Fork and 400,000 for Panther Creek. There is no mention of whether this is reasonable or feasible based on the biology and physical environment of the Yankee Fork or Panther Creek.

The large juvenile production goals appear to disregard results of previous study from Yankee Fork. Reiser and Ramey (1987) estimated a production capacity of about 90,000 Chinook and 16,000 steelhead smolts in the Yankee Fork. Richards and Cernera (1989) found that juvenile Chinook abundance unexpectedly declined sharply in midsummer (before a decrease in water temperature would have triggered out-movement). This occurred at low fish density. Unless this is better understood and can be ameliorated, summer rearing in the system would appear to be considerably "below average," a factor not considered in the Master Plan.

An additional issue is size at release of hatchery Chinook smolts in both Yankee Fork and Panther Creek. Recent analysis indicates that large smolts produced by rapid hatchery growth rates are more prone to mini-jacking (as evaluated under project 2002-631-00) and may pose other, real, natural production problems. The early (midsummer) migration of hatchery Chinook out of Yankee Fork observed by Richards and Cernera 1989 was felt to be a function of them having already reached a size (65-85 mm) normally reached by wild fish at the end of the summer. The length of fish being released from the Sawtooth Hatchery is currently ca. 140 mm (HGMP sec 9.2) and, according to the Master Plan, would be ca. 170 mm from Crystal Springs. A response is needed to discuss the ramifications of critical issues such as these.

The program assumes the smolts would emigrate quickly and enter the Salmon River. Interaction of these hatchery smolts with those from other Salmon River tributaries, as well as resident species, was not evaluated.

An important aspect of this program will be to minimize strays to other watersheds in the Salmon River basin. The feasibility of being able to achieve that in view of these issues needs further discussion in the Master Plan.

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

HGMPs for Yankee Fork and Panther Creek Chinook and Upper Snake River Yellowstone cutthroat trout are provided in Appendices A, B, and C, respectively. But risks to NOR fish are not adequately detailed for the Chinook salmon program.

3) Describe the harvest plan (see 2009 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D.4) (Step 1)?

The plan needs to clarify whether harvest rates will remain less than 8% until objectives for both escapement to the stream and for broodstock are achieved.

The assumed harvest rate for Yankee Fork (54%) and the assumed R/S (1.45) leads to an unsustainable natural population. Hatchery stocking is required under this scenario otherwise the population would decline. Overall, the Phase 2 assumptions seem optimistic in terms of providing harvest on a consistent basis.

There was no mention of a mark-selective fishery on hatchery fish in the terminal area. A selective fishery would be consistent with rebuilding the natural Chinook population. Although a selective fishery is less preferred by the Tribes, this approach should be discussed along with information on whether the Tribes might consider this approach during the rebuilding phase.

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

These were fairly thoroughly and clearly described. The design does not incorporate any of the features of the more "natural" rearing that were developed and incorporated into other BPA-funded anadromous species hatcheries.

Juvenile stress relief (acclimation) facilities are included for Yankee Fork and Panther Creek. It seems reasonable to place these fairly high in each watershed, as proposed. The discussion of the extant rearing ponds in the HGMP indicates a plan to use Pond Series 1, if access is possible, but does not mention the other three Series. If they are not to be used, what is the basis for that decision?

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

Fairly detailed conceptual designs (which could be considered as preliminary designs) were provided as described above but were not evaluated 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)?

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

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