



Independent Scientific Review Panel
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Memorandum (ISRP 2009-14)

April 28, 2009

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

From: Eric Loudenslager, ISRP Chair

Subject: Review of BiOp proposal Chum Salmon Enhancement in the Lower Columbia River (2008-710-00) – response requested

Background

At the Council's March 12, 2009 request, the ISRP reviewed Washington Department of Fish and Wildlife's proposal, Chum Salmon Enhancement in the Lower Columbia River. This proposal is intended to meet needs identified in the 2008 Biological Opinion (BiOp) for the Federal Columbia River Power System by promoting recovery of lower Columbia River chum salmon populations through development of an integrated program for chum salmon habitat restoration and supplementation/reintroduction.

ISRP Recommendation and Summary Comments

Does not meet scientific criteria. Response Requested – The proposal content is insufficient for a complete assessment. A more thorough proposal is needed.

This proposal is to conduct population status assessments; habitat assessment and restoration planning; and reintroduction and supplementation of chum salmon below Bonneville Dam. In this geographic region, chum salmon are listed as threatened under the Endangered Species Act.

The proposal includes seven identified objectives:

- Objective 1: Habitat restoration and chum channel site assessment;
- Objective 2: Lower Columbia River chum salmon stock status review;
- Objective 3: Develop a supplementation/reintroduction strategy for Lower Columbia River chum salmon;
- Objective 4: Population monitoring and evaluation program development;
- Objective 5: Grays River chum salmon supplementation;
- Objective 6: Removal of invasive vegetation in Hamilton Spring channel;

- Objective 7: Initiate Three Step Review for a least one top ranked project identified by the habitat restoration and chum channel site assessment.

Among the tasks to achieve these objectives there are several that may be scientifically justified if further evidence is provided. The purpose of this proposal is to integrate a variety of chum salmon assessment and restoration actions – some of which are new, some that have been completed (the recovery plans), and some that are ongoing but currently without funding (Grays River supplementation). Integration of these chum salmon restoration activities is encouraged. The ISRP finds that the proposal itself would benefit from better organization and presentation of more thorough background on the various activities to be integrated, including an explanation of the need for the integration and a summary of the outcomes from past work. In particular, scientific justification for the actions based on limiting factors analyses is required. This proposal is a good place to begin this integration. Restoration of Lower Columbia River chum salmon is obviously important, yet the sponsors do not clearly describe how this new plan will differ from or be a substantial improvement over the existing (previous) planning efforts. General and specific comments to improve the proposal follow.

The following areas require further justification or information:

1. Provide more specific information on factors shown to cause declines in Lower Columbia River chum salmon.
2. Describe in adequate detail how the proposed efforts will meld with similar activities of Oregon Department of Fish and Wildlife and other entities.
3. Describe the experimental design for Objectives 2 and 4 (stock status review, population monitoring). These objectives should precede any prescription or rehabilitation plans; i.e., assess limits to population growth, including harvest.
4. Present a schedule of activities. The timelines for completion of Objectives 2 and 3 by February 2010 appear optimistic.
5. Clearly define the specific benefits of the combination of habitat restoration for wild fish and supplementation, including a description of how these elements operate in a mutually beneficial way to restore the chum salmon run.
6. Describe the adaptive management experiment. The proposal indicates planning for adaptive management of the existing chum salmon supplementation program. Adaptive management *sensu Walters, Hilborn et al.* is an experiment. A description should be added of how planning for adaptive management of such a program is to be conducted; e.g., what sorts of adaptive management experiments could be designed, what hypotheses would be tested, and what the experiments would have to take into account.
7. Provide a clearer description of what is the reintroduction aspect versus the supplementation aspect of the proposal. Except where needed to rescue a severely diminished local chum population (and where harvest control and/or rapid habitat restoration could not accomplish

that), there does not seem to be adequate justification presented for the proposal's "supplementation" component, that is, the artificial propagation that constitutes true supplementation. The proposal's artificial propagation components that are for *reintroduction* may be justified, however.

In the 2007-09 review of 20071500 – Expand salmonid monitoring in Grays River to meet monitoring needs identified in the Lower Columbia Salmon Recovery and Subbasin Plan and maintain at risk chum salmon population through supplementation, the ISRP concluded that:

“What is missing ... is any indication that the performance of the natural population can be improved based on the inherent performance of a hatchery stock. It is questionable that a supplementation program will accelerate effort to sustain wild production or maintain or improve conditions for wild fish. The supplementation portion of the proposal is not as important as the monitoring portion until a better understanding exists of stock status and trends. However, the issue of supplementation can be addressed more thoroughly during a Three-Step Review.” (See attached below.)

That conclusion remains applicable to this proposal. The lack of clarity in identifying any limiting factors suggests that it is not known why the chum stocks have declined. Also, the sponsor needs to consider potential hatchery/wild impacts. In addition, how do these recovery efforts consider inter-species issues? To what extent will enhanced chum (fry) merely become forage for enhanced coho, Chinook, steelhead, cutthroat trout, etc? The usual argument from managers in support of supplementation as a restoration strategy is that there is intact, under-seeded, spawning and juvenile rearing habitat; i.e., the life-stage with excessive mortality is in habitat outside of the freshwater spawning and rearing domain. The proposal implies that with chum salmon the limiting condition is spawning habitat. It is not clear how supplementation is intended to ameliorate this bottleneck.

ISRP Comments by Proposal Section

1. Technical Justification, Program Significance and Consistency, and Project Relationships (sections B-D)

This is a proposal to develop a plan for an integrated program of habitat restoration, supplementation/reintroduction, and monitoring and evaluation for Lower Columbia River chum salmon recovery. The technical justification is not sufficient for reviewers to determine whether the proposed new integrated plan is necessary. There is already an existing integrated plan (Lower Columbia Fish Recovery Board [LCFRB] Salmon Recovery Plan 2004). It would be valuable to identify how this proposed planning process differs from, is similar to, or extends the efforts under the LCFRB Salmon Recovery Plan.

In a table, the sponsors list three BPA-funded projects and state that these “will be incorporated into population M&E plan developed in this proposal for implementation in FFY 2010.” The sponsors do not describe their actual plan for coordinating with other projects or time sequencing.

On Page 2, the sponsors state that “Harvest, habitat degradation, changes in flow regimes, riverbed movement and heavy siltation has (sic) been largely responsible for [Lower Columbia River chum salmon] decline.” Based on material presented in the proposal and accompanying references, it is not clear to reviewers that the sponsors know the exact factors leading to the sharp decline in chum salmon in the Lower Columbia River. Sponsors indicate that they seek to identify limiting factors, which suggests that they are not known (p. 13). The minimal list of studies specific to Lower Columbia River chum in their cited literature suggests that little is known about the ecological factors responsible for chum declines in the Lower Columbia River. The few references to the Lower Columbia River stocks involve mostly past monitoring activities, trends, and little in the way of substantive ecological analyses. The Johnson et al. (1997) review is useful, but covers the entire range of chum, with relatively little on the Lower Columbia River. It would be helpful for the authors to identify specific cases and locations in the Lower Columbia River where factors such as sediment, loss of habitat diversity, competition, predation, etc. have presented problems, and to give evidence that these are specifically identified problems in the Lower Columbia River rather than just general concerns.

The effects of harvest must be effectively addressed. The first paragraph of section D (p. 14) says WDFW has worked to reduce harvest but does not quantify the effect of harvest on the chum populations and effectiveness of the WDFW efforts to restrict harvest. Also, there is a need to clarify what the prospects are for eliminating Lower Columbia River chum harvest (mixed-stock, incidental take?), which would seem necessary if populations are so low.

Even with this lack of references to specific ecological factors leading to stock depletion in the Lower Columbia River, the sponsors provide a very extensive categorized assessment of potential threats to recovery. It has been prepared for every stream in the Washington portion of the Lower Columbia River. The approach is not quantitative but is at least based on ranked responses to recommended actions. Although the rankings are adequately described, additional support and justification for the assignment of rankings would be beneficial.

On the positive side, the LCFRB has identified a detailed 6-year habitat work schedule (<http://www.lcfrb.gen.wa.us/2008%20HWS.htm>) for implementation of its habitat restoration strategy. The LCFRB also sponsors community-based work groups to develop and implement watershed specific habitat restoration plans. Much planning at the watershed level has obviously already been conducted. How will the proposed planning activities complement or add to this previously conducted work?

The proposal would benefit by effective presentation of evaluation of results from the many years of previous effort by WDFW and others on habitat improvement and supplementation of chum salmon. For example, in proposal section D, relationships to other projects (p. 14), it is stated: “In 2001, WDFW and the PSMFC received Bonneville Power Administration (BPA) funding (project # 2001-053-00) to construct/restore spawning channels in Duncan Creek and evaluate two reintroduction strategies, recolonization of the channels through release of adult spawners into the channels, and direct plants of hatchery reared fed-fry released at the mouth of Duncan Creek, and natural recolonization via straying.” What are the results, and how do they pertain to the proposed project? A quantitative summary of the results of Duncan Creek, Grays

River, and Hood Canal chum salmon supplementation projects is needed if this restoration strategy is going to be proposed for additional locations in the lower Columbia River. This summary should provide evidence of the degree of success of those programs.

How likely it is that hatchery supplementation will help the situation? Hatcheries have clearly had some significant successes in terms of providing fish for harvest in areas farther north. Without a clearer idea of limiting factors in the Lower Columbia River, however, the expanded hatchery supplementation effort might at best be viewed as experimental and at worst as potentially harmful. It is increasingly well established that artificially-reproduced salmon in hatcheries results in decreased in-the-wild reproductive fitness of offspring, often within only one or two generations. The proposal does not discuss how the FY 2009 development stage of the program will consider this. To what extent may taking wild chum salmon, especially from the low populations, for spawning in hatcheries damage rather than “enhance” wild populations? Elsewhere, a modeling approach (AHA) has been used to assess supplementation options, and that approach may be useful here.

Even if the hatchery effort is viewed in a positive way as experimental, the authors of the proposal do not clearly discuss the specific ecological rationale for proceeding with supplementation. The rationale can and should be discussed clearly and succinctly. For example, in Johnson et al. (1997), WDFW discusses the possible interactions between hatchery and wild fish associated with supplementation. It is mentioned that whereas some view the stocking of hatchery fish on top of the wild fish as potentially further depressing wild fish, some evidence suggests that the hatchery fish may buffer the wild fish from excessive predation, i.e. suppressing the effects of compensatory mortality on wild fish at low stock sizes. The hatchery fish may thus protect wild fish at an early vulnerable stage, resulting in more recruitment. None of this rationale and supporting evidence is presented in the proposal to be evaluated and weighed by reviewers for potential benefits and cost to wild fish and to chum stock rebuilding. As written, the proposal thus seems to be an amalgamation of stock enhancement through a mixed bag of habitat restoration work and hatchery supplementation, with very little indication of how the sponsors view the two main activities as interrelated and how they see the two approaches working together for the rebuilding of chum salmon.

A project-relationship question involves the relation between Oregon and Washington recovery efforts. The authors indicate that for Oregon Lower Columbia River salmonid populations, a similar recovery planning process is underway as depicted for WA streams. Where exactly is Oregon (especially ODFW, but also others) in this habitat evaluation process? No data are presented in Table 5 on the status of Oregon chum salmon, nor is there anything in Table 7 on what monitoring efforts Oregon is planning to undertake. Chum may stray as much or more than some other species as part of their evolved life history strategies, and it is entirely possible that hatchery and monitoring efforts developed will impact Oregon efforts. How do Oregon efforts enter into the proposed activities? How closely are the agencies working together on Lower Columbia River chum issues? Oregon and Oregon stocks are mentioned, but that is the extent of it. The sponsors should indicate how thoroughly Washington and Oregon have coordinated their activities and planning on chum salmon.

2. Objectives, Work Elements, and Methods (section F)

Objective 1: Habitat restoration and chum channel site assessment.

This objective is to develop a prioritized list of potential habitat restoration projects. The sponsors list criteria/metrics to be used to rank projects but do not explain methods or reference studies used to calculate these metrics or overall ranking.

Objective 2: Lower Columbia River chum salmon stock status review.

This objective is to update the Lower Columbia River status review of genetic population structure and abundance. Methods involve DNA (microsatellite analysis and otolith mark analysis of samples collected in 2003-08.) No experimental design/power analysis is provided. There is a “shopping list” of statistical methods for the genetic analysis, but what hypotheses will be tested? Their timeline to have all of the proposed work done by Feb. 2010 does not seem realistic.

Objective 3: Develop a supplementation/reintroduction strategy for Lower Columbia River chum salmon.

The sponsors propose to develop a “strategy.” It’s not clear what this means or what methods they will use. Completion of this objective seems to rely on completion of Objective 2 – but both will be completed by February 2010. How are Oregon efforts to be melded with the efforts proposed here?

The literature shows that chum salmon use the estuary for rearing, and habitats in the lower Columbia River and estuary are likely to be important. For example fry from the Duncan Creek population join the lower river/upper estuary just below Bonneville, 140 mi from the river mouth. The sponsors should therefore integrate their strategy with LCREP and other groups concerned with estuarine habitat restoration (in addition to researchers involved in BPA project 20030100 (Historic Habitat Opportunities and Food-Web Linkages of Juvenile Salmon in the Columbia River Estuary and Their Implications for Managing River Flows and Restoring Estuarine Habitat). A balanced restoration program that provides rearing as well as spawning habitat is required if supplementation/reintroduction is chosen as a strategy.

The strategy should also consider limiting factors in the northeast Pacific Ocean.

Objective 4: Population monitoring and evaluation program development.

This objective needs to be tied to the subbasin plans and the Fish and Wildlife Program. The experimental design explanation is insufficient. The ISRP suggests that the sponsors work with a specialist to develop a statistically valid design for population estimation (Objectives 2 and 4).

Objective 5: Grays River chum salmon supplementation.

Is this program successfully producing adult returns?

Objective 6: The authors indicate that proposed vegetation removal in Hamilton spring channel will be evaluated by comparing the pre- and post-treatment percent of open spawning area/gravel. The pre-treatment condition will be documented by determining the percent of total wetted area within the spawning channel that is covered by vegetation. A post-treatment survey

will be done and the change in percent area covered will be used to measure the success. A more meaningful evaluation would involve assessment of spawners as the key response factor in the evaluation. A plan for such an evaluation is required.

Objective 7: Initiate Three-Step Review for at least one top-ranked project identified by the habitat restoration and chum channel site assessment.

No schedule or methods are provided and are required for review.

3. M&E (section G, and F)

Among the five “groundwork” components listed for FY 2009, the emphasis for the years of program operation may be on items (3) Adaptive management of existing supplementation programs, including continuation of the Grays River program, and (4) Development of a stepwise enhancement program that utilizes supplementation/reintroduction to rebuild Lower Columbia River chum populations. The amount of staff time and other resources (and budget) allotted each of the five groundwork components is not shown.

“Effectiveness monitoring” is mentioned once on page 7 and twice on page 19, but the proposal never says what this category of monitoring is nor what it will measure nor how it will be conducted.

Page 8—Table 4: The terms “primary” and “core” are used without definition. Word search can find definition for “primary” buried in the last paragraph of page 14, and, although “core” is mentioned as an LCFRB and TRT designation in item 1 on page 16, the term does not seem to be explained anywhere in the proposal.

Attachment: Related 2007-09 Review

http://www.nwcouncil.org/fw/budget/2007/reviews_detail.asp?id=508

200715000 - Expand Salmonid Monitoring in Grays River to Meet Monitoring Needs Identified in the Lower Columbia Salmon Recovery and Subbasin Plan and maintain an at risk Chum Salmon Populations through Supplementation

Sponsor: Washington Department of Fish and Wildlife (WDFW)

Province: Columbia Estuary **Subbasin:** Grays

Budgets: FY07: \$305,800 FY08: \$191,100 FY09: \$200,400

Short description: Supplementation of chum salmon through artificial propagation and associated monitoring.

ISRP final recommendation: Fundable in part

Comment (from response loop):

Fundable for monitoring the salmon populations at a level to achieve the subbasin plan schedule. Fundable for supplementation at a level sufficient to initiate Step One of a Three-Step Review.

In the preliminary review, the ISRP raised questions about the essential need to collect abundance data from the Grays River, since other intensive monitoring was taking place in the lower Columbia River and estuary. It was not clear to the ISRP that these data collections were called for in the subbasin or recovery plan. The sponsors clarified that the Lower Columbia Fish Recovery Board's Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan serves as the "subbasin" plan for the Grays River and has been adopted by the Council and accepted by NOAA Fisheries as the recovery plan for this region. The sponsors also clarified that the Grays River is not part of the State of Washington's Intensively Monitored Watershed program, but instead was recommended for in-depth biological monitoring by the subbasin plan, and that this proposal is consistent with that recommendation. They attached the recommended monitoring schedule.

The ISRP also questioned the basis for initiating supplementation for chum salmon in the Grays River. The sponsor response to the ISRP questions regarding the assessments on which supplementation for chum salmon is based were inadequate. They identified the biological status review and listing decision for these species, a genetic analysis of Columbia River chum salmon, the history of recent habitat disruptions from winter storms, Washington Department of Fisheries and Wildlife risk/benefit assessment for supplementation, and a completed Hatchery Genetic Management Plan. It appears that the agency position is that supplementation is necessary to avoid possible catastrophic losses because of limited spawning areas. The ISRP understands that supplementation is intended to improve the status of natural populations when spawning and juvenile rearing habitat is underseeded. What is missing from this section is any indication that the performance of the natural population can be improved based on the inherent performance of a hatchery stock. It is questionable that a supplementation program will accelerate effort to sustain wild production or maintain or improve habitat for wild fish. The supplementation portion of the proposal is probably not as important as the monitoring portion until a better understanding exists of stock status and trends. However, the issue of supplementation but can be addressed more thoroughly during a Three-Step Review.