



Independent Scientific Review Panel

for the Northwest Power and Conservation Council

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Review of the
Yakima Subbasin Summer and Fall Run
Chinook and Coho Salmon Hatchery
Master Plan

Project # 1988-115-25

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

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Background

At the Northwest Power and Conservation Council's July 24, 2012 request, the ISRP reviewed the Yakama Nation's Master Plan titled *Yakima Subbasin Summer and Fall Run Chinook and Coho Salmon Hatchery Master Plan*, a component of Project 1988-115-25, *Yakima Klickitat Fisheries Project, Design and Construction*. This is a Step 1 review in the Council's Three Step Review Process. Step 1 is the feasibility stage, and all major components and elements of a project should be identified. This review focuses on the Tribes' responses to the Step 1 scientific review elements specified by the Council.

As described in the Master Plan, the Yakama Nation proposes to implement hatchery strategies that will contribute primarily to harvest and secondarily to cultural/conservation goals identified for Yakima coho and summer and fall Chinook. No substantial new production is proposed, according to the proposal. Two Chinook hatchery programs with distinct and separate purposes are proposed. One addresses the goal of reestablishing a locally adapted, naturally spawning summer/fall Chinook population in the Yakima River upstream of Prosser Dam. The other addresses the need to improve the performance of the Upriver Bright (URB) fall Chinook harvest program in the lower Yakima River (downstream of Prosser Dam). Two coho programs are proposed: a segregated harvest program in the lower Yakima River and a reintroduction program in the upper Yakima River.

Review Summary and Recommendations

Response Requested

The Yakama Nation prepared a comprehensive and fairly thorough Master Plan for its Yakima Subbasin summer/fall Chinook salmon and coho salmon hatchery programs. This plan builds upon the existing hatchery system by improving the hatchery infrastructure and modifying the program goals and objectives to better fit the needs of the Yakama Nation while also addressing most Scientific Principles in the Council's Fish and Wildlife Program. The goal of the proposed Yakama Nation program is to provide harvest opportunities for tribal members and others, while also developing sustainable natural populations of summer/fall Chinook salmon and coho salmon in the upper Yakima River watershed.

The ISRP requests a response from the Yakama Nation prior to Step 2. This response should provide key information that is currently lacking in the Step 1 documents and address inconsistencies in the proposed integrated salmon projects with the Council's Fish and Wildlife Program. Details of this request are described below.

Summer/Fall Chinook Program

As currently framed, the integrated summer/fall run Chinook and coho salmon reintroduction and harvest programs are not consistent with guidelines in the 2009 Fish and Wildlife Program (hereafter "Program"). For the summer/fall Chinook program, there is not clear evidence that the habitat will be suitable to maintain a self-sustaining population for the foreseeable future. Also the Master Plan clearly identifies that anticipated overall harvest level of 63% (transition phase; based on values in Table 3-7) is likely incompatible with restoring a self-sustaining population, and is therefore inconsistent with the Program. As described in the Program under Artificial Production Primary Strategies (pages 18-19), integrated programs can be used to complement habitat improvements by supplementing populations up to the sustainable carrying capacity of the habitat. For restoration, the Program states, "that eventually, after appropriate habitat improvements, they [the populations] will become self-sustaining." Under these guidelines, the ISRP expects that Ecosystem Diagnosis and Treatment (EDT), or some other modeling, will be used to demonstrate a reasonable likelihood that habitat restoration will lead to capacity sufficient for the population to be self-sustaining.

Under Harvest Strategies (pages 19-20), the Program states "there is little point in recommending funding for implementation of a subbasin plan when the objectives of the plan cannot be reached under current harvest regimes. If, for example, a wildlife mitigation project aims to re-establish an elk herd in a subbasin and existing regulations allow for overly aggressive harvest of the herd while it is first being established, there is good reason to doubt that the project will succeed." Under monitoring and reporting in the Harvest Strategies section the Program states "manage harvest to ensure that risk of imprecision and error in predicted run size does not threaten the survival and recovery of naturally spawning populations." In the long-term phase of the proposed Master Plan, the assumed average harvest rate is 68% on summer Chinook salmon, a level that seems unrealistic even if significant habitat improvements are made in the watershed. The ISRP believes that natural spawning Chinook populations would not be sustainable at this high harvest rate.

Therefore, the Master Plan should describe an experimental approach to evaluate natural spawning by hatchery returns and natural fish with recent hatchery pedigree to gain the information needed to determine a sustainable harvest rate for the natural population. In the near term, maintaining the current high harvest rate on the integrated population is not compatible with the Fish and Wildlife Program. The Master Plan should demonstrate, using existing data, how it will achieve a PNI of 0.5 or higher through harvest management, broodstock management, and habitat rehabilitation efforts. Objectives for the target proportion of NOR versus HOR on the spawning grounds should be stated and should be consistent with establishing a self-sustaining population (e.g., see Table 3-6). For Step 1, the ISRP would also like data on recent program performance and a general timeframe for achieving the transition to the integrated program. This information can then be used in the Master Plan to describe more realistic potential benefits of the project.

Coho Program

Habitat capacity standards for coho salmon were developed, but the values need clarification. In the Master Plan (page 90) habitat improvement is identified as having the potential to increase Yakima River coho production by 26 percent. In Appendix E, key assumptions under recent past productivity is given as 34 coho smolts per spawner and capacity of smolts is 72,059. Under Phase 4, smolts per spawner is 93 and capacity is 256,720 smolts. This future performance is substantially more than the 26 percent increase that was estimated on page 90. The Master Plan needs to provide a reasonable likelihood that habitat restoration will lead to this level of improvement or modify the future production values. Additionally, the assumed SAR of 5% for natural coho production during Phase 3 (Table 3-2) is considerably higher than the observed SAR (avg. 3.6%) during 2000-2010. This assumption likely leads to an overestimation of project benefits. Finally, the objective of >5,000 coho spawners during Phase 3 should identify the proportion of NOR and HOR spawners that is consistent with the transition to an integrated program.

Other Requested Information

A response is also requested for a succinct and complete summary table showing recent program performance for coho and Chinook salmon along with a table that provides proposed program metrics. The summary table should include metrics such as numbers of broodstock required, anticipated fecundity and eggs required, numbers of progeny produced and released, required post release life-stage survival. These data requirements, or “report card” metrics, were recently summarized by the ISRP in its review of the Lower Snake River Compensation Plan’s spring Chinook program ([ISRP 2011-14](#)). An example of the information needed by the ISRP are Tables 8, 9, and 10 on pages 33, 34, 37, and 38 in the Revised Master Plan for the Hood River Production Program (see Tables below). Some, but not all, of this information is distributed throughout the Master Plan. One of the ISRP’s responsibilities in conducting a Step Review for a hatchery master plan is to confirm that the values (numbers) provided for abundance, SARs, and harvest fractions are computationally accurate across life stages. This confirmation is not possible when the necessary information is presented across different sections of the plan. For example, it is not possible for the ISRP to establish a conclusion for initiation of phase 3 of the Lower Yakima Segregated Coho Program using Tables 3-1, 3-3, 2-4, and the discussion of the coho program in section 5.2.2. Additionally, when reporting status and trends of the program such as in Table 3-10, a comparison of observations with the program objectives should be provided so that program progress can be readily monitored. Finally, the Master Plan claims that the proposed programs will not lead to increased hatchery production, but this is not clearly shown in the Master Plan because there is no table directly comparing recent with proposed production of hatchery Chinook and coho salmon.

In addition to information related to the aforementioned issues, the ISRP is interested in responses to the following questions:

- a. How will the program keep hatchery salmon straying to less than 5%, and what is the disposition of returning hatchery adults that are not used for broodstock in the hatchery?
- b. What is the current level of mini-jack production, how do they affect existing population metrics, and what efforts are being used to reduce mini-jacks?
- c. How will harvest rates be controlled in order to rebuild the natural populations in the upriver basin? What is the planned harvest rate in relation to run size and how will this objective be achieved? Is there a plan to allocate harvests in the Yakima River to non-tribal sport anglers as well as Tribal anglers?

The ISRP looks forward to seeing the comprehensive monitoring and evaluation plans that will be essential to documenting progress against the goals and objectives of the program and for adaptively managing the program. In particular we hope that the proponents will describe how they will assess possible competition and predation interactions between project coho and summer Chinook on spring Chinook, steelhead, and other juvenile fishes in the basin. Water reuse at Marion Drain and Holmes Ranch along with salmon incubation at those same sites may increase the risk of disease. How will fish health at these sites be monitored and addressed? The status of the surface water supply at Prosser needs to be addressed as well as a final location for the Upriver Bright (UBR) fall Chinook rearing and acclimation site in the lower River.

Example Tables showing useful metrics:

Table 8: Numerical Fish Objectives and biological performance criteria for the Proposed Program, Showing Comparison to 1991 Objectives and Observed Averages for Each HRPP Stock

	1991 Objective by 2016		10 Year Average		Proposed Objective by 2018	
	Wild	Hatchery	Wild	Hatchery	Wild	Hatchery
Spring Chinook						
Adult Escape to Mouth of Hood R.	1,700		99	399	300	600
Adult Escape to Natural Production	400		98 ¹	148 ¹	205	8
Broodstock Collection	220		1	108	20	180
Harvest (Tribal & Sport)	1,080		U	83	30	318
Pre-spawning Mortality	NA		U	60	45	90
Smolt production	24,000	250,000	U	120,380	15,000	150,000
Egg-to-Smolt Survival	U	U	U	U	4.4%	78%
Smolt-to-Adult Survival	0.68%	0.68%	U	0.24%	2.0%	0.40%
Pre-Spawn Mortality	10%	10%	15% ²	15% ²	15%	15%
Tribal & Sport / Incidental Harvest	63%	63%	1% ¹	21% ¹	10%	53%
HOR Natural Spawn (<5%)	NA	NA	NA	151% ¹	NA	4%
HSRG Rules (>0.70)	NA	NA	NA	0.02 ¹	NA	0.73
Summer Steelhead						
Adult Escape to Mouth of Hood R. ³	8,000		300	852	510	NA
Adult Escape to Natural Production	2,400		210	175	408	NA
Broodstock Collection	160		35	3	0	NA
In-Basin Harvest (Tribal & Sport)	5,440		1	110	51	NA
Pre-Spawning Mortality	NA	NA	27 ¹	22 ¹	51	NA
Smolt Production	40,000		3,921	38,585 ⁴	7,500	NA
Egg-to-Smolt Survival	NA	NA	0.58% ¹	71.0%	1.0%	NA
Smolt-to-Adult Survival	NA	NA	7.5%	2.1% ⁵	5%	NA
Pre-Spawn Mortality	NA	NA	10% ²	10% ²	10%	NA
Tribal & Sport / Incidental Harvest	NA	NA	0% ¹	10% ¹	10%	NA
HOR Natural Spawn (5%)	NA	NA	NA	5% ¹	NA	NA
HSRG Ratio (>0.7)	NA	NA	NA	0.67 ¹	NA	NA
Winter Steelhead						
Adult Escape to Mouth of Hood R.	5,000		662	1,003	656	1,000
Adult Escape to Natural Production	2,400		515	370	465	24
Broodstock Collection	90		68	24	60	0
In-Basin Harvest (Tribal & Sport)	2,510		2	365	66	876
Pre-Spawning Mortality	NA		60 ¹	63 ¹	66	100
Smolt Production	85,000		8,718	57,286	9,370	50,000
Egg-to-Smolt Survival	NA	NA	0.9%	66.4%	1.0%	75%
Smolt-to-Adult Survival	NA	NA	8.1%	1.1% ⁶	7.0%	2.0%
Pre-Spawn Mortality	NA	NA	10% ²	10% ²	10%	10%
Tribal & Sport / Incidental Harvest	NA	NA	0% ¹	58% ¹	10%	88%
HOR Natural Spawn (<5%)	NA	NA	NA	75% ¹	NA	5%
HSRG Ratio (>0.7)	NA	NA	NA	0.64 ¹	NA	0.95

¹Computed value; ²Assumed value; ³Estimate assumed 10% catch and release mortality; ⁴Average for Hood stock releases (1992-2005); ⁵Based on 1998-2002 five year average; ⁶Based on 1993-2002 ten year average
U= unknown; NA = Not available

Table 9: New Biological Objectives for the HRPP

Factor	Spring Chinook		Winter Steelhead		Summer Steelhead	
	Wild	Hatchery	Wild	Hatchery	Wild	Hatchery
Adult Escape to Mouth of Hood R.	300	600	656	1,000	510	0
Adult Escape to Natural Production	205	8	465	24	408	0
Broodstock Collection	20	180	64	0	0	0
In-Basin Harvest (Tribal & Sport)	30	318	66	876	51	0
Pre-Spawning Mortality	45	90	66	100	51	0
Smolt Production	15,000	150,000	9,370	50,000	7,500	0
Egg-to-Smolt Survival	4%	78%	1%	75%	1%	0%
Smolt-to-Adult Survival	2.0%	0.4%	7.0%	2.0%	5.0%	0.0%
Pre-Spawn Mortality	15%	15%	10%	10%	10%	0%
Tribal & Sport / Incidental Harvest	10%	53%	10%	88%	10%	0%

Table 10: Summarization of Harvest and Escapement in the Hood River Subbasin (Olsen 2007) and the HRPP's Program Objectives

Year	Hood River Escapement	Hatchery		Natural Spawners	
		Brood	Harvest	Hatchery	Natural
1999	87	17	0	70	23
2000	148	0	0	148	64
2001	1,050	134	130	920	41
2002	1,041	149	118	923	70
2003	326	0	0	326	101
2004	260	110	0	260	136
2005	648	162	39	609	111
2006	926	233	0	926	298
Average	561	101	36	523	106
1991 Objective	1,700	220	1,080	400	
Proposed Objective	900	200	318	205	8

ISRP Comments on Step 1 Review Elements

The Council has emphasized that an important part of the Three Step Review Process includes an ISRP review of the responses to the technical elements listed below. The ISRP comments on how the Master Plan addresses the Step Review elements follow below.

A. All Projects

Does the Master Plan:

- 1) address the relationship and consistencies of the proposed project to the eight scientific principles (see 2009 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section B.2) (Step 1)?

The eight Scientific Principles:

1. The abundance, productivity, and diversity of organisms are integrally linked to the characteristics of their ecosystem.
2. Ecosystems are dynamic, resilient and develop over time.
3. Biological systems operate on various spatial and time scales that can be organized hierarchically.
4. Habitats develop, and are maintained, by physical and biological processes.
5. Species play key roles in developing and maintaining ecological conditions.
6. Biological diversity allows ecosystems to persist in the face of environmental variation.
7. Ecological management is adaptive and experimental.
8. Ecosystem function, habitat structure and biological performance are affected by human actions.

The Master Plan provides an adequate response to most of the eight scientific principles for both the Chinook and coho programs. The Master Plan recognizes the need to improve salmon habitat, describes ongoing habitat restoration efforts and also recognizes the right of the Yakama Nation to harvest salmon. The Master Plan presents a logical, initial framework for transitioning over time from hatchery-based harvests to harvests based on sustainable natural production and integrated hatchery production. It recognizes that this transition will require considerable improvements in habitat and that a sustainable natural population of summer/fall Chinook salmon is expected within 25 years. However, as described below, the ISRP has raised several concerns and identified some limitations.

Care will need to be taken to ensure that Principles Five and Six are met as the proposed projects may have unintended consequences on existing fish populations in the basin. For example, it is assumed that introduced summer Chinook will utilize spawning areas that had once been occupied by native Yakima River summer Chinook. Introduced summer Chinook are native to the Okanogan River and may possess energy reserves and maturation schedules which will allow them to penetrate much farther upstream. Hybridization with spring Chinook is highly unlikely because of maturation timing. Summer Chinook mature and spawn in mid-October through November which is later than the spring populations that spawn from mid-August through early October. However, summer Chinook may reproduce in areas that are being used

by Naches and upper Yakima River spring Chinook, and their juveniles may directly compete with spring Chinook juveniles for food and territories in these locations. Additionally, spring Chinook are known to move downstream over time, occupying and utilizing downstream habitats during the course of their freshwater life times. Thus, they may encounter resident summer Chinook in lower parts of the river and compete with them for food and other resources.

Potential deleterious interactions may also exist between juvenile steelhead, spring Chinook, bull trout, and other native fishes, as well as planted coho parr and coho juveniles produced by NOR adults. Previous work by the Yakama Nation suggests that risks associated with coho predation on juvenile salmonids are low. However, NOR coho and parr released into natural habitats may behave differently than the fish that were originally investigated. Collaborative work is currently taking place with WDFW that examines the biological effects of rearing coho on native fish populations in tributaries. The ISRP believes this is important work and encourages the Yakama Nation to continue this effort and also to examine potential competitive interactions between summer Chinook and other salmonid species in the Yakima watershed. Results of such work should be incorporated into the Yakama Nation adaptive management plan framework.

The Fish and Wildlife Program scientific principles establish a framework that defines and establishes the Program belief that both physical and biological environmental conditions in the subbasin provide opportunity for human manipulation (in this case restoration) while also constraining the eventual outcome from management strategies. Although the discussion in the Master Plan of these scientific principles acknowledges these opportunities and constraints, the plan itself appears designed around U.S. v Oregon production goals rather than an analysis of ecosystem capacity, i.e., salmon production that can be supported by habitat in the Yakima Basin. The Yakama Nation response to principle 1 for both the Chinook and coho components identifies that EDT and All-H Analyzer (AHA) modeling support the program. For the Chinook component, Appendix E is referenced for this modeling. Appendix E is a very brief summary of the program assumptions used in the in-season implementation tool. This summary is not sufficient for the ISRP to conclude that modeling ecosystem attributes supports the proposed program design. Elsewhere in the Master Plan, the proponents conclude that existing conditions are not adequate for re-establishing the Chinook and coho populations, and that habitat restoration will be essential for success. The difficulty for the ISRP is that the Master Plan states on page 90 that EDT analysis in the subbasin plan predicts a 26% increase of coho production – this improvement is not enough to meet the proposed program objectives. The ISRP needs to see a succinct summary of the recent population production metrics, that is actual population data, and those same metrics expressed as goals for the program. In addition, the required changes in subbasin conditions to achieve the increases and a plan to implement the habitat enhancements are needed.

Some assumptions for natural production seem unrealistic, e.g., a harvest rate of 63% on summer run Chinook during the transitional phase (Table 3-7); a high harvest rate on this population suggests that it would not be sustainable without considerable supplementation

from the hatchery. Likewise the harvest rate of 68% during the long-term phase seems unrealistically high, even after significant improvements to the habitat. Assumptions and implementation by the program of such high harvest rates on the natural populations would effectively constrain the population to one requiring supplementation rather than a natural self-sustaining Chinook population. A high harvest rates that inhibits natural self-sustaining salmon populations is not consistent with the Council's Fish and Wildlife Program.

- 2) describe the link of the proposal to other projects and activities in the subbasin and the desired end-state condition for the target subbasin (Step 1)?

The Master Plan provides details on how the Chinook and coho hatchery program relates to the existing hatchery program and ongoing habitat restoration efforts, including those supported by the Bonneville Power Administration and other funding sources. The Yakima Klickitat Fisheries Project is also briefly described. The Master Plan relates its activities to regional habitat strategies, including the Yakima Subbasin Plan.

The Yakama Nation through its YKFP project has established two laudable goals, to re-establish the salmonid species that once existed in the Yakima River watershed and to do so in a manner that protects extant fish species and populations. There is an ongoing program that supplements spring Chinook salmon in the upper Yakima River, and the current proposal calls for expansions of the fall Chinook and coho supplementation and reintroduction programs that are occurring in the watershed. Recently, sockeye salmon have been placed into Cle Elum Lake in an attempt to reintroduce this species. The Master Plan mentions all of these activities but tends to discount the potential risks of the reintroduction portions of the coho and summer/fall Chinook projects on other fish species in the basin. Additionally, sockeye may bring IHN into the watershed. The Master Plan should include the steps that will be taken to protect project fish from this virus and the protocols that will be followed if it is found on fish being reared by the project's facilities.

The Master Plan clearly states the desired end state condition for the Yakima Subbasin. The intent is to restore degraded habitat to the point where self-sustaining populations of coho, fall, summer and spring Chinook, steelhead, bull trout, and lamprey can exist and sustain some level of harvest. Treaty harvest obligations will likely be met by artificial culture into the foreseeable future. Additionally, a portion of the plan describes the likely effects of climate change on the basin and how these expectations are driving current thinking about where habitat restoration should take place.

Regarding harvests, the plan states that the Zone 6 regulations will be adjusted to ensure adult escapement targets for hatchery broodstock and natural spawning. The process for achieving this should be described, given the mixed-stock nature of the Zone 6 fishery.

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

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

The Master Plan describes many biological objectives of the four proposed projects. The segregated Upriver Bright fall Chinook and segregated coho programs are being used to meet harvest obligations defined by treaty rights. The two integrated programs, summer/fall Chinook and coho are designed for both harvest and conservation purposes, to reintroduce fish into portions of the Yakima River where they had existed prior to habitat degradation and over exploitation. Habitat restoration activities are taking place in the basin. These actions include reopening blocked areas, screening water diversions, reducing sediment loads from irrigation waters, and planting in riparian areas. Future restoration efforts have been prioritized in the Yakima River Subbasin Plan suggesting that habitat for project fish will be improving in the future.

Each project has definable phases with described end points. Once these points are reached, a set of prescribed actions is scheduled to take place. Chapter Three of the Master Plan describes how adaptive management plans for each project will be used. This chapter also describes an annual decision making process where the validity of key assumptions and status and trends data are evaluated and used to create annual work plans. Some key assumptions shown in the Master Plan seem unreasonable, for example, productivity (smolts/spawner) and SAR values for NOR Chinook and coho. The origin of these values is not disclosed. When reviewing Appendix E, there is no indication of how the numbers such as harvest and natural escapement were selected, or on what evidence they were based. Some of the harvest rate values on natural populations seem unrealistically high for a program attempting to build a self-sustaining population. We suggest that the proponents insert empirical data whenever it becomes available into their key assumption matrix to help develop their annual work plans. The use of empirical data is important because the proponents clearly state there are major habitat and other issues that may affect the proposed program's likelihood of success

The Master Plan provides adult abundance objectives and harvest objectives for each program component (e.g., Table 3-1 for coho and Table 3-6 for Chinook). Time frames for achieving goals for different phases are not entirely clear. The trigger to move from one phase to the next is not clear, and how progress should be evaluated over the time period of a phase is not discussed. Objectives for some attributes need refining. For example, for coho phase 3, the objective is 5000 (HOR +NOR) spawners. The ISRP believes that the HOR and NOR components need to be individually defined. For example, 4500 HOR + 500 NOR would be very different with regard to success and managing the integrated population, compared with say 1500 HOR + 3500 NOR. Also, the harvest objective for coho, 14,000 total for the segregated and integrated programs, needs to be broken into objectives for each program.

The importance of the status and trends tables (e.g., Table 3-10) is not clearly explained in relation to criteria or progress benchmarks. It would be useful if this table included proposed benchmarks and the basis for those benchmarks. The monitoring approach should also be identified.

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

The Master Plan describes anticipated benefits and provides a framework for eventually transitioning from harvests based on hatchery production to harvests based on both hatchery production and sustainable natural production. The Plan recognizes that considerable improvements are needed in the habitat to achieve the final goal of the program. Salmon harvests along with restoration and conservation of salmon populations are the key goals.

The expected benefits from each of the four projects are clearly defined in the Master Plan. The segregated hatchery programs for Upriver Bright Chinook and coho are expected to enhance marine and in-river fisheries including those in Zone 6 and in the Yakima River itself. The integrated programs for summer/fall Chinook are expected to increase biological diversity by reintroducing Chinook into the middle portions of the Yakima and Naches Rivers. Similarly, it is anticipated that the integrated coho program will promote the colonization of upper and middle tributaries in the Naches and Upper Yakima Rivers. Both integrated programs will also contribute fish to marine and in-river fisheries. The plan recognizes that considerable improvements are needed in the habitat to achieve program goals.

- 5) describe the implementation strategies (see 2009 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section D) as they relate to the current conditions and restoration potential of the habitat for the target species and the life stage of interest (Step 1)?

The Master Plan describes current status of coho and Chinook salmon in the watershed and factors that limit their productivity. Although the focus of this Master Plan is on artificial production and improving salmon harvests, the Master Plan provides reasonable detail on ongoing habitat projects and goals for restoring natural production of Chinook and coho salmon. The hatchery program is consistent with the strategy to use integrated hatchery brood stock for the portion of the watershed where habitat and population recovery efforts are underway, and a segregated hatchery strategy in the lower river where harvest is the primary goal. A key issue will be to manage the fishery in the lower river in a way to meet harvest objectives while also meeting conservation objectives in the upper watershed. The priority for choosing between potentially conflicting objectives should be quantitatively described, e.g., anticipated harvest rates on the natural populations in relation to their run size.

Current conditions and habitat limiting factors, mainly water temperature, flow, and impacts caused by logging, farming, and other anthropogenic disturbances are described. In the integrated programs the expectation is that HOR and eventually NOR adults will successfully spawn and produce offspring under existing conditions. The proponents have shown that this is possible for coho. Summer Chinook were introduced into the Yakima Basin in 2008. These fish

will most likely mature at age 4 and 5; therefore, some adults from this release should be returning this year. How successful they may be in producing offspring is unknown. Yet, in the Key Assumptions tables presented in the Master Plan, relatively high productivity and SAR values are given to NORs of both species. This seems to be linked to the idea that in-basin fish have been adapting to conditions in the watershed. Releases of coho parr will also occur along with pre-spawning adult coho. These releases are made into selected tributaries and used to “probe” the capacity of the existing habitat to produce coho. The relationship between the restoration potential of the basin’s habitat and the hatchery programs described in the Master Plan is briefly mentioned in that the ultimate goal is to eventually eliminate the need for hatchery production once habitat functions have been restored.

The Master Plan provides a reasonable discussion of habitat strategies. However, evidence is lacking that these habitat strategies can improve conditions enough to achieve the Master Plan’s long-term objectives.

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

The Master Plan seems to be integrated with ongoing efforts to improve habitat. The program will rely less on hatchery production if and when salmon productivity increases in response to habitat improvements. It appears that close coordination among an array of partners in the basin is occurring in an effort to protect and restore habitat, as well as facilitate salmon recovery, but the Master Plan does not identify any specific habitat restoration efforts that will come directly from the work that is being proposed. The Master Plan acknowledges that increases in salmon productivity in response to habitat improvements will require considerable time, for example within 25 years.

A section of the Plan describes expected changes in the watershed due to global climate change. The Plan states that these expected changes have led the proponents to prioritize habitat restoration in upper and middle river tributaries as improvements in water quality, temperature, and flow realized there will cascade throughout the system.

- 7) ensure that cost-effective alternate measures are not overlooked and include descriptions of alternatives for resolving the resource problem, including a description of other management activities in the subbasin, province and basin (Step 1)?

Alternative actions were considered for meeting the biological objectives, and a rationale was described to exclude the alternatives. Alternatives included maintaining the existing program, eliminating hatchery production and improving habitat, and implementing the Hatchery Science Review Group (HSRG) solution. The HSRG estimated that the R/S of natural spawners was less than 1, indicating natural production was not sustainable. The HSRG solution was rejected, in part, because it would not meet the Tribe’s harvest goal of 18,000 fish. The Master Plan

adopted HSRG recommendations to mark 100% of the hatchery fish and to convert to local broodstock above Prosser Dam.

Meeting fall Chinook and coho harvest obligations via segregated artificial culture appears to be a reasonable solution due to present habitat conditions in the Yakima River, if the proponents can show that the segregated hatchery programs can co-exist with the integrated hatchery programs while also being consistent with HSRG and Fish and Wildlife Program recommendations.

Proposed new and remodeled infrastructure was described and justified to some extent. However, the ISRP did identify some issues that needed additional information. For example, the Master Plan states that 31 concrete raceways (10' wide x 100' long x 3.5' deep) will be built at Prosser for supporting 500,000 coho salmon. Rationale for 31 raceways should be described, including what the rearing density goal is and why this goal was chosen.

Additionally, the Yakama Nation proposed to add another well at Marion Drain where the current ground water capacity is 800+ gallons per minute. However, the reported maximum use of well water is only 500+ gallons. Additional justification for the new well is needed.

- 8) provide the historical and current status of anadromous and resident fish and wildlife in the subbasin most relevant to the proposed project (Step 1)?

Historical overviews and current status of coho and fall and summer Chinook were largely addressed in the Master Plan. However, additional information is needed. For example, the numbers of hatchery and natural fish that are spawning to produce natural coho smolts at Chandler should be provided. The numbers of hatchery and natural fish that are collected for broodstock, permitted to spawn naturally, and harvested should be presented in a concise summary.

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

The Master Plan states that recreational fishers harvest about 16% of the Chinook salmon return each year. Very few salmon are harvested by the Tribe in the Yakima watershed because most fishing occurs in Zone 6. The Master Plan anticipates that fishing in the Yakima River will increase in response to the new program, although it is not clear why it would increase if there is little or no fishing in the river now. Harvest rates by location were estimated. Current fishery regulations were briefly described. The program should describe anticipated harvest rates on upriver stocks in the lower river fishery and the desired spawning escapement in the upper river. Will the program make an effort to rebuild the integrated upriver stocks through reduced harvest rates in addition to habitat improvements? Will selective fishing gear be used in the Yakima River in an effort to reduce harvests of unmarked natural fish? The harvest

management plan needs to realistically consider what level of harvest a natural spawning population can withstand under current conditions and after habitat improvements.

Management plans for spring Chinook, sockeye, and resident fish are not in the plan. The Master Plan should describe the effects of the enhanced in-river salmon fishery on the resident trout population and other salmonids that might co-occur in the fishery.

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

The Master Plan states that the summer/fall and Upriver Bright fall Chinook and coho salmon are not listed under the ESA and that no recovery goals have been established. Summer-fall Chinook salmon and coho salmon were extirpated in the Yakima River watershed and the Tribe has been attempting to rebuild natural production. Coordination with NOAA Fisheries and utilization of their salmon recovery plans along with other regional plans or guiding documents (e.g. IHOT, HSRG, FCRPS Biological Opinion, Yakima Subbasin Plan, Wy-Kan-Ush-Mi Wa-Kish Wit Plan, Yakima River Salmon Recovery Plan) are adequately covered in the Master Plan.

However, there is no discussion of consistency with ESA recovery plans that may apply for bull trout and steelhead.

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

The Master Plan directly addresses compliance issues with NEPA, ESA, Clean Water Act and other regulatory issues. Upon approval of the Master Plan, the Yakama Nation/BPA will initiate their comprehensive environmental assessment in Step 2. This assessment includes effects on species protected by the ESA.

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

The Master Plan briefly describes a monitoring and evaluation (M&E) framework for the purpose of evaluating performance against goals and objectives, adaptively managing hatchery and harvest actions, and to test key assumptions of the decision rules. The Step 1 framework description does not provide enough detail for evaluation at this time. Based on the presentation of the status of preliminary investigations, a detailed review of the metrics and decision framework is needed. Additional information is needed in the way of background analysis, justification for productivity and abundance estimates, and a timeframe for reaching milestones, before moving to Step 2.

- 13) describe and provide specific items and cost estimates for ten fiscal years for planning and design (i.e. conceptual, preliminary and final), construction, operation and maintenance and monitoring and evaluation (Step 1, 2 and 3)?

The Master Plan provides sufficient detail on the conceptual costs of the program. Preliminary construction drawings were included in the Master Plan and in appendices to the Master Plan. The ISRP did not critique program costs. The Master Plan did not provide an analysis of benefits in relation to costs.

B. Artificial Production Initiatives

Does the Master Plan:

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

The Master Plan provides a reasonable conceptual description of its artificial production strategies for both coho and Chinook salmon. However, risk management and adaptive management are not adequately addressed at this stage. This falls into the M&E obligations, which are usually described in Step 2. There is a need to clearly define the objectives, the uncertainties, the essential performance metrics, and establish decisions before beginning the project. Decision rules for broodstock management are also usually described in Step 2 reports. The decision rules should include a table of broodstock origin (HOR versus NOR) in relation to the adult return and spawning escapement of natural origin salmon. How will a straying rate of <5% be achieved? How will the hatchery program attempt to reduce production of mini-jacks and early maturing adult Chinook salmon? Are salmon that are not collected for broodstock allowed to spawn in the river?

The assumptions of both the coho and Chinook integrated programs recognize the need to move to a PNI >0.50 and facilitate the adaptation to the natural environment. The proponents are also incorporating multiple sources for the Chinook in an effort to represent the breadth of adult return timing. The coho program reports a larger SAR for natural, compared to hatchery smolts, and that survival from tributary to McNary is larger for smolts from adults naturalized to the Yakima subbasin compared to imported smolts. The proponents plan to use adults from across the run timing spectrum to attempt to permit natural selection to act on fish being “re-adapted” to the Yakima subbasin. The assumptions anticipate an increase in “fitness” from the current state to a future state. The breeding plan does not, however, outline how this fitness increase will be accomplished. In several places in the Master Plan, transition to a reformed state is predicated on adequate returns of appropriate classes of adults (hatchery versus wild, etc.). There has been no formal analysis of the tradeoff between a program with many smolts, and making slow progress toward reform goals, versus a small program making more rapid progress. Such an analysis would benefit many of the programs attempting to reintroduce self-

sustaining populations in Columbia River Basin tributaries – Walla Walla, Umatilla, Clearwater, Hood, Methow, and Wenatchee. The ISRP is not aware of empirical evidence to suggest any of these programs has progressed beyond establishing reproduction by hatchery-origin adults.

The Master Plan did not formally discuss the policy involving diversity of life history types. However, since one of the goals of the integrated coho and summer fall Chinook programs is to reintroduce these fish into the Yakima Subbasin, this objective appears to be met.

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

The Master Plan provides an HGMP for both of the coho salmon and summer/fall Chinook programs.

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

The Master Plan identifies harvest objectives for both coho and Chinook salmon, including the contributions of the program to all fisheries versus the Zone 6 and Yakima River fisheries. A detailed harvest plan was not described in Step 1. The Master Plan should describe how it will (1) document contributions to all fisheries and Zone 6 fisheries, and (2) reduce in-river harvests of the upriver integrated stock when harvesting the segregated stock in the lower river while enabling adequate spawning escapement to the upper basin. That is, will Tribal fishers use selective fishing gear and if so, what catch and release mortality estimates will be used? How will harvest rates be controlled in order to rebuild the natural populations in the upriver basin? What is the planned harvest rate in relation to run size and how will this objective be achieved? Is there a plan to allocate harvests in the Yakima River to non-tribal sport anglers and Tribal anglers? The ISRP is concerned that harvest levels could prevent integrated programs for both coho and Chinook salmon from achieving self-sustaining reintroductions.

Fish marking methods – ad clips for the segregated programs and only CWTs for fish produced from the integrated programs – are being proposed as ways to protect adults produced from the integrated programs from selective fisheries. The incubation water supplies at Prosser, Marion Drain, and Holmes Ranch could be used to produce thermal marks on all project fish incubated at these locations. These “stealth” or cryptic marks could be used for a variety of purposes including identifying harvest contribution rates of all fish produced from the segregated and integrated projects. Formal harvest plan are generally presented in Step 2.

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

Detailed descriptions of existing facilities and some explanations for needed improvements are provided in the Master Plan. Conceptual designs for needed facilities are contained in the Master Plan.

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

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

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

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