

Council Document ISRP 2000-5

**Independent Scientific Review Panel  
for the Northwest Power Planning Council**

Review of the Yakama Nation's Mid-Columbia Coho  
Reintroduction Feasibility Project

**Partial Step Two of the Northwest Power Planning Council's  
Three-Step Review Process**

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# ISRP Partial Step Two Review of the Yakama Nation's Mid-Columbia Coho Reintroduction Feasibility Project

## Review Process

On March 24<sup>th</sup>, 2000, the Northwest Power Planning Council requested that the ISRP review the Yakama Nation's Mid-Columbia Coho Reintroduction Feasibility Project. The review is a partial step two review under the Council's Three Step Review Process and is intended to address the Council's Fiscal Year 2000 funding decision regarding the project. The ISRP's review is provided below in three sections: 1) Recommendations and Findings, 2) General Comments, and 3) Specific ISRP Reviewer Comments. The Specific Reviewer Comments are incorporated in the three-step review template submitted by the Yakama Nation.

## I. Recommendations and Findings

In the Council's Fiscal Year 2000 funding decision on the Mid-Columbia Coho Reintroduction Feasibility Project, the Council recommended that full funding be withheld until the project sponsors provided adequate information related to the bulleted items listed below. The Yakama Nation provided the ISRP with documents addressing each of the items. The ISRP's recommendations and findings on each item are provided under each bullet. More detailed ISRP comments are provided in the two later sections.

- The Council requested a detailed written report describing the background, methods, data collected, discussion and analysis of results, and problems encountered on the Methow coho reintroduction.

The Council's request for information on results from the Methow effort originated from concerns raised by the ISRP in its review of this project's Fiscal Year 2000 proposal. The ISRP felt that before abandoning efforts in the Methow River Basin and pursuing reintroduction in the Wenatchee River Basin, the reintroduction efforts in the Methow should be fully analyzed. To address this issue, the Yakama Nation provided the 1999 Annual Report (Dunnigan 1999), which describes research results for this project and includes work performed not only in the Methow but also in the Wenatchee and Yakima basins. We were impressed with the breadth of perspective and coverage of the literature demonstrated in that report. The report is well written and covers the issues well. In addition, the cover letter provides a good summary and that, along with other reports adequately explain the change in emphasis from the Methow to the Wenatchee River. Enough work will continue in the Methow to ensure that useful information can be obtained from work previously done.

- The Council requested a policy and scientific rationale for the decision to switch the emphasis of the reintroduction project to the Wenatchee sub-basin.

The Council's request for information on the switch also originated from concerns raised in the ISRP's earlier review. The ISRP commented that there needed to be more complete justification for shifting the emphasis of the effort from the Methow River to the Wenatchee River. The ISRP

now finds that the documents provided in the present process include more information on that subject, supporting the shift.

- The Council requested a three-step review for the project.

The ISRP recommends that the Mid-Columbia Coho Reintroduction Feasibility Project pass the partial step two review. The project should proceed to the next step in the Three Step Review Process, with the condition that additional plans for monitoring and evaluation include effects of the fishery and that other concerns expressed in the ISRP's general and specific comments are addressed.

- The Council requested a detailed study plan describing the proposed work.

The Yakama Nation provided its recently completed Hatchery and Genetics Management Plan as the project's study plan. In addition, we were supplied with a document entitled "Mid-Columbia coho salmon study plan" prepared by the Yakama Indian Nation Fisheries Resource Management Program, dated 11/25/98, which includes more detailed information on the proposed work. As described above as a condition to passing this partial step two review, the ISRP finds that the current study plan needs to improve.

The plan should be supplemented to:

- 1) Provide a specific statement of goals in terms of numbers of coho adults and/or of smolt to adult return rates that are expected to constitute success in reestablishment or at least to render unnecessary further hatchery plants or supplementation with artificially reared coho;
- 2) Modify monitoring and evaluation procedures to clarify how time-limited objectives will be measured (see ISRP comments on Question 1.1);
- 3) Discuss the possibility that further facilities may not be needed and the conditions that would enter into making that decision;
- 4) Respond to the general and specific comments provided below.

## II. General Comments

The plan would benefit by inclusion of ideas that will clearly distinguish the effort from earlier failed efforts to reestablish coho.

A. Harvest Rates as Limiting Factors. The Study Plan identifies factors limiting coho salmon enhancement in the mid-Columbia Basin as "...lower mainstem Columbia River and ocean harvest rates and smolt mortality within the mainstem Columbia, Yakima and Wenatchee/Methow river basins." (page 12). The documents we reviewed do not adequately deal with the issue of the possible effects of fisheries on the research project and the success of reestablishment of coho. The assumption that NMFS requirements for protection of endangered stocks will encompass benefits for upper river coho may or may not be warranted. The consideration of harvest as a limiting factor that could affect the success of the project, or affect its evaluation, was incomplete in the description of the research design, leaving too much to be filled in by the reviewer. Existing fisheries are described on pages 16 and 17 of the HGMP, but the reviewer looks for an analysis of how these fisheries might affect the study, specifically in the monitoring and evaluation phases. It appears that up to 50% of the coho may be taken below Bonneville Dam. Then it appears that the counts at Bonneville Dam are used as a basis for assuring that 50% of the total run succeeds in passing beyond Bonneville. Presumably, this includes the ocean and mainstem removals. An additional 10% may be removed in upriver fisheries, for a total harvest rate of 60%. This fishing rate might be too high for mid-Columbia stocks to tolerate. There is no discussion of this question. The discussion concludes by asserting that harvest rates would be adjusted annually, once the escapement goals are agreed upon and established by all relevant parties, presumably following successful reintroduction into mid-Columbia tributaries. Harvest rate might be a significant limiting factor on potential production of stocks in the mid-Columbia, and failure to address this issue could doom the "research" project to failure. The only way to find out is to mark experimental fish with coded wire tags and allow their capture in the fishery.

One of the objectives of the study is to measure the rate of survival from the smolt to adult stage. This would be accomplished by applying coded wire tags to "naturalized" juveniles beginning in the year 2002 (p. 42 and Table 9, p. 43) and observing the rate of return. However, it is stated that those fish so tagged would not be adipose clipped. Is the purpose of this procedure to avoid their being kept in the selective fisheries? They would thus presumably be treated by fishermen as wild fish and released if caught in the selective fisheries described as taking place in the ocean and mainstem. On the other hand, in the early years, 1999, 2000, and 2001, no coded wire tags would be applied to "transfer" fish. As we understand it then, these early "transfer" fish (if fin-clipped as hatchery fish) would be subject to the fishing rates that occur in the ocean and mainstem – or would they also not be fin clipped? Measurement of the adult return is planned to be made from counts in the fish ladders. For the Wenatchee River, for example, the estimate would come either from the counts at Rock Island Dam minus the counts at Rocky Reach Dam, or alternatively from counts at Tumwater Dam (HGMP, page 45, and Study Plan, page 34). This method will provide no estimate of the numbers of fish that might have been removed in the ocean or mainstem fisheries. Application of coded wire tags to the "transfer" fish would also make it possible to document straying (if they are fin-clipped so they can be identified as having a coded wire tag).

It would be shortsighted not to include estimates of fishing rate in the research design. Estimates should be obtained of harvest rates that occur on the study fish and to be expected if reestablishment were to occur. If test fish are treated as though they were wild fish, not subject to fishing, then no information will be obtained on probable fishing rates to which they will be subjected when the project succeeds, making later decisions on appropriate harvest rates for the fishery difficult. In summary, further thought needs to be given to this subject. Perhaps there should be a mix of fin-clipped and non-clipped fish in each group.

B. Monitoring and Evaluation. There is a considerable amount of monitoring being carried out in this project, and it is generally well reported. There are a number of facilities already in place to facilitate monitoring and evaluation. The breadth of perspective and coverage of the literature demonstrated in the 1999 Annual Report (Dunnigan 1999) are commendable. The report is clearly written and covers the issues well. However, we have several suggestions for additional monitoring and evaluation.

Given the very substantial investment in this effort, it is somewhat disturbing that there is no attempt to estimate the probability of success or establish criteria for measurement of success in establishing naturally spawning self-sustaining populations of coho salmon in the mid-Columbia Basin. There seems to be a belief that the long-term project will succeed, but there is no attempt to estimate the smolt-to-adult return rate that would be required to sustain a natural population. The 1998 Study Plan (Section 4.2.1) mentions the question, but does not carry it far enough to reach a conclusion. Based on other studies of natural production of coho smolts, a range of necessary smolt-to-adult survival rates should be calculated. That rate should be compared with current rates experienced for hatchery stocks in the mid-Columbia tributaries (Yakima and Methow), at least as a benchmark for how significant an improvement in this survival rate will be required. The needed increase will probably be substantial and should be specified.

Another concern, related to that above, is what appears to be an incorrect use of juvenile survival rates in the HGMP (pp. 19-20). These rates were used to estimate the female escapement and adult coho escapement required to achieve the smolt carrying capacities derived by methods of Reeves et al. (1989). There seem to be four problems:

- 1) It would seem to require twice the number of females indicated in Table 5 to achieve the smolt natural stocking capacities listed. For example: for Nason Creek,  $854 \text{ (females)} \times 2,750 \times 0.6 \times 0.8 \times 0.75 = 845,460 \times 0.5 = 422,730 \text{ (smolts)}$ , whereas the table indicates 427 females to give a comparable number. Thus the numbers for female and adult escapement given in the table should be doubled.
- 2) However, the adjustment has to be much greater than that. If those life-stage-specific survival rates are in fact from Lestelle, they represent what he calls benchmarks, maximum rates in the absence of any density effects and in optimum habitat. Neither of these conditions apply in this example, thus it is unrealistic to use those figures in the way they appear to have been used here. At smolt carrying capacity those rates would be substantially lower. As calculated, the egg to smolt survival is 18%. For a long run of years in the Oregon Coast range, egg to smolt survival averaged 3-4%. These values may not be typical of the mid-Columbia, but they come from relatively good habitat. Consequently, the numbers of returning adult females necessary to achieve the juvenile

carrying capacities are substantially higher than the corrected values in Table 5. Hence smolt-to-adult survivals needed for sustainability will be much higher than would be indicated with those figures.

- 3) The proposal should recognize that the use of Reeves et al., 1989 to estimate juvenile carrying capacity is based primarily on data from coastal populations. Adjustments probably will be needed to relate to mid-Columbia tributaries, where carrying capacities for coho probably are lower. To arrive at estimates of carrying capacity it might be more realistic to use historical estimates of adult numbers (given on page 17 of the HGMP), adjusted downward in consideration of habitat degradation.
- 4) The female sex ratio does not appear to include the number of jacks, which could be misleading.

Though the attempt to determine spawning success of hatchery-reared adults in the wild is to be commended (1999 Annual Report, Chapter 3), the experimental design (Study Plan, Section 4.1.3) is weak, for at least two reasons. Most importantly, lacking direct comparison of the success of naturally produced and hatchery-produced adults, the substantial variation in egg to fry survival rates and effects of gravel quality virtually guarantee that the comparison to literature values will be a test with very little power. The gravel sampling procedure is also questionable. Samples taken adjacent to the redd will not characterize conditions in the egg pocket (see Chapman, 1988, TAFS 117:1-21 and 1990, 119:156-164) and will provide only very general information about redd selection.

C. Other. There are some other concerns for which it is not easy to find a home among the many questions on the form. Some of these are listed below:

- 1) We are pleased to see some attention to the problem of return timing of naturally spawning adults (1999 Annual Report, Chapter 3), and that the original timing of coho in the mid-Columbia was somewhat similar to the early-run fish that are being used for reintroduction. Potential interactions with chinook could very much depend on emergence timing of the two species in systems where they both spawn. Existing temperature records could be used to estimate probable time of emergence for these coho to compare with the chinook. The EA (p. 5) downplays the possibility of interaction between coho and chinook because acclimation sites for release of coho smolts would be downstream of spring chinook spawning/rearing reaches, so that returning adults would home there and not move upstream. That may be true in the short term, but with the intention to develop naturally spawning populations, it is to be expected that coho would eventually move as far into the headwaters as they can penetrate, and consequently interact with juvenile chinook. The work by Spaulding et al. (1989) seems to suggest that the introduction of hatchery coho into a wild population of chinook will not significantly disrupt the chinook population, but it will be prudent to study interactions if and when coho establish natural populations themselves. Such studies are mentioned, but are said to be beyond the time frame of the current proposal. Of course, if there are adverse effects on the endangered chinook it will be difficult to mitigate them at that point in time.
- 2) The relative quality of juvenile rearing habitat in each basin should be more thoroughly addressed. The shift in emphasis from the Methow to the Wenatchee River, would seem

to require some discussion of differences in quality of habitat that might be available within the tributaries themselves.

- 3) It would be useful to see reference to “success stories” if they exist. Are there documented cases where hatchery coho (or other salmon, steelhead) have established naturally spawning, self-sustaining populations, or where hatchery stocks have successfully increased the abundance of wild stocks that were at a very low level? If so, what can be learned from them?

### **III. Specific ISRP Reviewer Comments that Address the Council's Three Step Review Questions**

Specific ISRP review comments that address the Council's Three Step Review Questions are incorporated in the Yakama Nation's submittal. This section includes the Council's specific three-step question (red in the electronic document), the Yakama Nation's response (black in the electronic document), and the ISRP's review comments (blue in the electronic document).

#### **INTRODUCTION**

The Mid-Columbia Coho Reintroduction Feasibility Project is studying the feasibility of re-establishing naturally reproducing coho in mid-Columbia basins, from which they have been extirpated for many years. The Northwest Power Planning Council has requested a review of this project under its three-step review process.

The Hatchery and Genetics Management Plan (HGMP) (YN et al. 1999), completed in December 1999, is the latest and best-developed plan for the Mid-Columbia Coho Project, and has provided significant new detail beyond the project as described in the April 1999 Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) (USDOE BPA 1999). Because at this stage the project is considered a research rather than a production project (although up to 1.4 million smolts are proposed to be released), the project's scope, goals, and impacts are best understood if reviewers read the HGMP in the order in which it is written. However, the attachments requested by the Council for its three-step review direct the reviewer to specific places in several documents that discuss issues of concern.

The following project-related documents are cited in answers to the questions below. Text highlighted in red (electronic version) represents guidance and questions from Council documents.

**HGMP:** Yakama Nation, Washington Department of Fish & Wildlife, and Bonneville Power Administration. December 1999. *Hatchery and Genetics Management Plan, Mid Columbia Coho Reintroduction Program*. Portland, OR.

**Dunnigan 1999:** Dunnigan, James L. October 1999. *Feasibility and Risks of Coho Reintroduction in Mid-Columbia Monitoring and Evaluation, 1999 Annual Report*. Bonneville Power Administration Project Number 69604000.

**BiOp:** NMFS. June 1999. *Biological Opinion: 1999 Coho Salmon Releases in the Wenatchee River Basin by the Yakama Indian Nation and the Bonneville Power Administration*. U.S. Department of Commerce, NMFS, Northwest Region.

**EA:** U.S. Department of Energy, Bonneville Power Administration. April 1999. *Mid-Columbia Coho Reintroduction Feasibility Project Final Environmental Assessment and Finding of No Significant Impact [FONSI]*. USDOE/EA-1282, Portland, OR.

**Study Plan:** Yakama Indian Nation, Fisheries Resource Management Program. November 1998. *Mid-Columbia Coho Salmon Study Plan 11/25/98*. Prepared for Bonneville Power Administration. Portland, OR.

**D&H 1998:** Dunnigan, J. and J. Hubble. August 1998. *Results From YKFP and Mid-Columbia Coho Monitoring and Evaluation Studies*. Prepared for the Mid-Columbia Technical Work Group.

## ANSWERS TO ATTACHMENT 1:

### Program Language Regarding Master Planning Requirements

#### 7.4B.1 Master Planning

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

#### Question 1.1: Project goals

HGMP:	Section 1.6 (p. 6)
EA:	Sections 1.1 & 1.2 (p. 1-2)
Study Plan:	Section 1.4 (p. 8-9, overall research objectives. Includes Yakima basin, some results from which could be applicable to other mid-Columbia basins)

**ISRP Reviewer Comments:** Specific numbers of returning adults that satisfy the requirements for reestablishment should be specified. Lacking that criterion, there are no standards for deciding when supplementation should terminate. Also, coho numbers could conceivably increase to numbers that would adversely affect other salmonids.

The long-term goal, to reestablish naturally reproducing populations of coho salmon in mid-Columbia tributaries, is identified as an “optimistic” goal “...that may take many years to achieve”. One wonders whether an even more optimistic possibility should be considered. Suppose the introduction of small numbers of coho results in immediate establishment of self-sustaining populations. While experience in the recent past has led us to expect less, it is perhaps worth remembering that planting of small numbers of salmon has, in some locations, resulted in successful introductions in relatively short time spans. It appears that the impact statement and study plan are actually taking a rather pessimistic attitude toward the possibility of success, rather than an optimistic one. This may be justifiable, based on local experience, but it seems the alternative should be discussed.

The project is further justified and described as “research”, in contrast to an action plan, and in this way avoids some of the sticky questions that are glossed over in the EA, such as the potential for significant competition and predation by coho on chinook and sockeye. While such predation is likely to be minimal, or at least tolerable, the issue takes on a different perspective when one considers the possibility of successful introduction from small numbers. Again, that likelihood seems small, but real.

#### Question 1.2: Measurable and time-limited objectives

HGMP: Section 1.7 (p. 7)

**ISRP Reviewer Comments:** It is not clear that the monitoring effort will make it possible to measure the time-limited objectives. For example, table 1 specifies a short-term objective of achieving 539 adults returning to the Wenatchee River in 1999, based upon numbers of smolts available for release. These numbers would increase to 1,027 in the years 2000 through 2005. The plan will depend upon counts of coho at the mid-Columbia dams to assess rates of adult return of the juveniles. It is not clear that a difference of the magnitude specified can be measured and interpreted with confidence, given the wide variability usually encountered in adult return numbers.

As noted in the general comments, numbers counted at the dams would fail to include fish that might stray or be intercepted before they arrive at the dams. The result would be an underestimate of the actual success of the project. This is a question that needs to be addressed in the study. An adequate number of all test fish should be marked with coded wire tags and adipose clips beginning immediately, so that subtractions prior to counting at Priest Rapids or Rock Island dams can be accounted for. Recoveries of marked “transfers” could provide useful information that could help explain small return numbers to the dams or other adult counting stations.

### **Question 1.3: Factors limiting production of the target species**

At this point in studying the feasibility of reintroducing coho to mid-Columbia basins, factors limiting production are uncertain. Major questions being addressed in the study include whether a lower Columbia River stock can be successfully adapted to the longer migrations necessary to reach mid-Columbia basins; and whether coho interactions with listed and sensitive species in these basins will threaten those other species. Release numbers and locations (which affect production) are being limited for the feasibility study period to minimize risks to other species. Production levels for the feasibility phase also are limited by the need to use excess space at existing facilities: it does not make economic sense to build substantial new facilities until more data show that coho have a reasonable chance of being successfully reintroduced without significant risks to other species.

Factors limiting higher production levels in the long-term would be evaluated once feasibility studies show that it is appropriate to consider "full implementation" of the project.

**ISRP Reviewer Comments:** See general comments and comments under Question 1.1. Plans for “full implementation” ought to consider the possibility that additional facilities may not be needed.

### **Question 1.4: Expected project benefits (e.g., gene conservation, preservation of biological diversity, fishery enhancement and/or new information);**

Attempts to restore species extirpated from a particular area are rare. In the near term, feasibility studies will provide valuable information on the ability of an anadromous salmon species to adapt to ecological conditions different from its genetic origin. If successful at meeting its long-term goal of re-establishing a species that previously occupied this environment while minimizing risks to other species, the project would increase the current diversity of species in the mid-Columbia area and enhance the coho fishery. See also HGMP: section 1.8 (p.7-8).

**ISRP Reviewer Comments:** One has to agree that species diversity would be increased if the project is successful.

**Question 1.5: Alternatives for resolving the resource problem**

Because coho have been extirpated from the mid-Columbia region, the problem is considered to be whether coho can be re-established in self-sustaining populations while minimizing risks to other species. Under this definition of the problem, alternatives were defined in terms of varying scopes of research to begin to answer the feasibility questions, and secondarily, to assess alternative research locations.

EA: Chapter 2 (p. 6-18)  
FONSI: Full document

**ISRP Reviewer Comments:** Alternatives were considered.

**Question 1.6: Rationale for the proposed project**

See response to Question 1, Attachment 1 and the cover letter to this submittal.

**ISRP Reviewer Comments:** Adequately discussed in the documents cited.

**Question 1.7: How the proposed production project will maintain or sustain increases in production**

Not applicable at this time. If feasibility studies show coho return in sufficient numbers to sustain a locally adapted broodstock and natural populations, proposals will be made and evaluated for how production could be increased while minimizing negative interactions with other species.

**ISRP Reviewer Comments:** The response needs to be clarified with specific goals to be used in the decision on termination of the supplementation effort. See comments under Question 1.1.

**Question 1.8: The historical and current status of anadromous and resident fish in the sub-basin**

EA: Sections 3.2.2 and 3.2.3 (p. 25-30)

HGMP: Section 2.2 (p. 12-14); section 2.4 (p. 17-18)

**ISRP Reviewer Comments:** Given the difficulty of obtaining historic information, this subject is well covered in the documents.

**Question 1.9:** The current (and planned) management of anadromous and resident fish in the sub-basin

EA: Section 3.2.4 (p. 30-31)

**ISRP Reviewer Comments:** This subject needs amplification with respect to specific goals for the number of coho planned to be added to the total salmonid population.

**Question 1.10:** Consistency of proposed project with Council policies, National Marine Fisheries Service recovery plans, other fishery management plans, watershed plans and activities

EA: Section 3.2.4 (p. 30-31) explains other fishery management plans in the area and that the Mid-Columbia Coho project coordinates with managers and regulators of these plans.

HGMP: Section 2.1 (p. 11-12) explains the relationship to Council policies and to other plans in the area as known up to December 1999.

The HGMP has been submitted to NMFS for a Biological Opinion, which is expected in early spring 2000. No recovery plan for coho exists in the mid-Columbia region because the species is considered extirpated.

**ISRP Reviewer Comments:** The discussion in the HGMP could have been clearer. For example, from discussions elsewhere, it appears that the Columbia River Salmon Management Plan, mandated by the U.S. District Court in U.S. v Oregon and Washington, requires transfer of some juvenile salmon from lower river hatcheries to mid-Columbia tributaries. The current proposal is to study the effects of those transfers.<sup>1</sup>

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<sup>1</sup> A couple of minor points of clarification are hard to resist with respect to the statement at the top of page 12, “The U.S. District Court ruled on March 22, 1974 that the Yakama Nation and Washington Department of Fish and Wildlife co-manage fish resources in Washington state.” The decision (decree) was actually handed down on February 12, 1974. Judge Boldt’s choice of Lincoln’s birthday was deliberate and planned. It is true that he issued an injunction to assist in enforcing the ruling on March 22, 1974 after considering a motion for reconsideration made by the state of Washington, and some questions raised by the state. It is misleading to say that the decision calls for the state agency and tribes (Yakama Nation included) to “co-manage” the fish resource. The state had asked the court to rule that the Yakama Nation (and Quinault Tribe) do not meet the qualifications and conditions specified by the court in order to be self-regulating. The request was “Denied as to the Quinault Tribe; the required regulation was filed with the Court, March 18, 1974. Denied as to the Yakima Nation, effective when that tribe

**Question 1.11: Potential impact of other recovery activities on project outcome**

Conservation and recovery activities for other species in mid-Columbia basins (e.g., spring chinook, steelhead, sockeye) have strongly influenced the project's Technical Team in determining all project activities, including smolt release numbers, locations, and timing; broodstock collection locations and timing; and all research activities, especially those related to potential ecological impacts. The HGMP, section 2.4 (p. 17) describes in general terms the potential influence of habitat restoration activities on project outcome.

**ISRP Reviewer Comments:** Adequately considered. The reverse effect has been of more concern to the proponents, i.e. the effects of coho introductions on recovery activities for other species.

**Question 1.12: Production objectives, methods and strategies**

Study Plan: Section 1.4 (p. 8-9, overall research objectives)  
HGMP: Sections 1.9 - 1.12 (p. 8-10)

**ISRP Reviewer Comments:** As noted previously, the Study Plan identifies factors limiting coho salmon enhancement in the mid-Columbia Basin as "...lower mainstem Columbia River and ocean harvest rates and smolt mortality within the mainstem Columbia, Yakima and Wenatchee/Methow river basins." (page 12). We have previously discussed harvest rates as a limiting factor, and how the study should be modified to consider effects of harvest. Since smolt mortality is identified as a limiting factor, one would expect the plan to emphasize reduction of smolt mortality. While there is a discussion of the effects of dams on smolt survival, and this is used as justification for emphasizing the Wenatchee River in place of the Methow, there are other measures that might be undertaken, or at least discussed as possibilities in the plan.

For example, thought might be given to applying the so-called NATURES approach, where the juveniles are reared in an environment intended to mimic natural stream conditions, the idea being that when they are released they will respond more appropriately to the cues found in the natural environment, including seeking cover, responding to flows, and so on, which is expected to lead to higher rates of survival. Given that the tribe is employing this method elsewhere, it is surprising that it is not mentioned in this proposal.

Faithful homing seems to be crucial to the success of the program and is a factor in the rate of survival that will be measured. Previous experience leads us to believe that a portion of the test fish may return to the hatchery where they were reared, rather than the acclimation site. Any improvement in homing will result in an improved rate of measured "survival" to the tributaries where they were planted. The plan might discuss measures that could be employed to improve

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adopts a regulation comparable to that filed by the Quinault Tribe." While the ultimate effect of self-regulation led to the need for agreements on co-management, the term never appeared in any of Judge Boldt's rulings.

homing. For example, we did not find information on the length of time juveniles will be held in the acclimation ponds. This might affect their homing ability.

**Question 1.13: Brood stock selection and acquisition strategies**

HGMP: Sections 5 & 6 (p. 32-38)

**ISRP Reviewer Comments:** The approach is to bring lower river “common garden” fish into mid-Columbia River hatcheries for release. The next step would be to include returning fish in the hatchery broodstock in succeeding generations, but augment them with more common garden fish — the purpose of the continuation of the hatchery breeding and the augmentation being to keep high the effective population number of the founders of this new race. We suspect that coho have colonized all through their history with rather small  $N$ 's. They may not need large  $N$ 's (above 100? above 500?). We wonder whether repeated generations of reproduction in the hatchery, especially if augmented with common garden cousins, will be the most likely way to engender a wild-spawning population. Why not set a criterion of, say 500, over two sequential brood years, then breed only from successful coho returning to the project? Jacks could be used to increase  $N_e$  over the next generation. Has there been input from a geneticist on this issue?

**Question 1.14: Rationale for the number and life-history stage of the fish to be stocked, particularly as they relate to the carrying capacity of the target stream and potential impact on other species**

Smolts are being used for research:

- a. to reduce potential interactions with listed species—once they leave acclimation sites, they migrate quickly (HGMP, section 2.5; EA, section 3.3.1.2); and
- b. because we expect that smolt releases have the highest survival to the adult life stage, and therefore would be the most efficient method of re-establishing populations of coho in these areas.

Numbers to be released are calculated based on expected survival rates so as to allow sufficient returns to test whether a genetically viable and locally adapted broodstock can be established (HGMP: section 1.9, Table 1).

Release locations were chosen to minimize impacts to other species in the basin that are the subject of special management programs. Most acclimation/release locations are at or above facilities that allow most returning coho to be collected for broodstock, thus minimizing potential adverse F2 interactions between returning coho progeny and other sensitive species. The exceptions are Chumstick and Brender creeks in the Wenatchee basin. They were chosen to allow for potential natural spawning, but both are downstream of habitat for sensitive species (HGMP: section 2.2 [p. 12-14]).

The Yakama Nation also proposes conducting predation studies in the Yakima basin using naturally produced coho fry and fingerlings, partly because of the critically low numbers of chinook and steelhead in the Wenatchee and Methow basins. The transferability of the results from Yakima basin studies to other mid-Columbia basins is still being debated (Dunnigan 1999, p. 11-16).

See also: HGMP: Section 2.5 (p. 18-20, estimated carrying capacity and p. 21-29, ecological interactions); section 5 (p. 32, origin and identity of broodstock); section 10.4.2 (p. 45, monitoring of natural spawning); section 10.4.4 (p. 46-47, predation monitoring).

**ISRP Reviewer Comments:** Adequately discussed for the most part. See general comments (p. 2) regarding deficiencies in analysis of carrying capacity.

**Question 1.15: Production profiles and release strategies**

HGMP: Section 1.9 (p. 8-10); section 9 (p. 41).

**ISRP Reviewer Comments:** See previous comments, especially 1.12.

**Question 1.16: Production policies and procedures**

HGMP: Sections 5 & 6 (p. 32-38, broodstock); section 7 (p. 38, mating); section 8 (p. 39-40, incubation/rearing); section 9 (p. 41, release).

**ISRP Reviewer Comments:**

The HGMP at 7.1 speculates that ‘random’ mating would be used. What is the randomization procedure? How will spawners be rejected from the broodstock? Why not consider some form of selection? For example, assort spawners according to whether they successfully return to the mid river acclimation site. Include jack returns above their proportion — it would increase the representation of returning adults in the population. It would be best to use single pair matings — it will reduce variation of family size and its detrimental effect on  $N_e$ . Use a backup, bet-hedging male’s semen after a minute and before activation with water. It might be useful to divide each female’s eggs into multiple clutches, each fertilized with a separate male’s semen.

**Question 1.17: Production management structure and process**

Study Plan: Section 1.5 (p. 9-10)

HGMP: Section 1.3 (p. 1)

See also the response to Question 1, Attachment 2, on contributions of Technical Team and the project process.

**ISRP Reviewer Comments:** See previous comments.

**Question 1.18: Related harvest plans**

HGMP: Section 2.3 (p. 16-17)

**ISRP Reviewer Comments:** A rather general description of fisheries that take place on upper river coho is provided in the section referenced by the respondents, but the only plan referenced is the fishery management plan of PFMC, which relates to ocean harvest. Of primary concern however, is the issue of whether the proposal for reestablishment of coho in the mid-Columbia is consistent with harvest plans that could affect coho reestablishment. The response and the documents provided do not adequately deal with this issue. The Study Plan identifies factors

limiting coho salmon enhancement in the mid-Columbia Basin as “...lower mainstem Columbia River and ocean harvest rates and smolt mortality within the mainstem Columbia, Yakima and Wenatchee/Methow river basins.” (page 12). Realistically, the fisheries are likely to be a significant if not determining factor in the ability to interpret results of the research project, as well as the ability to establish and maintain self-sustaining populations of coho in the mid-Columbia tributaries. The reviewer looks for an analysis of how these fisheries might affect the study, specifically in the monitoring and evaluation phases.

**Question 1.19: Constraints and uncertainties, including genetic and ecological risk assessments and cumulative impacts**

- D&H 1998: Research results from studies through August 1998 (includes Yakima basin).
- EA: Section 3.3.1.1 (p. 32-33, genetics impacts); section 3.3.1.2 (p. 33-44, ecological interactions); section 3.6 (p. 61-63, cumulative impacts).
- Dunnigan 1999: 1999 research results (includes Yakima basin).
- HGMP: Section 2.5 (p. 18-30, ecological interactions); sections 5.3 (p. 35) & 6.3 (p. 38) (broodstock); section 8.6 (p. 40, rearing space); section 9.8 (p. 41, release numbers); sections 10.3 & 10.4 (p. 44-48, research).

**ISRP Reviewer Comments:** It is possible for molecular geneticists to follow family lineages of colonists from this program, as the colonists propagate in space and time. It would be a valuable insight into how coho evolve. It would be valuable (perhaps even crucial) to evaluating the success or failure of this effort at reestablishment. It may be this is already part of the program’s thinking. It’s not clear from reading the HGMP

**Question 1.20: Monitoring and evaluation plans, including a genetics monitoring program**

- HGMP: Section 10 (p. 42-48)

**ISRP Reviewer Comments:** Monitoring and evaluation plans need to be improved in line with comments above. See also the recommendation in Question 1.19 relating to the genetic monitoring.

**Question 1.21:** Conceptual design of the proposed production and monitoring facilities, including an assessment of the availability and utility of existing facilities

HGMP: Section 1.4 (p.2-6); section 6 (p. 35-37, broodstock collection facilities)

EA: Section 3.4 (p. 44-57 [proposed and alternative sites changed somewhat as project was modified under the HGMP]).

**ISRP Reviewer Comments:** Adequately discussed.

**Question 1.22:** Cost estimates for various components, such as fish culture, facility design and construction, monitoring and evaluation, and operation and maintenance.

See Attachment 4.

**ISRP Reviewer Comments:** Cost estimates are provided.

## ANSWERS TO ATTACHMENT 2:

### Questions Identified in the September 1997 Council Policy Document for FY98 Project Funding

**Question 2.1:** Has the project been the subject of appropriate independent scientific review in the past? If so, how has the project responded to the results of independent review?

**Response:** A program for coho reintroduction has been reviewed and supported in a number of policy and planning documents, including the *Wy-Kan-Ush-Mi-Wa-Kish-Wit* (Tribal Restoration Plan) and the Northwest Power Planning Council's Fish and Wildlife Program (measures 7.1H, 7.4A, 7.4F, and 7.4O) (see EA, section 1.1, p.1).

Development of the research into the feasibility of coho reintroduction in mid-Columbia basins has been guided by a Technical Team, consisting of state, federal, and tribal biologists and managers. Reviewers, researchers, and geneticists from NMFS' Science Center in Seattle have participated actively in designing appropriate research, and state and federal fisheries managers have worked with tribal project managers to develop release numbers and locations for the research that will minimize risks to listed species in the subject basins.

Specifics of the project have evolved since analysis of its effects first began in late 1998 as part of Bonneville Power Administration's (BPA's) Environmental Assessment (EA) of the decision to fund the feasibility research. Both Technical Team and public concerns influenced changes to the proposal. Section 1.5 in the EA (p. 5-6) describes how comments during scoping of the EA influenced the alternatives and the analysis. Appendix A to the EA summarizes the concerns and issues that still existed after the draft EA was reviewed by participating agencies and the public, and provides BPA's responses to those concerns.

In June 1999, NMFS prepared a Biological Opinion on the project, according to its responsibilities under the Endangered Species Act. In its opinion, NMFS made certain conservation recommendations (BiOp, Section VII, p. 25-26) and set certain terms and conditions (BiOp, Section IX-C, p. 29-31). A major condition was a requirement for a six-year plan, the result of which was the HGMP.

The HGMP further refined project activities and represents a consensus of the project's Technical Team and agency/tribal policy representatives, including NMFS and USFWS participants. The plan currently is in final official review by NMFS in Washington, D.C. An opinion is expected in late March or early April 2000.

**ISRP Reviewer Comments:** The project has been reviewed by those named in the response, but the reviewers seem to have taken a rather narrow focus, perhaps depending upon their agencies' particular responsibilities. The cover letter from the tribe (of March 24, 2000) mentions that the ISRP reviewed the proposal to BPA during the FY 2000 review process. The ISRP felt that there needed to be more complete justification for shifting the emphasis of the effort from the Methow River to the Wenatchee River. The documents provided in the present process include more information on that subject, supporting the shift.

**Question 2.2:** Have project sponsors demonstrated adequately at earlier stages that the project is consistent with the Council's policies on artificial/natural production in Section 7 (the specific concern of the Panel)? If not, can these points be demonstrated now?

**Response:** See answers to Attachments 1 and 3. Also relevant are responses to Attachment 5.

**ISRP Reviewer Comments:** The response is too broad to evaluate. However, since the transfer of coho is mandated by U.S. v Oregon and Washington, a research project to evaluate the results would seem to be a logical requirement stemming from any Council policy.

**Question 2.3:** Is the final design of the project consistent with any master plan and preliminary design?

**Response:** No major facilities are being constructed for this feasibility phase of the project. Limited development of acclimation sites is proposed, as described in the EA, section 3.4.1.3, p. 47-57.

**ISRP Reviewer Comments:** No final design is proposed at this time.

**Question 2.4:** If not, do the changes raise any underlying scientific questions for further review?

**Response:** Not applicable.

**ISRP Reviewer Comments:** Agree.

**Question 2.5:** Has information about the project or its purposes changed in such a way to raise new scientific concerns?

**Response:** Not at this time. Chapter 1 of the EA describes the project need and purposes (sections 1.1 and 1.2); and the near- and long-term decisions to be made (section 1.4). The HGMP (section 1.6) further refines these purposes. As described in response to Question 1 in this attachment and in the cover letter, the project has been modified several times to respond to scientific concerns and will continue to adapt as research contributes answers to the feasibility questions (see HGMP, section 1.6.2).

**ISRP Reviewer Comments:** Adequately covered.

**Question 2.6:** Has the underlying science or the way it is understood changed so as to raise new scientific issues?

**Response:** Not at this time. See responses to Questions 1 and 5 in this attachment.

**ISRP Reviewer Comments:** Agree.

**Question 2.7:** How technically appropriate are the monitoring and evaluation elements of the project?

**Response:** The Monitoring and Evaluation program has been developed by the Technical Team, with substantial review as described in the response to Question 1 in this attachment. The M & E program is described in detail in section 10 of the HGMP, p. 42-49. The proposed monitoring and evaluation elements described in the HGMP will be critical to gauging project performance.

**ISRP Reviewer Comments:** We recommend some additions as stated in responses above.

**Question 2.8:** Are there ways to obtain the same production benefits with facilities that are lower in cost or less permanent, should monitoring and evaluation later indicate that the effort be abandoned?

**Response:** Because the project currently is considered research, high-cost, permanent facilities have not been proposed. Every effort is being made to use existing hatchery facilities and acclimation sites that already exist or that require minimal development (EA, section 3.4, p. 44-57; HGMP section 1.4, p. 2-6 and section 6, p. 35-37). BPA's finding of no significant impact under the EA was based partly on limiting the majority of facilities needed for feasibility work to those that already exist.

**ISRP Reviewer Comments:** It is unlikely that lower cost facilities could be developed for this phase of the project.

## ANSWERS TO ATTACHMENT 3:

### Program Language Identified by the ISRP

**Question 3.1:** Measure 7.0D: Comprehensive environmental analysis assessing the impacts on naturally produced salmon of hatchery produced anadromous fish.

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

**Response:** The EA and FONSI deal with the questions of interactions of hatchery produced salmonids and naturally spawning salmonids and steelhead in the Columbia Basin for the feasibility phase of this project. See Mid-Columbia Coho Reintroduction Feasibility Project EA (p. 33-42) and FONSI (p. 4-6). See also BiOp (p. 14-25); HGMP (section 2.5.2, p. 21-30); and Dunnigan 1999. The issue of competition between species is a longer-term effect that is acknowledged as a potential in all these documents. However, because coho returns are expected to be relatively low for the period of the feasibility studies, and because natural spawning is planned only for streams with no known listed populations, studies confirming the significance of the potential likely will be conducted only in the Yakima basin until the Technical Team determines that numbers of returning adults to other basins would make such studies necessary and meaningful (HGMP, section 10.4.5.2, p. 47-48).

**ISRP Reviewer Comments:** The issues are dealt with as far as possible. As for competition, there is evidence in the literature that competition will occur. While some small increase in total salmonid production would be expected to occur, reestablishment of coho in the mid-Columbia tributaries will require that some species make living space available. In this case, it would seem that steelhead would be the most likely candidate for making this adjustment, since they tend to occupy the same smaller branches of tributaries (as a general rule). The decision to reestablish coho is a policy (or legal) decision that appears to have been made. Biologically, there would be a trade-off.

On page 28 of the HGMP it is stated that "Project participants expect to implement competition studies when numbers of naturally reproducing fish in the target basin are adequate to make such monitoring possible." It should be recognized that at that point, it might be too late to turn back, and the study would become nothing but an academic exercise with no practical application.

**Question 3.2:** Measure 7.1A: Evaluation of carrying capacity and limiting factors that influence salmon survival.

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

Question 2a: How does the project intend to address the issue of carrying capacity within the watershed(s) into which fish will be placed?

**Response:** HGMP: Section 1.6.1 (p. 6); section 1.9 (p. 8); section 2.5 (p. 18-20).

**ISRP Reviewer Comments:** See general comments on monitoring and evaluation, p. 2.

Question 2b: Do these fish originate from the most appropriate native stock? Specifically, how will the artificial production which is proposed impact natural production?

**Response:** HGMP: Sections 5 and 6 (p. 32-38) discuss the broodstock to be used. Because coho have been extirpated from the mid-Columbia region, there is no natural coho production. Natural donor stocks outside of the Columbia River basin were considered (i.e. Upper Fraser River basin in British Columbia), but trans-boundary and disease policy constraints precluded this as a viable possibility.

**ISRP Reviewer Comments:** The stock chosen appears to be the only option available. Furthermore, the Management Plan in *U.S. v Oregon and Washington* appears to call for transfer of these fish in any case.

Question 2c: What are the impacts on mainstem and ocean harvest? How are these impacts addressed?

**Response:** Adult returns are not expected in sufficient numbers to affect harvest during the period of the feasibility studies. See EA, section 3.6.4 (p. 63); and HGMP, section 2.3 (p. 16-17).

**ISRP Reviewer Comments:** The reverse effect is most likely, i.e. ocean and mainstem harvest could adversely affect the project, and to an unknown degree, unless some changes are made in the monitoring and evaluation steps, as noted in our general comments, p. 3.

**Question 3.3:** Measure 7.1C: Collection of population status, life history and other data on wild and naturally spawning populations of salmon and steelhead.

Measure 7.1C calls for the collection of population status, life history and other data on wild and naturally spawning populations of salmon and steelhead. The primary question we would like to have addressed with regard to this measure, especially with regard to listed species is:

Question 3a: What biological baseline information on naturally spawning populations of salmon and steelhead have been collected, and what high priority populations and "provisional population units" have been identified?

**Response:** There are no naturally spawning populations of coho in the target basins. What little is known of their historical life cycle is described in the EA, section 3.2.2. Information on other high priority species in these basins and their status is discussed in the EA, section 3.2.3, and the HGMP, section 2.2.

**ISRP Reviewer Comments:** Adequately discussed.

**Question 3b:** Does this baseline information include a profile on the genetic and morphological characteristics of wild and naturally spawning populations? What characteristics are to be maintained by management actions?

**Response:** There currently are no naturally spawning coho populations in the target basins. The HGMP, section 10.4.3 (p. 45-46) describes the genetics monitoring program.

**ISRP Reviewer Comments:** There are genetic profiles of all of the salmon populations in the mid-Columbia tributaries, with the exception of coho, and coho have not been in existence during the time when such profiles were possible. With respect to the genetic monitoring to take place under this program, the description is sketchy — not very specific about what traits will be included. It does not review the literature. But the principal topics are there.

**Question 3c:** What are the limiting factors for wild and naturally spawning populations?

**Response:** See the EA, section 3.2.1 and the HGMP, section 2.4. In addition, a limiting factor for establishing naturally spawning coho populations is whether their presence poses a significant risk to other sensitive species, a major focus of research for this project. It is also possible that the length of their migration and the number of dams coho must pass will be limiting factors (Dunnigan 1999, p. 47).

**ISRP Reviewer Comments:** The Study Plan identifies factors limiting coho salmon enhancement in the mid-Columbia Basin as "...lower mainstem Columbia River and ocean harvest rates and smolt mortality within the mainstem Columbia, Yakima and Wenatchee/Methow river basins." (page 12). See the General Comment at the beginning of this ISRP review.

We feel that a more complete discussion of available potential habitat for coho could have been provided. The method of estimating carrying capacity used in the HGMP tends to be somewhat detached from ground-truth observations on the fish themselves that might be deduced from information in Mullan et al., 1992.

**Question 3d:** What is the natural carrying capacity for the identified populations?

**Response:** HGMP, section 2.5.

**ISRP Reviewer Comments:** See general comments p. 2.

**Question 3e:** What monitoring of identified populations of salmon and steelhead is identified as part of the project?

**Response:** The M & E program is described in detail in section 10 of the HGMP, p. 42-49.

**ISRP Reviewer Comments:** See previous comments.

**Question 3f:** Are these efforts being coordinated with NMFS? If so, how?

**Response:** Yes. See response to Question 1, Attachment 2 and the cover letter.

**ISRP Reviewer Comments:** Adequately considered.

**Question 3.4:** Measure 7.1F: Systemwide and cumulative impacts of existing and proposed artificial production projects on the ecology, genetics and other important characteristics of the Columbia River Basin anadromous and resident fish.

Measure 7.1F calls for a study to address the system wide and cumulative impacts of existing and proposed artificial production activities on the ecology, genetics and other important characteristics of Columbia River Basin anadromous and resident fish. This study is to be coordinated with the genetic impact assessment of Columbia River Basin hatcheries called for in measure 7.2A.2 of the Council's program. How does the project's environmental assessment address the direct, indirect and cumulative effects of the proposed production activities on anadromous and resident fish? Have those effects commonly associated with cumulative hatchery releases -- density dependent, competition, predation, disease transmission and genetic effects on other fish in the mainstem and oceanic environments been addressed? If so how? Have the genetic effects of the project on fish within and outside the Columbia River Basin been specifically addressed?

**Response:** The EA, chapter 3, discusses all the effects listed above (genetic effects, including straying [section 3.3.1.1]; competition, predation, disease transmission [section 3.3.1.2]; cumulative effects, including migration corridor impacts [section 3.6]). Ecological interactions are further discussed in the BiOp (p. 14-25, including oceanic impacts); the HGMP (section 2.5); D&H 1998; and Dunnigan 1999.

**ISRP Reviewer Comments:** Adequately considered.

**Answers to Attachment 4:**

**Fiscal Questions Relating to the Step 3 Review**

1. What are the final cost estimates for Fiscal Year 1999 through 2008 for construction, operation and maintenance, and monitoring and evaluation for the project?

**Response:** See tables below.

2. Are these cost estimates different from preliminary design estimates? If so, please explain.

**Response:** Not applicable; see below.

3. Has a value engineering review been performed by BPA to ensure that cost-effective alternate measures are not overlooked? What are the results of the review?

**Response:** See "Response" under "Schedule for Development" below.

*(Project #9604000 Evaluate the Feasibility and Risks of Coho Reintroduction in Mid-Columbia) Project2*

*(Version – March 24, 2000)*

*Schedule for Development*

<u>Facility</u>	<u>Step 1 Com- pleted</u>	<u>Step 2 Com- pleted</u>	<u>Step 3 Com- pleted</u>	<u>Final Design Completed</u>	<u>Construction Initiated</u>	<u>Construction Completed</u>	<u>Operation Begins</u>
Element 1							
Element 2							
Element ...							

**Response:** *The table above is not filled in because the project has not yet determined if it is feasible to re-establish coho in the mid-Columbia. No proposal exists at this time for a central coho hatchery supplementation facility or other facilities requiring significant design or construction efforts. However, costs of such a facility in today's dollars are estimated below, in the event the project determines that re-establishing coho would be feasible.*

*Estimated Cost Expenditures and Future Needs*

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<sup>2</sup> It would be helpful if this form is completed and provided in an electronic version. This draft form will be provided upon request.

**Response:** *The future costs estimated below assume that the feasibility phase of the project determines that the project will be successful at re-establishing coho within acceptable risk parameters. The estimates assume that a central coho hatchery supplementation facility would need to be constructed; however, a full range of alternative ways to implement coho reintroduction would be evaluated in an EIS that likely would be prepared on such a proposal.*

Planning so far has cost **(\$225,000)**. Construction of the **(acclimation/release sites and modifications to Winthrop and Entiat NFHs)** is estimated to cost **(\$944,000)**. **Construction of a new central coho hatchery in the mid-Columbia is estimated to cost (\$8,500,000)**. Annual operation and maintenance costs after all facilities **(including a new central hatchery)** are fully developed would cost about **(\$950,000)**. Monitoring and evaluation is estimated to cost about **(\$580,000)** annually. These cost figures are based on estimates from **project planning**. Cost of **(preliminary)** design for the **(acclimation and central hatchery)** is estimated to be about **(\$105,000)**.

**Costs to Date<sup>3</sup>**

FY	90	91	92	93	94	95	96	97	98	99
Planning	NA	NA	NA	NA	NA	NA	\$.03	\$.03	\$.025	\$.140
Land Purchase	NA	NA	NA	NA						
Construction	NA	\$.05	\$.174	\$.125						
O&M	NA	NA	NA	NA	NA	NA	\$.075	\$.099	\$.175	\$.190
M&E	NA	NA	NA	NA	NA	NA	\$.0385	\$.145	\$.250	\$.245

**Future Costs<sup>4</sup>**

FY	00	01	02	03	04	05	06	07	08	09
Planning	\$.01	\$.205	\$.195	\$.405	\$.30	\$.205	\$.06	\$.055	\$.035	\$.025
Land Purchase	NA	NA	NA	NA	\$.90	\$.250	NA	NA	NA	NA
Construction	\$.02	\$.275	\$.250	\$.02	\$.03	\$4.55	\$4.02	NA	NA	NA
O&M	\$.03	\$.9135	\$.992	\$.9265	1.2555	\$1.409	1.6665	\$.869	\$.803	\$.7605
M&E	\$.04	\$.4935	\$.494	\$.5365	\$.5815	\$.642	\$.9095	\$.632	\$.633	\$.6305

<sup>3</sup> Costs are in millions of dollars.

<sup>4</sup> Costs are in millions of dollars.

**ISRP Reviewer Comments regarding Attachment 4 questions:** Estimated costs are provided.

## **Responses to Attachment 5:**

### **Policies of the Artificial Production Review, Report and Recommendations (Document 99-15)**

**5.1. The manner of use and the value of artificial production must be considered in the context of the environment in which it will be used.**

The analyses in the EA, BiOp, and HGMP demonstrate that project sponsors and the Technical Team have considered effects to other aquatic species and to terrestrial species as well as physical impacts of site development and improvements.

**ISRP Reviewer Comments:** Agree.

**5.2. Artificial production must be implemented within an experimental, adaptive management design that includes an aggressive program to evaluate benefits and address scientific uncertainties.**

The project history demonstrates adaptive management at work (see cover letter for this submittal). The M&E program as described in the HGMP indicates the mechanisms by which project managers and decision-makers will continue to consider and evaluate information to further adapt the project as necessary.

**ISRP Reviewer Comments:** Monitoring and evaluation need improvement as previously noted. The institutional mechanisms for adapting the program that should occur in light of monitoring and evaluation are not clear. The decision-makers are not identified. It is not specified how the information from the monitoring program will be organized and made available and to whom, nor how or when the program will be revised, redirected, or otherwise modified.

**5.3. Hatcheries must be operated in a manner that recognizes that they exist within ecological systems whose behavior is constrained by larger-scale basin, regional and global factors.**

Because the project as currently constituted is using existing hatcheries with already established mandates and goals, it is a given that operations devoted to this project are constrained by the existing ecological environment and by larger-scale basin, regional, and global factors.

**ISRP Reviewer Comments:** The project neglects the larger-scale effect of harvest on its outcome. Improvements in monitoring and evaluation are needed, as previously specified. The

possible effects of shifting a portion of lower river production to the upper river is an element that deserved discussion in an ecological context beyond the discussions of predation and competition that are provided.

5.4. A diversity of life history types and species needs to be maintained in order to sustain a system of populations in the face of environmental variation.

If successful at meeting its overall goal of re-establishing a species that previously occupied this environment while minimizing risks to other species, the project would increase the diversity of species in the mid-Columbia area.

**ISRP Reviewer Comments:** Agree. See previous comments.

5.5. Naturally selected populations should provide the model for successful artificially reared populations, in regard to population structure, mating protocol, behavior, growth, morphology, nutrient cycling, and other biological characteristics.

The HGMP defines the practices that are intended to achieve the project's long-term goal of re-establishing a self-sustaining, naturally reproducing coho population.

**ISRP Reviewer Comments:** No such options for use of naturally selected populations are available in this situation.

5.6. The entities authorizing or managing an artificial production facility or program should explicitly identify whether the artificial propagation product is intended for the purpose of augmentation, mitigation, restoration, preservation, research, or some combination of those purposes for each population of fish addressed.

The artificially produced fish are intended for research into the feasibility of restoring populations of coho into areas from which they have been extirpated.

**ISRP Reviewer Comments:** While the documents attempt to classify this as a research project, they also acknowledge that the long-term goal is to restore harvestable populations. It therefore represents a combination of restoration, augmentation, and research. The research component described in these documents is an essential component of any such attempt at restoration or augmentation.

- 5.7. Decisions on the use of the artificial production tool need to be made in the context of deciding on fish and wildlife goals, objectives and strategies at the subbasin and province levels.

The EA and the HGMP indicate that the feasibility studies have been planned in the context of broader regional goals, objectives, and strategies. The project's managers, who include the members of the multi-agency Technical Team, will continue to respond to overall sub-basin and regional issues and concerns.

**ISRP Reviewer Comments:** In the present case, regional managers appear to have agreed upon this project as an initial step. It is not too early for them to begin to consider the possible effects of success on regulation of the harvest of the mixed coho stocks (in the ocean, mainstem, and tributaries) in order to permit adequate numbers of spawners from this project to reach the mid-Columbia tributaries.

- 5.8. Appropriate risk management needs to be maintained in using the tool of artificial propagation.

The HGMP specifies the full range of risk management goals, objectives, practices, and monitoring to which this project is committed.

**ISRP Reviewer Comments:** The risks are identified and discussed.

- 5.9. Production for harvest is a legitimate management objective of artificial production, but to minimize adverse impacts on natural populations associated with harvest management of artificially produced populations, harvest rates and practices must be dictated by the requirements to sustain naturally spawning populations.

The HGMP indicates that the project's long-term vision is to re-establish self-sustaining coho populations in harvestable numbers; however, the near-term goal is simply to see if self-sustaining populations can be re-established.

**ISRP Reviewer Comments:** See previous comments on this subject.

- 5.10. Federal and other legal mandates and obligations for fish protection, mitigation, and enhancement must be fully addressed.

This project is being proposed and funded under auspices of the Northwest Power Planning and Conservation Act, with its mandate to protect, mitigate, and enhance fish and wildlife resources in the Columbia River basin. It has been and continues to be subject to all processes and reviews (including the current three-step review) required by the Northwest Power Planning Council.

The Endangered Species Act, as it applies to listed species both in and outside the basin, is addressed through the EA, the HGMP, BiOp, and ongoing consultations with and participation by NMFS and USFWS in project planning and implementation.

Other federal and state mandates and concerns, such as USFS and WDFW concerns with sockeye salmon in the Wenatchee, are addressed through the participation in the Technical Team of representatives of all federal, state, and tribal entities with responsibilities in the project areas.

The EA fully documents the project's compliance with federal and other legal mandates.

**ISRP Reviewer Comments:** This is a matter that is up to the federal entities to decide.