



**Independent Scientific Review Panel**  
for the Northwest Power & Conservation Council  
851 SW 6<sup>th</sup> Avenue, Suite 1100  
Portland, Oregon 97204

Review of the  
**Walla Walla Spring Chinook  
Hatchery Master Plan 2013**

Project # 2000-038-00

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

ISRP Members

Richard Alldredge

Robert Bilby

David Heller

Colin Levings

R. Scott Lutz

Robert Naiman

Greg Ruggerone

Dennis Scarnecchia

Steve Schroder

Carl Schwarz

Chris Wood

Peer Review Group Members

John Epifanio

Eric Loudenslager

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# ISRP Review of the Walla Walla Spring Chinook Hatchery Master Plan 2013

## Background

At the Northwest Power and Conservation Council's June 18, 2013 request, the ISRP reviewed the Confederated Tribes of the Umatilla Indian Reservation's (CTUIR) Walla Walla Spring Chinook Master Plan. As described in the Master Plan, the goals of the CTUIR (the Project Sponsor) for Walla Walla Basin spring Chinook are to provide treaty and non-treaty fisheries in the basin and to restore natural spawning. The proposed hatchery's purpose is to contribute to harvest and natural spawning in the near term, in a manner consistent with the long-term goal to reestablish a self-sustaining naturally spawning population through an "all-H" approach that includes hatchery production and habitat and passage improvements. The program is proposed to end the dependence on imported broodstock, improve survival through local adaptation, and meet harvest and natural spawning objectives. Implementation is proposed in three phases, moving from one phase to another based on the performance of hatchery and naturally spawning fish in the South Fork Walla Walla River, Touchet River, and Mill Creek.

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 and to previous ISRP reviews of the hatchery Master Plan in 2008 ([ISRP 2008-14](#)) and 2010 ([ISRP 2010-17](#)). The previous ISRP reviews focused on four requests:

1. evaluate the natural production of smolts and adults from the recent releases, and if information is lacking to conduct the evaluation, develop a proof-of-concept release program to justify the need for potential raceway construction;
2. provide evidence that the habitat in the subbasin is adequate to support a reintroduced population and link with the habitat restoration description;
3. provide a decision framework; and
4. provide an HGMP for the program.

The current Master Plan submittal is substantially revised to address the basic Step elements and the ISRP's past reviews, and thus the ISRP provides feedback on not only those four issues but on the Step elements.

## Review Summary and Recommendations: Response Requested

This submission is as an improvement over previous submissions as it attempts to address many of the ISRP's concerns and requests for information. However, the ISRP requests a response to fill remaining gaps in information and analysis that are critical to demonstrate the efficacy of the proposed project. Such a response is not envisioned as a major re-write, but rather as a request for information, data, or analyses as supporting documentation, preferably provided within a few weeks or months of this request. For most of these issues, it is important that the responses go beyond a written description of justification to include, where appropriate, a modest level of quantitative analysis. The ISRP recognizes that while there are important ecological challenges within the subbasin to reintroducing a self-sustaining population of spring Chinook, there are also opportunities because complementary efforts to address the other H's in the subbasin are underway. Moreover, current and previous artificial production provides an important foundation for framing realistic expectations about carrying capacity, rates of return, likelihood of straying, and other characteristics.

The Sponsor proposes a program for re-establishing a self-sustaining natural population of spring Chinook in the subbasin (particularly in the South Fork Walla Walla). The Chinook salmon has been extirpated as a self-sustaining stock for 75 years as a result of human practices within and outside of the subbasin. The proposed program includes a three-phased approach toward creating an "Integrated" artificial production program capable of sustaining a harvestable surplus of both natural and hatchery-origin adults for a tribal fishery (terminal and mainstem Columbia River) and a selective non-tribal recreational fishery on surplus hatchery-origin adults. To achieve these two goals, the Sponsor proposes expansion of artificial production facilities within the Walla Walla subbasin capable of producing and rearing 500,000 smolts; 400,000 for release into the South Fork and 100,000 for release into the Touchet River.

A fundamental outcome of hatchery reform in the Columbia River Basin, both through the Council's Artificial Production Review (APR) process and the Hatchery Science Review Group (HSRG), has been the recognition that *adult* production rather than simply *hatchery smolt* production is an appropriate metric of success. Moreover, hatcheries need to be managed consistent with natural stock conservation. Last, habitat conditions ultimately constrain natural production levels. Therefore, a program that relies on a fixed level of artificial production (in this case 500,000 smolts) is inconsistent with the guidance from the APR, HSRG, and the 2009 Fish and Wildlife Program. Rather, a Master Plan for an Integrated hatchery ought to guide the design of hatchery facilities to achieve specific production levels aimed at the Plan's goals and determined by adult return rates, harvest, and escapement developed in the Plan. Ultimately, the Plan's decision framework should include comprehensive evaluation that might lead to alternative production levels if empirical evidence suggests the original estimates or assumptions are not attainable (or conversely, exceeded).

The ISRP requests information on 1) the production levels and productivity for each of the three phases, 2) how long each of the two initial phases is expected to last, and 3) some clarification

on the precedence of the decision rules and guidelines that will be used to transition from one phase to the next. The ISRP provides specific details on individual response elements below.

## Responses to Past Four ISRP Concerns

First, we address the four issues identified in previous Step 1 reviews.

- 1. “...evaluate the natural production of smolts and adults from the recent releases, and if information is lacking to conduct the evaluation, develop a proof-of-concept release program to justify the need for potential raceway construction.”**

A primary information gap identified in previous ISRP reviews (2008 and 2010) was that the conditions in the Walla Walla subbasin required to support significant natural production and to maintain a self-sustaining population of spring Chinook had not been clearly identified or sufficiently demonstrated. The ISRP identifies at least two key relevant policies guiding artificial production within the Fish and Wildlife Program. First, *reintroduction* programs should have a reasonable potential for achieving self-sustaining status in the foreseeable future. Second, escapement of adults (including strays, jacks, or hatchery-origin recruits) should not occur in numbers that overwhelm the carrying capacity of the natural environment or disrupt natural production and spawning.

The Sponsor provides a first level analysis of the project progress to date. Beginning in 2000, out-of-basin origin spring Chinook (Carson strain) were out-planted as adults into the Walla Walla subbasin and allowed to reproduce under natural conditions. Beginning in 2005, approximately 250,000 spring Chinook smolts (Carson strain) were released annually into the South Fork of the Walla Walla River. Estimates of adult returns from these releases, and of their progeny (smolts produced from natural spawning of the hatchery-origin adults), revealed that current and restored conditions in parts of the Walla Walla would support some natural production of a local spring Chinook population.

A robust evaluation of the subbasin’s biological potential is essential to justify the design of this artificial production program as an *Integrated* program. Specifically, if habitat conditions (current or expected under proposed restoration) are inadequate to support the full life-cycle necessary for natural production, and therefore cannot support an Integrated hatchery and harvest program, then we might expect the decision framework should lead to alternative “All H” approaches that are more consistent with the Fish and Wildlife Program (for example, intensified habitat restoration or the development of a segregated hatchery and harvest program). For the current version of the Master Plan, it remains unclear what level of natural production, productivity, and adult recruitment is possible or likely in the subbasin.

To meet scientific criteria, the Master Plan documentation should include presentation of model analyses and results from the M&E conducted to date. Specifically, while additional years of data were provided on adult returns to Nursery Bridge and to the trap at Dayton

(Figures 2-1 and 2-2) and on smolt production as measured at the Walla Walla screw trap (Figure 2-3), basic analysis and context was absent about juvenile or adult production and recruitment relative to those adults released for natural spawning. Also missing was a basic analysis of the relative levels of escapement for the natural vs. hatchery adults. Moreover, no information is provided on smolts per spawner or adult-to-adult production from the previous and ongoing release of 250,000 smolts in the current program. Each of these analyses identified should be tractable with currently available data.

A suggestion for presentation is to have the data in the figures for the south fork Walla Walla presented on a brood year basis and in tabular form where age, sex, jack rates, and actual count information for NORs and HORs are presented. This would make it possible to track trends in abundance from one brood year to the next. Annual return numbers by themselves may be misleading as the performance of individual brood years can affect yearly counts. Additionally a table is needed to indicate the number of hatchery adults and smolts out-planted each year into Mill Creek, the Touchet River and in the South Fork Walla Walla.

**2. provide evidence that the habitat in the subbasin is adequate to support a reintroduced population and link with the habitat restoration description.**

A key information gap is the amount of suitable habitat currently available or expected in the future in the subbasin to permit self-sustained natural recruitment. We note that there has been an EDT estimate for natural production within the context of the HSRG's Walla Walla section of the Columbia River Review.<sup>1</sup> The Sponsor might use this information in combination with their own data to present a clear picture of the range of natural production likely in the subbasin.

In a practical approach, the proposal relies on the Snake River steelhead recovery plan to guide habitat restoration and to establish habitat conditions with a capacity and productivity sufficient to maintain "self-sustaining" anadromous *O. mykiss*. The hypothesis is that if environmental and habitat conditions are suitable for steelhead, they will also be suitable for spring Chinook. The ISRP supports the reasoning behind this strategy. In fact, significant habitat related work including fish passage improvements, flow restoration, screening of irrigation diversions, aquifer re-charge efforts and other actions have occurred in the Walla Walla subbasin. These actions have been guided mainly by the Walla Walla River Subbasin Plan, the Oregon Middle Columbia River Steelhead Recovery Plan, and the Snake River Salmon Recovery Plan for South East Washington. These actions were outlined in appended materials as tabular portions of the Oregon mid-Columbia Steelhead plan and were placed into Appendix D while the entire Snake River Salmon Recovery Board's plan for South East Washington is Appendix E to the Master Plan.

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<sup>1</sup> For example, see [www.hatcheryreform.us/hrp\\_downloads/reports/columbia\\_river/system-wide/4\\_appendix\\_e\\_population\\_reports/plateau-walla\\_walla\\_spring\\_chinook\\_01-31-09.pdf](http://www.hatcheryreform.us/hrp_downloads/reports/columbia_river/system-wide/4_appendix_e_population_reports/plateau-walla_walla_spring_chinook_01-31-09.pdf).

To fully evaluate the extent of habitat improvement in the subbasin, we recommend a more focused approach. For example, the Sponsor might include several paragraphs in the Master Plan that summarize projects in the Touchet, Mill Creek, and the Upper Walla Walla River including 1) “status” of habitat (e.g., completed, ongoing, designed, or proposed); 2) the purpose or problem addressed by the actions (e.g., low flows, temperature and DO, sedimentation, contaminants, etc.); and, 3) the expected benefits of this work in terms of some range of biological responses. This type of reporting should be used to describe all restoration actions.

### ***3. provide a decision framework***

The three-phased approach proposed by the Sponsor potentially provides for an improved decision framework with identified targets and numerical objectives. The phased approach is consistent with the Council’s Fish and Wildlife Program, the APR, and HSRG reviews and analyses. It also integrates robust monitoring and evaluation and decision criteria to feed the adaptive management process. While this approach represents a step forward, there remain some issues that need to be reconciled.

In general, the framework provides decision rules based on proportional abundances and relative contributions of natural and hatchery fish to move between Phases. The ISRP recommends inclusion of criteria based on productivity as well as abundance in these decision rules. Decision rules have been established on how NORs and HORs will be allocated into the hatchery brood stock, the South Fork Walla Walla, and the terminal harvest during each phase of the project. Examples of how fish will be allocated at different abundance levels of NORs and HORs during each phase are provided in the Master Plan and in Appendix C. It would be more transparent if the rules themselves were described, as well as the rationale behind the allocation decisions. For example, in Phase One, ten percent of the hatchery brood stock will be made up of NORs regardless of their abundance or whether this “mining” of natural spawners would be excessive. This kind of conflicting use needs supportable rationale. Similarly, there appears to be situations in Phase 3 where the minimum Proportionate Natural Influence criteria ( $PNI \geq 0.5$ ) will be relaxed during years or stretches of years when adult abundance is low to ensure sufficient brood stock (NOB).<sup>2</sup> Such a trade-off needs to be constrained by defining limits on the number of generations that such PNI reductions ( $< 0.5$ ) will be deemed acceptable, along with the analytical justification for such decision trade-offs. Ultimately, to achieve the program’s stated goals, the decision rules should favor NORs remaining in a natural loop to ensure high PNI benefits rather than being redirected to brood take justified by the desire to maintain hatchery production at 500,000 smolts. Ultimately hatchery production levels in Phase

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<sup>2</sup> The Sponsor will want to check the consistency of this proposal with the HSRG review for Walla Walla spring Chinook (or identify new information that over-rides). In particular, the HSRG identified spawning ground carrying capacity at ~450 (based on EDT) and a population designation as “Primary” even though the historical run has been extirpated. Regardless, HSRG’s recommendations for Primary populations include a  $PNI > 0.7$  – thus higher than the 0.5 indicated by the Sponsor’s Master Plan. While the program must achieve 0.5 before it can possibly reach 0.7, some explanation of the lesser plateau needs to be addressed.

2 and Phase 3 need to accommodate the background stock/recruit status of the natural population.

More specifically, there are additional sets of information to be revised within the proposed Master Plan. These are:

- A. Phase 1: Provide details regarding development of a local “in-basin” stock<sup>3</sup> from the adults and juveniles that are currently available to the program. The text and decision rules are not sufficiently complete to understand what the annual operating plan will be in the initial years and when abundance of fish returning to the Walla Walla is small. Specifically, if too few hatchery and natural adults return to the subbasin in the initial years to produce the eggs needed for a release of 500,000 juveniles, how many adults or smolts will be imported from out-of-basin? Modeling and simulation are needed to provide scientific justification for maintaining the release level at 500,000 smolts by importing eggs rather than reducing the release level commensurate with the number of in-basin adults.

In places, the rule(s) for Phase 1 appear inconsistent or in conflict with each other or with the program’s goals. One rule calls for a 350 minimum natural spawning escapement (NOS), another indicates that 100% of NOR adults can be used as hatchery broodstock, and another calls for 10% NOR in the brood stock. While these rules may have been designed for specific (although not defined) situations, it is unclear as to the order of rule “precedence” – some transparency is required to assess the viability of these situations. For example, if n=30 NOR and 600 HOR adults returned, how would they be used for hatchery production and spawning escapement? If there is a situation where 100% of NOR are used for brood stock, what is the likelihood of any NOR in the succeeding generation?

The ISRP also recommends that a timeframe be proposed for conducting the transition from out-of-basin brood source to an entirely in-basin operation. Once the transition is established, the smolt production level should be limited by the availability of in-basin brood stock, unless importing eggs can be justified by quantitative analysis. Continuing to add out-of-basin stock will interfere with the creation of a local Walla Walla stock.

- B. Phase 2: Provide a schedule and timeframe for increasing PNI rather than leave it open-ended. This timeframe could be an expected range in terms of generations. Also, consider variable artificial smolt production levels that reflect empirically-determined SARs and other metrics of productivity. Include in the M&E estimation of a cohort replacement rate (i.e., stock productivity) to establish whether (how close) the natural population is to being “self-sustaining.” Both abundance and productivity would be appropriate choices as natural population indicators for transitioning between Phase 2 and Phase 3.
- C. Phase 3: Develop a strategy to base artificial production levels on assessed values of the abundance and productivity of the natural population. In the current decision tables, PNI is



allowed to fall below 0.5 when NOR abundance is small. A limit to the number of generations needs to be specified (and justified) for operating under this relaxed decision rule to avoid undesired impacts from domestication overwhelming natural selection. The number of generations should be determined by quantitative analysis that balances genetic risk and potential abundance benefits.

The ISRP recommends that the Sponsor begin planning the scope and extent of the Monitoring and Evaluation needed for this program (especially in Step 2). The Master Plan will ultimately need close links between the M&E and metrics to inform the decision framework. So decision rules can be rigorously applied, it will be critical that these metrics are strong and measurable for things like estimating SARs; NOR and HOR counts; age and growth characteristics of NOR and HOR; sex ratios; and jacking and straying rates (both into and out of the subbasin).

#### ***4. provide an HGMP for the program***

The Sponsor provided an HGMP as an appendix. The Sponsor indicates that the program will be operated to produce a “locally adapted” stock. This remains a nagging issue because the founding stock for re-introduction is the Carson NFH strain of spring Chinook. This strain is probably of mixed, yet not fully known, origin. While the Carson strain is used elsewhere in the Basin, adding it to the Walla Walla may further homogenize genetic level diversity of the mid-Columbia River Spring Chinook ESU as well as to those populations with the lower Snake River, for example, the Tucannon or Grande Ronde. Given that the historical and aboriginal stock of spring Chinook salmon in the Walla Walla has been extirpated, there is no real evolutionary or local genetic legacy to conserve within the subbasin. Therefore, a Carson strain is not likely a primary risk within the subbasin. However it might be a risk if significant straying occurs out of subbasin to more aboriginal populations in adjacent subbasins (or other populations). Therefore, the ISRP recommends considering and addressing alternative (more locally adjacent and evolutionarily related, if available<sup>4</sup>) sources for the re-introduction enterprise.

The ISRP has concerns regarding some of the fish culture methods being proposed, especially those being considered for the incubation and early rearing phases. The ISRP recognizes, however, that the fish culture methods presented in the Master Plan are provisional. To help the Sponsor see how challenges similar to the ones they are facing have been addressed elsewhere, we suggest that they visit the Cle Elum Supplementation Research Facility and other local facilities. Several innovative spring Chinook culture methods have been developed in the region and the Sponsor may wish to consider incorporating some of these into their program. Justification for proposed culture practices should be made more fully in Step 2.

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<sup>4</sup> This kind of information is available from WDFW genetics lab, as well as within the most recent Status Review by NMFS.

## 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 goal of restoring an extirpated run to a self-sustaining status and supporting harvest in the subbasin is consistent with Basinwide Principles. The Sponsor provides reasonable explanations of the consistency of the proposed action to the Fish and Wildlife Program's scientific principles, perhaps with the exception of Principle 7: Ecological management is adaptive and experimental. This Principle requires recognition that the appropriate artificial production levels are "unknown" at this time and need to be determined based on an experimental/empirical framework. In its current state, the decision framework is deficient and the Master Plan presently provides no alternative artificial production levels based on empirical results. Because the program establishes a fixed level of production it is actually inconsistent with most of the scientific principles. Consequently the "experimental and adaptive management" principle for the program is inadequate. The ISRP recognizes that Integrated Hatchery programs permitting surplus harvest as terminal, mainstem, and recreational fisheries will be consistent with Basinwide Principles as long as the decision rules are rigorously adhered to maximize escapement of NOS and PNI rather than supporting the hatchery brood enterprise if adult numbers should dwindle.

Critical to this program will be a rigorous M&E program (to be presented more fully in Step 2) that feeds the decision framework and movement toward or from Phase III.

Among the challenges in the subbasin for sustaining natural production will be agricultural demands for water as demands are expected to increase in the future. Consequently, the Sponsor and an array of partners are attempting to reduce this impact by securing water rights for fish, screening irrigation diversions, lining irrigation ditches, recharging aquifers, and increasing the quality of agricultural return flows.

- 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 proposed reintroduction of spring Chinook into the Walla Walla subbasin is linked to a number of continuing habitat restoration, fish passage, flow maintenance, restoration and augmentation efforts, as well as with on-going maintenance and operation work in the subbasin. These activities are shown in Table 4.1 in the Master Plan. The Sponsor has played a significant role in this effort. The connection between the proposed spring Chinook hatchery program and the restoration work in the subbasin would be strengthened if the full scope of this work were briefly mentioned in the Master Plan. For example, the primary factors limiting salmonids in the Walla Walla subbasin are high water temperatures; inadequate flows; channelization; lack of channel complexity; invasive plants and fishes; poor rearing, holding, and spawning areas; lack of floodplain connectivity; sedimentation; and decreased riparian diversity. The CTUIR, WDFW, ODFW, the Walla Walla Watershed Council, county conservation and irrigation districts, and other collaborators have worked together on numerous projects that directly address these limiting factors. This work was done to protect and restore ESA-listed summer steelhead and bull trout. It is also making it possible for spring Chinook to once again be present in the subbasin. The addition of spring Chinook helps add biological, cultural, and potential economic value to the restoration work taking place in the Walla Walla subbasin. A synopsis of this restoration effort should be included in the Master Plan.

The Master Plan delineates three progressively occurring end points. The first one is the establishment of a locally adapted spring Chinook broodstock for the Walla Walla Hatchery. It will be derived from out-of-basin fish that were released into the Walla Walla River either as adults or as smolts. The second end point is to use the newly created broodstock source to produce spring Chinook for tribal and non-tribal harvest in the lower Columbia River and in terminal areas in the Walla Walla River. The third desired end point is to create a self-sustaining population of spring Chinook in the South Fork Walla Walla. In this phase of the project, no hatchery smolts will be released into the South Fork but hatchery fish will still be released into Mill Creek and the Touchet River. Adults produced from these latter two releases will serve as a potential buffer if natural production in the South Fork falls below a predetermined level. If that occurs, releases of hatchery smolts would recommence in the South Fork until abundance levels increased to a desired level.

- 3) define the biological objectives (see 2009 Columbia River Basin Fish and Wildlife Program, Basinwide Provisions, Section C.2 (1) and (2), with measurable attributes that define progress, provide accountability and track changes through time associated with this project (Step 1))?

The Master Plan describes the biological objectives of the Walla Walla spring Chinook Hatchery program. These objectives can be partitioned into two major categories: 1) within hatchery performance and 2) post-release performance. The within-hatchery performance standards appear to be consistent to other programs in the basin for spring Chinook.

The biggest challenge for the hatchery will be obtaining a source of incubation water. So far no ground water source with suitable chemical or temperature profiles has been located. It was mentioned, however, that pilot wells could be drilled to find a shallow alluvial aquifer at the project site. Even though such a water source would likely not meet all the rearing and incubation water needs of the proposed project it might provide a valuable source of incubation and potable water for the hatchery. Consequently, we hope that the Sponsor will perform some exploratory drilling work and report their findings in Step 2.

Because of potential water limitations, the Sponsor is considering using a Moist Air Incubation system during the green egg to eyed egg incubation period. Moist Air Incubators are experimental and in some instances have not performed well. Therefore, their use should be done on an experimental basis first before committing entirely to this form of early incubation. Vertical stack incubation was proposed as a possible alternative during this phase of the incubation period. In this case, 15 stacks each containing two, eight-tray units would be placed in the hatchery. The water demands for this configuration would be around 150 gpm. Both of these methods have some drawbacks. Although very water efficient, Moist Air Incubators have not performed well in the past and may facilitate the spread of pathogens. Newly fertilized eggs will be treated with iodophore and this treatment will kill pathogens located on the outside surface of the eggs. However, BKD and viruses will remain in the interior of eggs treated with iodophore and if these eggs break or hatch prematurely these pathogens can be horizontally transferred. Vertical Incubators face the same problem, as pathogens from broken eggs can move from one tray to the next. Another incubation alternative that the Sponsor may wish to explore is the use of "iso-buckets." Each iso-bucket holds all the eggs from a single female. Iso-buckets can be made from square two gallon plastic buckets. Each bucket is supplied with its own 0.3ths of a gpm single pass through water supply. This method allows the eggs of each female to be kept entirely separate from one another reducing the chance for pathogen transfer. Linear arrays of these buckets could be placed into the rearing troughs that are scheduled to be installed in the hatchery building.

We recommend that the Sponsor contact staff at the Cle Elum Supplementation Research Facility to see how their iso-buckets are constructed and operated. At this facility, sets of twenty-eight iso-buckets are placed into rearing troughs and each line of buckets is supplied with 8.4 gpm of incubation water. Water first enters a head box and is then distributed down a central distribution line. Spigots are attached to the central pipe and are used to deliver a regulated flow of water into each iso-bucket. This method of incubation is simple, cheap, and reliable as it has been used at the Cle Elum facility for 15 incubation cycles without failure. At the proposed Walla Walla facility it would require approximately 47 gpm of incubation water to operate 155 iso-buckets.

The Sponsor plans to cull egg lots with high ELISA OD readings which is an accepted practice and one that can be easily accommodated if eggs are initially incubated in iso-buckets. Once the eggs have reached the eyed stage they will be placed into Kitoi Boxes located at the head ends of rearing troughs located in the hatchery building. Fry are expected to voluntarily exit their

incubation box and enter a rearing trough where they will be fed for a period of time prior to being introduced into larger outside raceways. Fry produced from eggs fertilized at the same time and originating from a single female may emerge over a two week period of time. Such protracted emergence may cause some early feeding challenges. Again, the Sponsor may wish to perform some pilot work to evaluate the use of Kitoi boxes under their circumstances. A possible alternative would be to complete the incubation period in vertical stack incubators. The water demands of the two types of incubation systems would be fairly comparable if 5 gpm were delivered to each Kitoi box. Typically these units require 10 to 12 gpm, but the planned density of eggs in each unit is about 10% of what is normally used (e.g. ~ 17,000 vs. 100,000 to 500,000 eggs). Thus a lower flow rate is most likely permissible, but should be tested via experimentation.

The ISRP recognizes that at any new hatchery facility alternative methods will need to be considered and evaluated before standard methods can be established. The protocols that are employed, however, should be based on careful quantitative comparisons. These comparisons can only occur after a well thought out monitoring and evaluation plan for hatchery performance metrics has been created and implemented. Such a plan will need to be present in Step Two.

In terms of the post-release performance, the All-H-Analyzer and EDT modeling were used to estimate out-of-basin survival rates, harvest rates, and some within hatchery performance metrics as well as the productivity of NORs spawning under natural conditions. The assumptions in these models are shown in Table 2.5 in the Master Plan. Adult-to-adult productivity of NORs remains constant during Phases Two and Three at 6.61 adults per returning spawner. This value increases in Phase Three to 7.40 adults per adult, reflecting the expectation that the fish will become locally adapted to the South Fork Walla Walla over time. The report should clarify that these return per spawner values reflect productivity when spawner abundance approaches zero because these high productivity estimates are too high for typical spawning densities. Also, it is difficult to assess how realistic such values might be since they are affected by environmental conditions in the basin as well as those in the Lower Columbia and ocean. The Sponsor should present data for other nearby subbasins to justify this assumption. The hatchery smolt-to-adult survival rate or SAR is expected to be 0.55%. This may be high as the average SAR achieved over five brood years by project hatchery fish is 0.23. The Sponsor claims that this rate was heavily influenced by one year when the SAR was estimated to be ~0.03% (2007). However, it could be equally stated that the 0.23 rate was also influenced by an exceptionally high year in 2006 when it equaled ~0.63%. Nevertheless, the Sponsors hypothesize that SARs will increase over time due to low rearing densities and volitional releases at the hatchery and converting the program to locally adapted fish. As noted above, the assumptions and expectations used to estimate the biological benefits of the project will need to be assessed on an annual basis by applying a monitoring and evaluation plan designed to actually measure out-of-basin survival, natural productivity of HORs and NORs, and within hatchery performance.

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

The Master Plan states that the project has three goals. The primary one is for harvest augmentation. Secondly, the program will fulfill a Tribal objective of placing adult spring Chinook into historical spawning areas in the Walla Walla, Mill Creek and the Touchet River. Significant fish passage issues exist in Mill Creek making it unlikely that spring Chinook will be able to establish a self-sustaining population anytime in the immediate future. Poor habitat conditions in the Touchet are also likely to constrain spring Chinook production in the Touchet River. However, the presence of spring Chinook will increase species diversity (in addition to bull trout and summer steelhead) in the watershed and also enhance the value of the numerous habitat restoration, fish passage, and flow augmentation efforts that have already taken place in the basin.

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

How Phases One and Two will be implemented is generally well described in the Master Plan. However, in Step Two it would be helpful if the release locations of adults and smolts into the Touchet and Mill Creek were described in more detail. How Phase Three will be carried out is a little less clear. During this phase the hatchery will be operated in an integrated fashion with a goal of having fewer than half of the naturally spawning adults in the South Fork of HOR origin. Additionally the smolt program will be reduced to approximately 100,000 fish all of which will be out-planted into the Touchet River. No hatchery smolts will be released into the South Fork. At the same time, the Sponsor plans to continue collecting 310 fish as broodstock for the hatchery and half of these fish will be HORs. The Sponsor needs to clarify some expectations in their Phase Three strategy (see Table 2.7). First, where will the hatchery broodstock come from when the desired endpoint of Phase Three is reached? At this point no hatchery smolts are scheduled to be released into the South Fork Walla Walla from the hatchery. Additionally, during this phase it is expected that between 25 and 39% of the natural spawners in the South Fork will be HORs. Again where will these fish come from when the hatchery no longer releases smolts into the South Fork Walla Walla? And finally, if the goal is to release 100,000 smolts each year into the Touchet, why is it necessary to use 310 fish as broodstock? To maintain genetic diversity a broodstock consisting of 100 fish, 50 of each sex might suffice during this phase of the project. One of the Tribal objectives is to out-plant hatchery adults into Mill Creek—what provisions will be made to continue that effort in Phase Three when releases of hatchery smolts into the South Fork are terminated? In Step Two it would be helpful to describe how smolt releases from the hatchery into the South Fork will be reduced in Phase Three and what would trigger these reductions.

Previous work by the Sponsor has indicated that habitat conditions in the South Fork Walla Walla can support spring Chinook salmon. Additionally the CTUIR has worked diligently with a suite of partners to develop additional habitat restoration actions to improve existing conditions, not only in the South Fork but also Mill Creek, the Touchet River, and elsewhere in the basin. Table 2.6 in the Master Plan provides a brief synopsis of prioritized habitat work designed to increase the carrying capacity of summer steelhead in the subbasin. This work is expected to benefit spring Chinook as well. The Master Plan would have been enriched if a more comprehensive summary of past and planned habitat work had been presented. Two major habitat restoration plans, the Oregon Middle Columbia River Steelhead Recovery Plan and the Snake River Salmon Recovery Plan for South East Washington were attached as appendices to the Master Plan. These plans, however, cover multiple drainages and species. A more focused discussion would have been appreciated.

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

The Master Plan makes it clear that the objectives of the project could not be accomplished without the habitat restoration activities that have already occurred in the basin. Additionally, the Sponsor states that significant new work will have to occur in the subbasin in order for Phase Three of their project to be successful. In general, the planned work adheres to the principles of the Council's Fish and Wildlife Program. For example, the project is using spring Chinook, a native species, albeit one that has been extirpated from the subbasin for 75 or more years. Most of the reintroduction effort is taking place in the South Fork of the Walla Walla, an area that is recognized as having the best available spring Chinook habitat in the subbasin. Past and proposed habitat restoration work has emphasized removal of migration barriers, installation of irrigation diversion screening, acquiring habitat protections and improvements through a variety of methods, including the CREP program, fencing, no-tillage agriculture methods, riparian planting, and an aquifer recharge program. Thus, the program is using a native species, building from strength, and supporting habitat protection and improvement, all actions endorsed by the Fish and Wildlife Program.

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

The "Alternatives" section in the Master Plan is very brief (Chapter 2.5, page 27). Four alternatives to the existing program were considered and are presented in Appendix F. In Alternative One, incubation and early rearing facilities were added to the adult holding facility on the South Fork Walla Walla. Adults would be spawned at the facility and their offspring would be incubated and undergo early rearing at the site. Fingerlings, however, would be transported to the Ringold Springs Hatchery and reared to the smolt stage in an up-graded earthen pond. They would then be transported back to South Fork facility and placed into an

acclimation pond prior to being liberated into the Walla Walla River. Two reasons were given for why this alternative was not chosen. Apparently, past releases of smolts released from Ringold have had relatively poor survival, and thus the Sponsor suggests they would have to almost double the number of smolts released to achieve the number of adults they need for their harvest augmentation/reintroduction program. And secondly, they felt such a large release of smolts would negatively impact native fish species in the Walla Walla River. Neither of these reasons appears to be justified. No reason, for example, is given as to why Walla Walla smolts reared at Ringold but held in acclimation ponds and released into the South Fork would have survival rates as low as fish released from Ringold. Perhaps the potential effects of transportation at the smolt stage might be a better reason to reject this possible approach. Such stress could interfere with imprinting leading to higher stray rates or interrupt or delay smoltification which could increase vulnerability to predators.

Alternative One is very close to a successful strategy used by ODFW for steelhead in the Grande Ronde. ODFW collects broodstock at acclimation pond sites, spawns the fish, and incubates them at a Grande Ronde facility (Wallowa Hatchery) until the eggs reach the eyed stage. At that point, the fish are transported to the Irrigon Hatchery where the final portion of the incubation period is completed and the fish are raised to the smolt stage. They are then returned to the Grande Ronde sites, acclimated in ponds, and released. This approach was used because of concerns about water quality. Such an approach could be taken in the Walla Walla. It would allow the development of a localized broodstock, and HORs could be allowed to spawn naturally in the South Fork and elsewhere. This method may be something the Tribe might wish to consider if water quality becomes an issue at their South Fork site.

In Alternative Two, acclimation ponds would be constructed at the South Fork site. Incubation and early rearing, however, would occur at Little White Salmon Hatchery. Parr would be transported to Ringold and reared in an upgraded earthen pond until reaching the smolt stage. At that point, they would be transported to the South Fork facility and held in acclimation ponds until released into the Walla Walla. The Sponsor again states that this approach would require significantly more smolts than their preferred alternative because the fish were reared for a time at Ringold. They do provide a more cogent reason for rejecting this approach. It would continuously introduce out-of-basin spring Chinook into the Walla Walla and as planned would not allow the development of a localized broodstock.

In Alternative Three, no juveniles would be released from the South Fork facility. Instead, 500,000 smolts would be released from Ringold and the adults produced from that release would be transported and released into the Walla Walla for natural reproduction. As in Alternative Two, incubation and early rearing would occur at Little White Salmon and final rearing to the smolt stage would take place at Ringold. This method was rejected because it would not meet harvest goals and it would continuously import out-of-basin fish into the Walla Walla.

The Fourth Alternative would not use any artificial culture. Instead the reintroduction of spring Chinook in the Walla Walla would depend on natural production. This option was overruled



because it would not meet the Tribes' harvest requirements in an acceptable timeframe. An another alternative the Tribe may wish to consider is establishing an incubation and early rearing site elsewhere in the basin if a suitable source of incubation water is not available at the South Fork location. In this alternative, broodstock would still be collected at the Nursery Bridge Dam, spawning could take place at the South Fork facility, but eggs would be transferred to this new location where incubation and some early rearing would take place prior to the fish being transported back to the South Fork hatchery for final rearing and release.

Whether the Tribes' preferred alternative or some variation of it takes place depends on water quality and availability at its South Fork location. As mentioned above, it is important that this pending issue be resolved so that final plans for this hatchery can be presented in Steps Two and Three.

- 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)?

The Master Plan provides a brief overview in the main text of the historical status of anadromous and resident fish and wildlife in the Walla Walla subbasin. More extensive information on bull trout, summer steelhead, and spring Chinook is presented in Appendix E to the Master Plan. The native run of spring Chinook salmon were extirpated ~ 75 years ago. A smaller scale project has been ongoing using non-local stock (Carson spring Chinook) since 2000 and at a smaller level of artificial production since 2005. A primary unanswered question (critical information gap) is the level of analysis and reporting sufficient to inform decisions about expanding the enterprise in terms of net impacts to target and non-target species.

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

Chapter 4 of the Master Plan addresses management in the subbasin. The Master Plan states that the project's fish are expected to contribute to mainstem fisheries as well as terminal area tribal and recreational fisheries. Moreover, the returning adults will be managed to achieve an escapement goal of 1,100 adults (NOR + HOR) in the South Fork Walla Walla. Tribal fisheries will be managed based on decision rules that change depending upon adult abundance. The Walla Walla stock is extirpated, and the donor Carson stock of spring Chinook is not listed under the ESA.

While it is desirable for the presentation of management to be succinct, the information in the Master Plan is presented in a tangential fashion. A direct statement about the federal, tribal, and state authorities and their individual and overlapping co-management responsibilities is largely absent.

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

The consistency with other management plans is covered briefly in Chapter 6 with extended compliance documents to be developed under Step 2.

As for ESA requirements, spring Chinook are not listed under the ESA, and therefore no recovery goals have been established for this species in the Walla Walla by NOAA Fisheries. Spring Chinook were extirpated from the watershed because of water withdrawals, migration blockages, and other anthropogenic factors.

Beginning in 2000 the CTUIR began to reintroduce this species into the Walla Walla River. A first step was to transplant out-of-basin spring Chinook into the subbasin to see if the fish would spawn and produce juveniles under current conditions. In 2005, out-of-basin hatchery smolts were also released into the South Fork of the Walla Walla River. The Master Plan presents data showing that both types of releases produced adult fish and that some natural production of spring Chinook has occurred in the South Fork. Key limiting factors in the subbasin have been identified in the Walla Walla subbasin plan and future habitat restorations have been prioritized in the Snake River Salmon Recovery Board's plan for Southeast Washington and in ODFW's Mid-Columbia River Steelhead Recovery Plan. The Sponsor indicates they are using suggestions provided by the HSRG on how to establish and maintain the broodstock source for their hatchery program. However, there are some inconsistencies (or at least differences) with the proposed level of production and the HSRG's population report for the Walla Walla Spring Chinook. In particular, the HSRG reported spawning ground carrying capacity at ~450 (based on EDT) and a population designation as "Primary" even though the historical run has been extirpated. Can the spawning ground, therefore, support expected escapement of 1,100 recruits? Regardless, the HSRG's recommendation for Primary populations includes a PNI > 0.7 – thus higher than the 0.5 indicated by the Sponsor's Master Plan. While the program must achieve 0.5 before it can possibly reach 0.7, some explanation of the lesser plateau needs to be addressed. While the latter might be based on dated information, some justification or explanation is warranted as to the differences.

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

Extended compliance documents will be developed under Step 2. The Master Plan states that an Environmental Impact Statement that examines the effects of constructing and operating the South Fork Hatchery will be prepared to address NEPA requirements. Additionally, the Sponsor will prepare a Biological Assessment (for ESA) that addresses potential consequences of the hatchery program on fish and wildlife in the subbasin. It is recognized that the project must comply with NPDES, the Clean Water Act, and other regulatory issues. These are particularly germane given the water limitation identified elsewhere for operating the facility. Upon approval of the Step 1, a comprehensive environmental assessment will be completed and included in Step 2.

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 Sponsor provides a general level of description adequate for a Step 1 submission. The ISRP will expect a considerable level of detail in the Step 2 submission (which is sufficiently targeted to inform the decision rules, among more general M&E indicators).

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 and Appendix H provided sufficient detail on the conceptual costs of the program. Preliminary construction drawings were included in appendix G. The ISRP did not critique program 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)?

Overall, the goals of the Master Plan may be considered consistent with Primary Strategy (that is, complementary to ongoing habitat improvement and passage, along with reintroduction of an extirpated run) if the issues with the Decision Framework can be rectified. As for the Fish and Wildlife Program's APR Standards, most of these elements are covered by other questions in the template, but two elements (see below) require additional attention.

- *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 Sponsor describes an Integrated Hatchery program that will be driven by natural selection (PNI>0.5) upon reaching Phase 3. By re-establishing a run in the subbasin, many of the functional ecological elements will be returned to the basin. However, by focusing on a more generic Carson strain rather than a more local and genetically related natural source from within the mid-Columbia River spring Chinook ESU (which included the historical Walla Walla

run), there is some risk at diminishing the structure of genetic level diversity among the populations in the ESU and perhaps among ESUs. See comments related to HGMP.

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

Largely absent from the plan is a risk management strategy within an adaptive decision framework that accommodates *variable production*; spawning ground and related habitat carrying capacity limits; and recognition of conservation of a reintroduced population. Moreover, the Phase 3 goal of Mill Creek and the Touchet is conceptually problematic and inconsistent with their serving as a demographic safety-net (*sensu* HSRG) for the South Fork Walla Walla because they are not expected to be self-sustaining and will rely on smolts and adults produced in the South Fork Walla Walla.

Risk management is also a key rationale for a robust M&E – to test assumptions, to evaluate success at achieving objectives, and to examine risk indicators (such as PNI systematically falling below 0.5, extremely low SARs, straying or jacking at high rates, low effectiveness of volitional releases, etc.).

Finally, two ESA-listed salmonids, summer steelhead and bull trout are present in the basin. The HGMP states that some “take” of steelhead may occur during normal hatchery operations, for example at the broodstock collection site and possibly at the hatchery water intake. However, Tables 11-13 in the HGMP indicate that such take levels should be minimal. Because steelhead, bull trout, and spring Chinook were all present in the subbasin in the past it is assumed that deleterious ecological interactions among these fish will be minimal. To test the strength of this assumption, the Sponsor will want to examine and monitor non-target effects of releases and harvest on the distribution, survival, and growth of steelhead and bull trout in the subbasin to see how these populations may be responding to the presence of naturally produced juvenile spring Chinook. How this might be accomplished or is currently being assessed should be indicated in the Monitoring and Evaluation Plan presented in Step Two.

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

An HGMP for the Walla Walla spring Chinook hatchery program was attached to the Master Plan as Appendix A. The Sponsor indicates that the program will be operated to produce a “locally adapted” stock. This remains a nagging issue because the founding stock for re-introduction is the Carson NFH strain of spring Chinook. This strain is probably mixed, yet not fully known, origin. While it is used elsewhere in the Basin, adding the Walla Walla may further homogenize genetic level diversity of the mid-Columbia River spring Chinook ESU. Given that the historical and aboriginal stock of spring Chinook in the Walla Walla has been extirpated, there is no real evolutionary or local genetic legacy to conserve within the subbasin. Consequently, a Carson strain is not likely a primary risk within the subbasin. However, if

significant straying out of the basin to more aboriginal populations in adjacent subbasins (or other populations contributing to the mid-Columbia River Spring Chinook ESU) carries some risk. Therefore, the ISRP recommends considering alternative (more locally adjacent and evolutionarily related, if available) sources for the re-introduction enterprise.

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

The Master Plan includes strategies for ensuring spring Chinook harvest associated with each of the project's three Phases. Lower river harvests are expected to be managed under the auspices of the U.S. v. Oregon Management Agreement. Terminal area harvests will be managed to achieve desired escapement levels. Non-treaty sport fisheries will be allowed only to harvest HOR fish (adipose fin marked) while Tribal fisheries will be able to keep both NORs and HORs. The 2009 Fish and Wildlife Program states that artificial culture and production solely for harvest augmentation is appropriate when it is replacing a diminished or lost resource such as spring Chinook in the Walla Walla. However, the Fish and Wildlife Program also indicates such projects have to provide harvest benefits. That is, productivity of the hatchery stock has to be great enough to provide a harvest. Figure 2.1 in the Master Plan shows that releases of 250,000 out-of-basin spring Chinook smolts from 2005 – 2010 have returned an "average" of approximately 374 HOR adults. Following expansion, release numbers will be increased to 500,000 smolts per year. Additionally the use of out-of-basin smolts is expected to end once a sustainable localized broodstock source (~ 310 localized brood per year) has been created. These two factors are expected to increase the number of HOR adults returning to the Walla Walla. Therefore, the project is expected to produce surplus fish that can be harvested thus meeting a Fish and Wildlife Program requirement.

All the hatchery fish will be marked (i.e., adipose-clipped) making it possible to visually identify them for selective fisheries and for population monitoring purposes. The Sponsor will need to describe how they will monitor both non-treaty and treaty terminal fisheries in Step Two to meet their escapement objectives. Moreover, the Sponsor will need to describe in high detail how it will measure and handle the potential competing demands on NOR adults (e.g., brood or NOB, v. escapement to wild spawning grounds or NOS, v. harvest).

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

Appendix G to the Master plan provides provisional facility plans and discusses whether existing facilities need to be upgraded. This discussion also includes needed upgrades to the fish trapping system located at the Nursery Bridge Dam and the current water intake system at the South Fork Adult Holding Facility. Additionally a fairly comprehensive review of ground water availability and quality is presented.

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

Reviewer 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)?

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