HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Yakima River Summer and Fall Run Chinook Production Program
Species or Hatchery Stock:	Fall Chinook (*Oncorhynchus tschawytcha*)
Agency/Operator:	Yakama Nation
Watershed and Region:	Yakima River Subbasin/Columbia Plateau Province
Date Submitted:	May 2010
Date Last Updated:	August 26, 2004; Updated July 2005, Sept. 2007, March 2009, January 29, 2010

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Yakima River summer and fall run Chinook Production Program (includes Prosser and Marion Drain hatchery production and feasibility program to re-establish summer run Chinook).

Brief Overview: The Yakima Subbasin Summer and Fall Run Chinook Master Plan (Master Plan) proposes to transition the existing hatchery program. When upgrades to the Prosser Hatchery are completed pursuant to the Master Plan, fall Chinook transfers from Little White Salmon would be replaced with an adult brood collection program at Priest Rapids Dam (preferred alternative) or an egg transfer from Priest Rapids Hatchery (PRH). The Prosser Hatchery would be expanded as necessary to accommodate the program, including changes necessary for fish health and disease considerations. Fish would be released from acclimation site(s) in the lower Yakima River below Horn Rapids Dam. In addition, an integrated program using local fall Chinook brood stock to augment harvest and natural spawning escapement would continue to be developed. This program will use local brood stock collected at or near Prosser Dam and will mark releases so that natural-origin returns can be distinguished. These fish would be released from Prosser Hatchery or acclimation sites upstream in the lower Naches or middle Yakima Rivers. New hatchery releases targeted at re-establishing the summer run component would be implemented. Summer Chinook collected from Wells Hatchery or Wells Dam will be used initially to re-establish a summer run until adult returns are sufficient to meet the targeted summer run release objective with an integrated local brood source program. The existing fall Chinook program at Marion Drain would be replaced with the summer run rearing program. Marion Drain fall Chinook would be treated as part of the aggregate Yakima fall run Chinook population (see Section 6.2). The combined annual release goal for the fall-run and summer-run portion of the program would be approximately 2.0 to 2.7 million Chinook (generally consistent with the existing program – see Table 1.11.2.2).

These fish would be released from acclimation sites in the Yakima River as follows:

- ~1.7 million PRH fall run Chinook from acclimation site(s) below Horn Rapids Dam. These will continue to be LWS NFH fish released from Prosser Hatchery until the Master Plan is submitted, approved, and implemented.

- ~0.1-0.5 million Prosser Hatchery fall run Chinook (local brood program) from Prosser Hatchery or acclimation sites in the lower Naches and middle Yakima Rivers. This portion of the program is already occurring and will be ongoing.

- ~0.2-0.5 million summer run Chinook (initially from Wells Hatchery or Wells Dam brood source) from acclimation sites in the lower Naches and middle Yakima Rivers. This portion of the program is already occurring and will be ongoing. Transition to local brood

is expected to occur slowly over the next 20-30 years as adult returns to the Yakima increase.

These program modifications are consistent with HSRG recommendations and are expected to contribute to enhancement of VSP parameters for naturally spawning fall Chinook and reduce ecological risks to native species relative to the existing program.

1.2) Species and population (or stock) under propagation, and ESA status.

State common and scientific names.

Fall Chinook (*Oncorhynchus tschawytcha*)
ESA Status: Not listed and not a candidate for listing. NOAA Fisheries grouped summer and fall run Chinook together as part of the Upper Columbia River Summer-/Fall-run Chinook ESU when it made a "not warranted for listing" determination for this ESU in 1998. Yakima River summer/fall Chinook are part of this ESU. The term "fall Chinook" in this document applies to the aggregate summer- and fall-run components.

1.3) Responsible organization and individuals

Indicate lead contact and on-site operations staff lead.

Name (and title): Joe Blodgett, Fish Production Biologist and Facility Manager
Agency or Tribe: Yakama Nation
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

Co-operators	Role
Yakama Nation	Lead entity; manages and operates Prosser Hatchery complex
U.S. Bureau of Reclamation	Owner of facility land; and minor funding entity for facility upgrades and public education
U.S. Fish and Wildlife Service	Little White Salmon/Willard NFH Complex and Fish Pathology Monitoring and Analyses
Grant County Public Utility District	Priest Rapids Hatchery funding entity
National Marine Fisheries Service	Funding Entity/Administration via Mitchell Act Funds
Washington Department of Fish & Wildlife	Co-Manager; Operator of Priest Rapids and Wells Hatcheries
Bonneville Power Administration	Funding Entity- Administrator
U.S. Army Corps of Engineers	Funding Entity- Administrator via John Day mitigation
Northwest Power and Conservation Council (NPCC)	Makes Fish and Wildlife Program decisions under the Northwest Power Act
Yakima Basin Fish and Wildlife Recovery Board	Lead entity on development of mid-Columbia Salmon and Steelhead Recovery Plan

1.4) Funding source, staffing level, and annual hatchery program operational costs.

The program includes 9 scientific technicians and 2 management biologists for Marion Drain and Prosser Hatcheries or 11 full-time equivalent staff with an annual operating cost of approximately $1.1 million (2002 dollars). This operational information includes Prosser and Marion Drain production of summer and fall-run Chinook as well as coho.

The URB fall Chinook production program in the Yakima Basin is funded through John Day mitigation, the Mitchell Act, and the Bonneville Power Administration. John Day mitigation funds are used to culture the LWS fish up to being transferred to the Yakima Basin. Mitchell Act funds are used for final rearing and acclimation at the Prosser Hatchery. Bonneville Power Administration funds are used to culture the in-basin Yakima and Marion Drain production and for monitoring and evaluation.

1.5) Location(s) of hatchery and associated facilities.

Include name of stream, river kilometer location, basin name, and state. Also include watershed code (e.g. WRIA number), regional mark processing center code, or other sufficient information for GIS entry. See "Instruction E" for guidance in responding.

As described in 1.1 under "Brief Overview", the Yakama Nation Prosser and Marion Drain hatcheries are the main facilities for the program described in this HGMP. Although Little White Salmon NFH (USFWS) and Priest Rapids and Wells Hatcheries (WDFW) provide current or future fish for this program, activities at these out-of-basin facilities will not be described in this document.

An HGMP for the LWS NFH fall Chinook salmon program which supplies fall Chinook salmon to this program is available at the follow website: http://www.fws.gov/pacific/Fisheries/Hatcheryreview/Reports/columbiagorge/LW--006LWURBHGMPMay04.doc. The LWS NFH URB fall Chinook program is currently covered under a Section 7 Biological Opinion dated November 27, 2007 (http://www.nwr.noaa.gov/Salmon-Harvest-Hatcheries/Hatcheries/Sec-7-USFWS-Columbia.cfm). The LWS NFH URB fall Chinook program is being updated to reflect changes due to reprogramming at the Spring Creek NFH.

The HGMP for Priest Rapids fall Chinook (which may supply fish to this program in the future) can be found at:
http://wdfw.wa.gov/hat/hgmp/pdf/snake_river/ucol_priest_rapids_fck.pdf

The HGMP for Wells Hatchery Summer Chinook can be found at:
http://wdfw.wa.gov/hat/hgmp/pdf/snake_river/wells_sck.pdf

Broodstock source	Yakima River
Broodstock collection location (stream, RKm, subbasin)	Chandler Canal (Water diversion system upstream of and off right bank at Prosser Dam) and Prosser Dam- Right Bank Fish Ladder, RKm 75.1, Yakima Subbasin; and Marion Drain fishwheel, ~RKm 132.9, Yakima Subbasin.
Adult holding location (stream, RKm, subbasin)	Prosser Hatchery (Off river of the Yakima River ~0.75 miles downstream of Prosser Dam , RKm 75.1, Yakima Subbasin; and Marion Drain Hatchery, ~RKm 132.9, Yakima Subbasin.
Spawning location (stream, RKm, subbasin)	Prosser Hatchery (Off river of the Yakima River ~0.75 miles downstream of Prosser Dam , RKm 75.16Yakima Subbasin; and Marion Drain, ~RKm 132.9, Yakima Subbasin.
Incubation location (facility name, stream, RKm, subbasin)	Prosser Hatchery (Off river of the Yakima River ~0.75 miles downstream of Prosser Dam , RKm 75.16, Yakima Subbasin; and Marion Drain, ~RKm 132.9, Yakima Subbasin.
Rearing location (facility name, stream, RKm, subbasin)	Prosser Hatchery (Off river of the Yakima River ~0.75 miles downstream of Prosser Dam , RKm 75.1, Yakima Subbasin; and Marion Drain, ~RKm 132.9, Yakima Subbasin.

The WRIA code for Prosser Dam and Hatchery, Chandler canal, and Marion Drain facility is 37.

1.6) Type of program.

Define as either: Integrated Recovery; Integrated Harvest; Isolated Recovery; or Isolated Harvest (see Attachment 1 - Definitions" section for guidance).

The long-term intent of the program as described here and in the Master Plan is a combination of integrated harvest and integrated recovery using locally adapted brood sources.

Background: The Yakima fall Chinook program originated strictly as a mitigation program to mitigate for activities within the Columbia River Basin that have decreased salmonid populations. Upriver production was designed to mitigate for the loss of Tribal harvest opportunity as a result of reduced natural fall Chinook runs above Bonneville Dam. Since 1997, after being adopted into the YKFP, the program has evolved into a supplementation program, while still having mitigation responsibilities under *United States versus Oregon* and the Columbia River Fish Management Plan.

1.7) Purpose (Goal) of program.

Define as either: Augmentation, Mitigation, Restoration, Preservation/Conservation, or Research (for Columbia Basin programs, use NPPC document 99-15 for guidance in providing these definitions of "Purpose"). Provide a one sentence statement of the goal of the program, consistent with the term selected and the response to Section 1.6. Example: "The goal of this program is the restoration of spring Chinook salmon in the White River using the indigenous stock".

The purposes of this hatchery program are: to provide harvest, to maintain viable salmon population parameters for Yakima River fall Chinook, to contribute to regional research and education, and as mitigation for hydro system impacts. Specific goals are:

Conservation: 1) increase population viability (abundance, productivity, diversity and spatial distribution; McElhany et al. 2000; see also NRC 1996) by enhancing local adaptation of fall Chinook released in the subbasin, by re-establishing a summer run component, and by working with other parties to implement habitat restoration strategies, and 2) ensure that population size remains large enough to allow the population to maintain itself (Sections 6.1.1 and 6.1.3 of Master Plan)

Harvest: 1) meet or exceed Treaty harvest obligations consistently and on a long-term sustainable basis, 2) maintain or increase recreational fisheries on a long-term sustainable basis (Section 6.1.3 of Master Plan)

Habitat: continue work to address limiting factors as identified in the Yakima Subbasin Plan and Yakima Steelhead Recovery Plan (Section 6.1.5 of Master Plan)

1.8) Justification for the program.

Indicate how the hatchery program will enhance or benefit the survival of the listed natural population (integrated or isolated recovery programs), or how the program will be operated to provide fish for harvest while minimizing adverse effects on listed fish (integrated or isolated harvest programs).

The hatchery strategy calls for transitioning the existing hatchery program. Fall Chinook from Little White Salmon would be replaced with fish from Priest Rapids Dam (or Hatchery) and these fish would be released from new acclimation sites below Horn Rapids Dam. Given the geographical and genetic proximity of Priest Rapids fish to the lower Yakima River, these releases could continue indefinitely to meet mitigation and harvest goals with little impact to conservation objectives. Improved survival from a lower basin release of these fish combined with increased production from habitat restoration and a more fully developed local brood source should work synergistically to further conservation and harvest objectives. The integrated program using local fall Chinook brood stock to augment harvest and natural spawning escapement in the middle reaches of the Basin would continue to be developed and new hatchery releases targeted at re-establishing the summer run component would be implemented. The integrated program will use local brood stock collected at or near Prosser Dam and will mark all releases so that natural-origin returns can be distinguished. Summer Chinook collected from Wells Hatchery or Wells Dam will be used initially to re-establish a summer run until adult returns are sufficient to meet the targeted summer run release objective with an integrated local brood source program. The combination of these strategies as well as habitat protection and enhancement strategies identified in the Yakima Subbasin and Recovery Plans should work to improve VSP parameters for summer and fall run Chinook in the Yakima and Columbia Basins.

Impacts to listed steelhead in the Yakima Basin are discussed in other sections of this HGMP.

Background: The *United States versus Oregon* Columbia River Fish Management Plan (1988) stated a short-term production goal for the Yakima Basin as a release of 1.7 million Upriver Bright Stock fall Chinook from the Little White Salmon Hatchery. The long-term production goal for the Yakima Basin was stated as the construction of a Yakima Hatchery with capacity for production of 3.0 million Upriver Bright fall Chinook. The CRFMP also supported the establishment of a new program where the production of 200,000 fall Chinook was to be converted to summer Chinook and identified the construction of a Yakima hatchery for regional [summer Chinook] supplementation as a long-term goal. This program is part of mitigation for the lost natural production of tens of thousands of adult spawners due to flooding of mainstem habitat from construction of John Day Dam. The proposed program is consistent with the 2008-2017 *U.S. v Oregon* Management Agreement (Tables B.2 and B.5), the Columbia River Fish Accords, and other mitigation obligations and agreements (e.g., John Day mitigation).

1.9) List of program "Performance Standards".

"Performance Standards" are designed to achieve the program goal/purpose, and are generally measurable, realistic, and time specific. The NPPC "Artificial Production Review" document attached with the instructions for completing the HGMP presents a list of draft "Performance Standards" as examples of standards that could be applied for a hatchery program. If an ESU-wide hatchery plan including your hatchery program is available, use the performance standard list already compiled.

Example: "(1) Conserve the genetic and life history diversity of Upper Columbia River spring Chinook populations through a 12 year duration captive broodstock program; (2) Augment, restore and create viable naturally spawning populations using supplementation and reintroduction strategies; (3) Provide fish to satisfy legally mandated harvest in a manner which minimizes the risk of adverse effects to listed wild populations; (4)....".

In general the YKFP monitors production programs in terms of performance relative to:
1) Increasing natural production.
2) Increasing harvest opportunity.
3) Limiting genetic impacts to target and nontarget populations.
4) Limiting ecological impacts to nontarget populations.

Monitoring and Evaluation for this particular program will fall into the following five general categories: Hatchery, Harvest, Escapement (Abundance and Spatial Distribution), Productivity, and Predation. Chapter 7 of the Master Plan (included in Section 11 here) details objectives and strategies for each of these five categories. Diversity will be monitored through genetic and biological sampling of returning fish recaptured at adult traps and those fish used for brood stock. Ecological Interactions monitoring is part of the umbrella YKFP M&E project, BPA project id 199506325.

1.10) List of program "Performance Indicators", designated by "benefits" and "risks."

"Performance Indicators" determine the degree that program standards have been achieved, and indicate the specific parameters to be monitored and evaluated. Adequate monitoring and evaluation must exist to detect and evaluate the success of the hatchery program and any risks to or impairment of recovery of affected, listed fish populations.

The NPPC "Artificial Production Review" document referenced above presents a list of draft "Performance Indicators" that, when linked with the appropriate performance standard, stand as examples of indicators that could be applied for the hatchery program. If an ESU-wide hatchery plan is available, use the performance indicator list already compiled. Essential 'Performance Indicators" that should be included are monitoring and evaluation of overall fishery contribution and survival rates, stray rates, and divergence of hatchery fish morphological and behavioral characteristics from natural populations.

The list of "Performance Indicators" should be separated into two categories: "benefits" that the hatchery program will provide to the listed species, or in meeting harvest objectives while protecting listed species; and "risks" to listed fish that may be posed by the hatchery program, including indicators that respond to uncertainties regarding program effects associated with a lack of data.

1.10.1) "Performance Indicators" addressing benefits.

(e.g. "*Evaluate smolt-to-adult return rates for program fish to harvest, hatchery broodstock, and natural spawning.*").

Performance Indicators Addressing Benefits

Indicator	Performance Standard	Indicator is Monitored
Total number of fish harvested in tribal fisheries targeting this program.	Program contributes to fulfilling tribal trust responsibility mandates and treaty rights, as described in *U.S. v. Oregon* management agreements	*U.S. v OR* TAC and YN monitoring
Number of fish released by program, returning, or caught, as applicable to given mitigation requirements.	Program contributes to mitigation requirements.	*U.S. v OR* TAC and YN monitoring
Annual number of fish produced by this program caught in all fisheries, including estimates of fish released and associated incidental mortalities, by fishery.	Fish produced for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding overharvest of non-target species.	*U.S. v OR* TAC and YN monitoring documents total harvest of URBs in fisheries; proportion Yakima would need to be derived from available information such as release numbers, dam counts, etc.
Annual escapements of natural populations that are affected by fisheries targeting program fish.		YN and WDFW conduct annual redd counts of naturally spawning fall Chinook in the Yakima Basin
Annual number of spawners on spawning grounds, by age.	Artificial propagation program contributes to an increasing number of spawners returning to natural spawning areas.	YN and WDFW estimate Yakima River run size from Prosser dam count, harvest, and redd count data. Age composition can be estimated from Prosser Denil passage and Prosser hatchery broodstock scale sampling.
Annual number of redds in selected natural production index areas.		YN and WDFW conduct annual redd counts of naturally spawning fall Chinook in the Yakima Basin

1.10.2) "Performance Indicators" addressing risks.

(*e.g. "Evaluate predation effects on listed fish resulting from hatchery fish releases."*).

Performance Indicators Addressing Risks

Indicator	Performance Standard	Indicator is Monitored
Marking rate by mark type for each release group.	Release groups are sufficiently marked in a manner consistent with information needs and protocols to enable determination of impacts to natural- and hatchery-origin fish in fisheries.	Yes, marking rates for each release group will be documented. For M&E purposes, we intend to mark 100% of all hatchery-origin releases. However, due to the large number of releases, associated marking costs, and tribal policies relative to mass marking and selective fisheries, it may be necessary to modify M&E measures to monitor performance based on less than 100% marking. Marking rates will be sufficient to determine relative survival differences between different release groups.
Temporal distribution of broodstock collection, and of naturally produced population at point of collection.	Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of the population from which broodstock is taken.	Broodstock will be taken representatively from throughout the run (e.g., Denil at Prosser Dam, fishwheel in Marion Drain, and possibly other methods such as seining).
Age composition of broodstock collected, and of naturally produced population at point of collection.		Scale samples will be taken from all brood collected for age composition.
Number of spawners of natural origin removed for broodstock.	Broodstock collection does not significantly reduce potential juvenile production in natural rearing areas.	Mark rates and sampling protocols will be designed so that the proportion of Hatchery- and natural-origin fish used for brood and escaping to the spawning grounds will be known and for calculating Proportion Natural Influence (PNI).
Number and origin of spawners migrating to natural spawning areas.		(see above).
Number of eggs or juveniles placed in natural rearing areas.		Juvenile fish will be released from acclimation sites in the upper (summer run) and lower (fall run) Yakima Basin. Annual seine surveys will be conducted in natural juvenile rearing areas.

Life history characteristics	Life history characteristics of the natural population do not change as a result of this artificial production program.	At least the following characteristics will be monitored on an annual basis: Juvenile migration timing (at Chandler), juvenile size at outmigration (Chandler sampling, hatchery release and seining operations), adult return timing (at Prosser), adult return age and sex composition and size at return (Prosser Denil and brood sampling), Spawn timing and distribution (comprehensive spawner surveys), fecundity and egg size (hatchery spawn sampling)
Carrying capacity criteria for basin-wide and local habitat, including method of calculation.	Annual release numbers do not exceed estimated basin-wide and local habitat capacity, including spawning, freshwater rearing, migration corridor, and estuarine and nearshore rearing.	Yakima Basin carrying capacity will be monitored using life-cycle and habitat production modeling analyses. Models will be frequently updated to include the most recent production and habitat parameters.
Annual release numbers from all programs in basin and subbasin, including size and life-stage at release, and length of acclimation, by program.		YN documents these data.
Location of releases and natural rearing areas.		YN documents these data.
Timing of hatchery releases, compared to natural populations.		Timing of hatchery releases is known. Timing of wild/natural migrations determined from Chandler juvenile trap monitoring.
Genetic profiles of naturally produced adults, as developed at program's outset (e.g. through DNA or allozyme procedures) and compared to genetic profiles developed each generation.	Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production.	This is not presently a program priority. However, DNA samples could be taken from fish at the Prosser Denil and during spawning if sufficient funding were made available.
Total number of natural spawners reaching the collection facility.	Collection of broodstock does not adversely impact the genetic diversity of the naturally spawning population.	Mark rates and sampling protocols will be designed so that the proportion of Hatchery- and natural-origin fish used for brood and escaping to the spawning grounds will be known and for calculating Proportion Natural Influence (PNI).
Total number of spawners estimated to pass the collection facility to spawning areas, compared to minimum effective population size (when established) required for those natural populations.		Total number of natural spawners is estimated (see above); minimum effective population size could be estimated using available data.
Timing of collection compared to overall run timing.		Prosser Dam counts and Prosser Denil sampling and collection data should be sufficient.
The ratio of observed and/or estimated total numbers of artificially produced fish on natural spawning grounds, to total number of naturally produced fish, for each significant spawning area.	Artificially produced origin adults in natural production areas do not exceed appropriate proportion of the total natural spawning population.	Mark rates and sampling protocols will be designed so that the proportion of Hatchery- and natural-origin fish used for brood and escaping to the spawning grounds will be known and for calculating Proportion Natural Influence (PNI).
Observed and estimated total numbers of naturally produced and artificially produced adults passing a counting station close to natural spawning areas.		(see above).
Location of juvenile releases.	Juveniles are released on-station, or after sufficient acclimation to maximize homing ability to intended return locations.	Juvenile fish will be released from acclimation sites in the upper (summer run) and lower (fall run) Yakima Basin. Annual seine surveys will be conducted in natural juvenile rearing areas.
Length of acclimation period.		Fish will be acclimated for a period of 6 weeks to 12 weeks depending on annual water conditions.
Release type, whether forced, volitional, or direct stream release.		Volitional release.
Level of smoltification at release, compared to a regional smoltification index (when developed). Release type, whether forced, volitional, or direct stream release.	Juveniles are released at fully smolted stage.	Volitional release as pre-smolt subyearlings or yearling smolts.
Number of adults available for broodstock (moving geometric mean, based on number of ages at return for this species).	The number of adults returning to the hatchery that exceeds broodstock needs is declining.	Prosser dam counts and denil sampling should provide an index with which to make this determination.

Scientifically based experimental design, with measurable objectives and hypotheses.	The artificial production program uses standard scientific procedures to evaluate various aspects of artificial propagation.	The fall Chinook program is currently evaluating the effects of conventional versus accelerated rearing on smolt-to-smolt and smolt-to-adult survival. See http://www.efw.bpa.gov/searchpublications/ YKFP M&E annual report for latest year's results.
Monitoring and evaluation framework including detailed time line.	The artificial propagation program is monitored and evaluated on an appropriate schedule and scale to address progress toward achieving the experimental objective and evaluate beneficial and adverse effects on natural populations.	Monitoring and evaluation framework is being developed as part of the Master Plan for this species.
Annual and final reports.		See http://www.efw.bpa.gov/searchpublications/ YKFP M&E annual report for latest year's results.
Annual reports indicating level of compliance with applicable standards and criteria.	Artificial production facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols such as those described by IHOT (1995), Pacific Northwest Fish Health Protection Committee (PNFHPC), the Co-Managers of Washington Fish Health Policy, National Investigational New Animal Drug (INAD) Office, and Montana Dept. of Fish Wildlife, and Parks (MDFWP).	See http://www.efw.bpa.gov/searchpublications/ Lower Yakima O&M annual report for latest year's results
Discharge water quality compared to applicable water quality standards and guidelines, such as those described or required by NPDES, IHOT, PNFHPC, and Co-Managers of Washington Fish Health Policy tribal water quality plans, including those relating to temperature, nutrient loading, chemicals, etc.	Effluent from artificial production facility will not detrimentally affect natural populations.	See http://www.efw.bpa.gov/searchpublications/ Lower Yakima O&M annual report for latest year's results
Water withdrawals compared to applicable passage criteria.	Water withdrawals and instream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment.	See http://www.efw.bpa.gov/searchpublications/ Lower Yakima O&M annual report for latest year's results for all performance indicators for this standard.
Water withdrawals compared to NMFS, USFWS, and WDFW juvenile screening criteria		
Number of adult fish aggregating and/or spawning immediately below water intake point.		Hatchery personnel will monitor.
Number of adult fish passing water intake point.		
Proportion of diversion of total stream flow between intake and outfall.		
Certification of juvenile fish health immediately prior to release, including pathogens present and their virulence.	Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens.	USFWS fish health professionals sample and certify all releases.
Number and location(s) of carcasses or other products distributed for nutrient enrichment.	Any distribution of carcasses or other products for nutrient enhancement is accomplished in compliance with appropriate disease control regulations and guidelines, including state, tribal, and federal carcass distribution guidelines.	See http://www.efw.bpa.gov/searchpublications/ Lower Yakima O&M annual report for latest year's results for all performance indicators for this standard.
Statement of compliance with applicable regulations and guidelines.		
Spatial and temporal spawning distribution of natural population above and below weir/trap, currently and compared to historic distribution.	Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally produced population.	Derived from spawner survey (temporal and spatial) and Prosser Dam counts (temporal).
Mortality rates in trap.	Weir/trap operations do not result in significant stress, injury, or mortality in natural populations.	Mortality rates are documented.

Prespawning mortality rates of trapped fish in hatchery or after release.		Mortality rates are documented.
Size at, and time of, release of juvenile fish, compared to size and timing of natural fish present.	Predation by artificially produced fish on naturally produced fish does not significantly reduce numbers of natural fish.	These data are available for analysis (see above).
Total cost of program operation.	Cost of program operation does not exceed the net economic value of fisheries in dollars per fish for all fisheries targeting this population.	See 1.4 above.
Sum of ex-vessel value of commercial catch adjusted appropriately, appropriate monetary value of recreational effort, and other fishery related financial benefits.		This calculation will be difficult to do accurately since these fish are harvested in marine fisheries from Alaska possibly as far south as Northern California and inland to Prosser Dam and as expressed above, the proportion of Yakima fish in the total URB harvest in these fisheries can only be roughly estimated.
Total cost of program operation.	Juvenile production costs are comparable to or less than other regional programs designed for similar objectives.	See 1.4 above.
Average total cost of activities with similar objectives.		
Number of adult fish available for tribal ceremonial use.	Non-monetary societal benefits for which the program is designed are achieved.	YN documents this use.
Recreational fishery angler days, length of seasons, and number of licenses purchased.		See relevant U.S. v OR TAC and WDFW documentation.

See also Sections 1.7-1.9 above.

1.11) Expected size of program.

In responding to the two elements below, take into account the potential for increased fish production that may result from increased fish survival rates effected by improvements in hatchery rearing methods, or in the productivity of fish habitat.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

The program goal is to maintain an annual release of 2.0 to 2.7 million fall Chinook consisting of:

- Up to 1.7 million Priest Rapids stock (presently LWS NFH) fall run Chinook. Brood stock (~800-1000 fish) collected at Priest Rapids Dam or Hatchery (presently LWS NFH).
- ~0.1 to 0.5 million local (Prosser Hatchery) fall run Chinook. The brood stock would be collected from several locations: a) the Prosser Dam right bank denil ladder and fish trapping facility; b) from fish stranded in the Chandler canal during maintenance operations in October; c) from a denil ladder at the Prosser Hatchery outlet stream; d) potential retrofits at existing irrigation diversion dams; and e) potential seining or trapping operations at other locations in the lower Yakima River. It is anticipated that up to 600 adults would be collected annually for this program. Broodstock would be collected throughout the entire adult migration period to increase the diversity of life histories being reared at the hatchery. On average, about 400 fall Chinook passed upstream via the Denil ladder from 2000-2008 (Table 6.5.1.1 in Master Plan). Chandler canal collections ranged from about 50-500 and averaged about 100 fall Chinook since 1997 (YN, unpublished data). The denil ladder at the Prosser Hatchery has not yet been

operated to capture fall Chinook, but biologists estimate another 100-200 fish could be captured there. Since fall Chinook collected at these three locations may consist largely of hatchery-origin returns, other collection options will be developed to increase the number of natural-origin fish used for brood stock.

- ~0.2 to 0.5 million summer run Chinook (100-250 adults, initially from Wells Hatchery or Wells Dam brood source).
- The existing fall Chinook program at Marion Drain would be replaced with the summer run rearing program. Marion Drain fall Chinook would be treated as part of the aggregate Yakima fall run Chinook population (see Section 6.2).

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location. (*Use standardized life stage definitions by species presented in* Attachment 2).

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling	Acclimation sites in the upper (summer run) and lower (fall run)Yakima Basin	~ 2.0-2.7 million (part of the summer run release might be a yearling program)
Yearling	Prosser Hatchery	~ 30,000 to 300,000 (for research and survival evaluation)

The *U.S. vs OR* production goal is an out-of-basin release of 1.7 million [Little White Salmon] fall Chinook. The program expects to maintain an annual release of approximately 2.0 to 2.7 million fall Chinook. Table 1.11.2.1 summarizes historic releases of hatchery fall Chinook smolts made in the Yakima between 1983 and 1996. Table 1.11.2.2 reflects the current status of the fall Chinook program with respect to release numbers and release location.

Table 1.11.2.1. Summary statistics, LWS hatchery fall Chinook smolt releases in the Yakima Subbasin, 1983 - 1996.

	Hatchery Plants Above Prosser		Hatchery Plants Below Prosser				
Year	No.	% Clipped	No.	% Clipped	Hat. Smolt Survival To Prosser, Pen Reared Fish Only (%)	Hat. Smolt Survival To Prosser, Direct Releases Only (%)	Catch Rate In Oceanic And Columbia River Fisheries (% Of No. Tagged Fish Released)
1983	0	N. A.	323,796	0	N. A.	N. A.	NO DATA
1984	105,097 (Sunnyside Dam)	100 (98.8% tagged)	479,556 (84.6% Horn, 15.4% Prosser)	21.5 (all Horn; 99,522 tagged)	N. A.	27.1	.09%
1985	100,655 (Sunnyside Dam)	100 (100% tagged)	1,763,500 (52.4% Horn, 47.6% Prosser)	6.1 (all Prosser, all tagged)	N. A.	15.7	PROSS = .09% SUNNY = 0.0%

1986	97,460 (Sunnyside Dam)	100 (96.1% tagged)	1,547,700 (53.2% Horn, 46.8% Prosser)	6.5 (all Prosser, all tagged)	N. A.	32.2	PROSS = .03% SUNNY = 0.0%
1987	196,980 (Sunnyside Dam)	100 (100% tagged)	872,609 (all Prosser)	22.6 (all Prosser, all tagged)	N. A.	44.4	PROSS = .15% SUNNY = .09%
1988	444,795 (55.3% Wapato net pens, 44.7% Sunnyside Dam)	100 (100% tagged)	1,375,888 (all Prosser)	14.5 (all Prosser, 95.6% tagged)	22.6	6.7	PENS = .001% PROSS = .005% SUNNY = 0.0%
1989	540,198 (63% Wapato net pens, 37% Sunnyside Dam)	90.6 (85% Wapato fish clipped and tagged; 100% Sunnyside fish clipped and tagged)	1,430,316 (24% Horn, 76% Prosser)	14.0 (18.4% Prosser fish clipped and tagged; 0% Horn fish clipped and tagged)	18.5	8.7	PENS = .001% SUNNY & WAPATO = .0005%
1990	679,714 (70.6% Wapato net pens, 29.4% Sunnyside Dam)	45.6 (39.9% Sunnyside fish clipped and tagged; 50% Wapato fish clipped, 48% Wapato fish clipped and tagged)	880,344 (all Prosser)	9.2 (9.2% Prosser fish clipped and tagged)	38.0	33.9	PENS = .05% PROSS & SUNNY = .05%
1991	478,916 (Wapato net pens); 1,152,829 (Roza WW #3)	100% Wapato fish clipped and tagged; all of the Roza WW#3 fish were ventral clipped, but none were tagged.	0	N/A	35.0	31.4	PENS = .04%
1992	0	N/A	0	N/A	N/A	N/A	No Data
1993	165,428 Frontage Rd.	98.5% tagged, 100% clipped	582,731 Prosser ?	98.5% tagged, 100% clipped	N/A	5.5	.005%
1994	0	N/A	1,703,892 Prosser Hatch.	11.6%	N/A	N/A	.001%
1995	0	N/A	1,694,188 Prosser Hatch.	11.7%	N/A	N/A	NO DATA
1996	0	N/A	1,885,504 Prosser Hatch.	10.6%	N/A	N/A	NO DATA

Table 1.11.2.2. Yakima Fall Chinook Release Summary, 1997-2008.

Release Yr.	LWS NFH[1]	Prosser[2]	Marion[2]	Edler[2]	Stiles[2]	TOTAL
1997	1,694,861					1,694,861
1998	1,695,399					1,695,399
1999	1,690,000	192,000				1,882,000
2000	1,695,037	306,000	16,000			2,017,037
2001	1,699,136	427,753	12,000			2,138,889
2002	1,704,348	286,158	4,000			1,994,506
2003	1,771,129	365,409	18,000			2,154,538
2004	1,748,200	561,385	52,223			2,361,808
2005	1,700,000	466,000	41,000	75,000	38,890	2,320,890
2006	1,683,664	130,002	2,000		118,835	1,934,501
2007	1,200,000	550,000	20,000		95,000	1,865,000

2008	800,000	8,336	12,000	55,000	55,000	930,336

[1] Transfers from Little White Salmon NFH released as subyearlings from Prosser Hatchery.
[2] Progeny of local brood stock released as subyearlings from Prosser Hatchery and upriver acclimation sites.

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.
Provide estimated smolt-to-adult survival rate, total adult production number, and escapement number (to the hatchery and natural areas) data available for the most recent twelve years (roughly three fish generations), or for the number of years of available and dependable information. Indicate program goals for these parameters.

Table 1.12.1. Yakima River Basin Fall Chinook Data, 1983 - 2008.

	Hatchery Releases by Brood Source		Natural Smolt	Wild and Hatchery Returns to Prosser			Redd Counts[3]	
Year	LWS[1]	Yakima[2]	Counts	Adults	Jacks	Total	Yakima	Marion Drain
1983	323,796		22,403	264	116	380	50	101
1984	584,663		9,078	694	637	1,331	118	81
1985	1,863,155		285,191	181	92	273	45	77
1986	1,645,160		19,811	497	238	735	134	117
1987	1,022,236		157,581	472	64	536	14	75
1988	1,819,671		75,508	190	34	224	400	12
1989	2,310,636		47,631	670	0	670	149	114
1990	1,560,058		291,092	1,504	0	1,504		
1991	1,632,233		87,252	865	106	971	29	42
1992	130,630		287,727	1,500	112	1,612		39
1993	750,000		181,317	1,056	9	1,065	74	34
1994	1,695,392		246,029	1,357	163	1,520		29
1995	1,694,188		32,354	1,179	143	1,322		34
1996	1,685,278		6,292	1,166	226	1,392		26
1997	1,694,861		35,494	1,031	89	1,120		16
1998	1,695,399		486,573	1,064	84	1,148		22
1999	1,690,000	192,000	45,702	1,876	20	1,896		24
2000	1,695,037	322,000	198,002	1,371	922	2,293		
2001	1,699,136	439,753	1,677,537	3,651	660	4,311		34
2002	1,704,348	290,158	95,424	6,146	95	6,241	590	56
2003	1,771,129	383,409	113,577	4,796	79	4,875	1,273	86
2004	1,748,200	613,608	217,832	2,862	85	2,947	889	100
2005	1,700,000	620,890	182,278	1,920	22	1,942	350	56
2006	1,683,664	250,837	43,716	1,499	29	1,528	357	60
2007	1,200,000	665,000	28,989	892	240	1,132	321	67
2008	800,000	130,336	88,905	2,739	124	2,863	201	46
Avg:	1,453,803	390,799	190,896	1,594	169	1,763	312	58

[1] Little White Salmon National Fish Hatchery.
[2] Includes Marion Drain.
[3] Blanks indicate no data were available.

Table 1.12.2. Average combined hatchery- and natural-origin smolt counts at Prosser for fish returning at age-3, -4, and -5, combined adult returns to Prosser Dam of all age classes, and estimated Prosser smolt-to-adult return indices for Yakima River fall Chinook for adult return years 1988-2008.

Adult Return Year	Prosser Average Smolts[1]	Prosser Total Adults	Prosser Smolt-to-Adult Return Index (SAR)
1988	1,029,429	224	0.02%
1989	1,469,019	670	0.05%
1990	1,664,378	1,504	0.09%
1991	1,579,989	971	0.06%
1992	1,811,088	1,612	0.09%
1993	2,034,865	1,065	0.05%
1994	1,976,301	1,520	0.08%
1995	1,329,664	1,322	0.10%
1996	1,023,053	1,392	0.14%
1997	1,097,032	1,120	0.10%
1998	1,533,093	1,148	0.07%
1999	1,786,511	1,896	0.11%
2000	1,716,156	2,293	0.13%
2001	1,867,966	4,311	0.23%
2002	1,946,676	6,241	0.32%
2003	2,108,238	4,875	0.23%
2004	2,653,056	2,947	0.11%
2005	2,707,132	1,942	0.07%
2006	2,724,824	1,528	0.06%
2007	2,312,562	1,132	0.05%
2008	2,450,308	2,863	0.12%
Average	1,848,635	2,027	0.11%

[1] Average combined hatchery- and natural-origin smolt counts for the years which would comprise the age-3, -4, and -5 adult return components for each adult return year. For example, the "Prosser Average Smolts" for adult return year 1988 is the average of hatchery- and natural-origin Prosser smolt estimates for juvenile migration years 1983-1985.

Table 1.12.3. Release-to-adult survival rates of summer and fall Chinook salmon reared as sub-yearlings and yearlings at selected hatcheries in the Mid-Columbia Region. Survival rates are expressed as un-weighted means of variable-sized release groups. Data from Priest Rapids Fall Chinook HGMP, August 26, 2005.

Hatchery	Age at Release	Release Years	Release-to-adult survival rate (%)
Priest Rapids	sub-yearling	1976-1989	0.835
Priest Rapids	sub-yearling	1990-1996	0.370
Rocky Reach	yearling	1984-1989	1.366
Wells	sub-yearling	1976-1989	0.098
Wells	yearling	1976-1989	0.410

Estimates of total fall Chinook escaping fisheries and spawning naturally in the Yakima River

have ranged from about 1,350 to 11,300 fish from 1998 to 2007.

Table 1.12.4. Estimated fall Chinook return, escapement, and harvest in the Yakima River, 1998-2008. Data from WDFW and YN databases, 6 March 2009.

	Escapement								
	Total Return		Above Prosser		Below Prosser		WA Recreational Harvest		
Year	Adult	Jack	Adult	Jack	Adult	Jack	Adult	Jack	Rate
1998	1,743	106	1,064	84	645	22	34	0	1.8%
1999	4,056	43	1,876	20	2,046	23	134	0	3.3%
2000	4,557	1,138	1,371	922	2,931	194	255	22	4.9%
2001	5,886	869	3,651	660	1,293	151	942	58	14.8%
2002	13,369	211	6,146	95	4,923	116	2,300	0	16.9%
2003	10,092	193	4,796	79	3,874	73	1,422	41	14.2%
2004	5,825	271	2,862	85	2,231	140	732	46	12.8%
2005	3,121	45	1,920	22	491	7	710	16	22.9%
2006	2,299	67	1,499	29	363	10	437	28	19.7%
2007	1,318	461	892	240	194	26	232	195	24.0%
2008			2,739	124			502	64	

Because of the quantity and relatively higher quality of fall Chinook available to tribal fishers in Zone 6 Columbia River fisheries, Yakima River tribal harvest is typically at or near zero even though regulations allowing fall season fisheries in the Yakima River are propagated annually by the Yakama Nation.

1.13) Date program started (years in operation), or is expected to start.

The Yakima Upriver Bright Program began in 1983. In early years the program consisted of direct stream and/or acclimated releases transferred from out-of-basin facilities. The first year of operation for the Prosser hatchery was 1994. The first year of operation for the Marion Drain hatchery was 1997. The first year that Wells hatchery summer run eggs were transferred to Prosser Hatchery was 2008.

1.14) Expected duration of program.

This is an ongoing supplementation program designed to augment both natural production and tribal and sport harvest. The program is expected to end when goals can be met by other means not requiring artificial production.

1.15) Watersheds targeted by program.

Include WRIA or similar stream identification number for desired watershed of return.

Yakima River Subbasin/Columbia Plateau Province, generally WRIAs 37 and 38.

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

The YN considered four other alternatives for managing Yakima River summer/fall Chinook.

1) Maintain existing program. The existing program does not meet current conservation goals identified for the Subbasin. The USFWS hatchery review group and the HSRG have recommended transitioning the Yakima program from LWS NFH stock to Priest Rapids stock.

2) Transition to a segregated program for non-local fall Chinook with releases below Prosser and an integrated hatchery program using locally collected broodstock with releases at or above Prosser. This alternative was rejected due primarily to the difficulty maintaining a segregated program without adequate trapping facilities in the lower Yakima River; disease considerations were also a factor. Using green or eyed-eggs instead of pre-smolts or isolating adults eliminates disease concerns with Priest Rapids stock fish. Thus, portions of this alternative were incorporated into the preferred alternative.

3) Eliminate hatchery production. This alternative was considered not viable because it is inconsistent with harvest objectives and existing *U.S. v Oregon* management agreements, principles and case law (see sections 1.8 and 3.2 of Master Plan).

4) Restore the natural fall Chinook spawning habitat eliminated by the construction of The Dalles and John Day dams. This alternative was not considered practical for a number of reasons. First, the direct costs associated with the removal of the dams would be very great, possibly in the billions of dollars. In addition to the direct expenses involved in dam removal, secondary expenses would accrue from providing an alternative to lost electrical generation and shipping as well as the cost of habitat mitigation required during and after dam removal. Dam removal would also require broad political support. Though the benefits to fish could be very large, the alternative was rejected on economic grounds.

SECTION 2. PROGRAM EFFECTS ON NMFS ESA-LISTED SALMONID POPULATIONS. (USFWS ESA-Listed Salmonid Species and Non-Salmonid Species are addressed in Addendum A)

2.1) List all ESA permits or authorizations in hand for the hatchery program.

This document is intended to be consistent with NOAA (2008) which states (RPA 39):

> The FCRPS Action Agencies will continue funding hatcheries in accordance with existing programs… Consultation under the ESA on the operation of hatchery programs funded by the FCRPS Action Agencies including the submittal of updated and complete HGMPs. Updated and complete HGMPs are to be

> submitted to NOAA Fisheries and ESA consultation should be initiated by … July 2009 for hatchery programs in the Middle Columbia … ESA consultations should be completed by January 2010 for hatchery programs in the Middle Columbia …

Project sponsors are also aware of direction in NOAA (2009a) calling "for consultations on hatchery programs within the MCR Steelhead DPS to be completed by January 2010". Project sponsors remind NOAA of its statement in this document that "mitigation obligations will not be diminished under this process". The Yakama Nation considers this project essential to meeting federal commitments to honor the Treaty of 1855, and to "protect, rebuild, and enhance" anadromous salmon populations throughout tribal usual and accustomed fishing areas as described in the 2008-2017 *United States v Oregon* Management Agreement and in the Columbia River Fish Accords. As such, any changes to program parameters described herein which would diminish the number of adult salmon returning to tribal usual and accustomed fishing areas that result from this HGMP development and consultation process will not be implemented unless and until they are considered and approved in appropriate policy fora.

The program has the following permits or authorizations: YKFP projects have been operating under a "BPA Letter" dated 4/6/01 from Robert Beraud to Rob Jones which states that NMFS has no concern that YKFP activities would violate 7d rules. An electronic copy of the letter is not available but could be mailed via U.S. mail if desired. In addition, the BPA environmental coordinator for the YKFP has prepared NEPA documents which cover all the environmental aspects of the project, including ESA coverages. At least the following related documents are on file with BPA (Obtain copies from Patricia R. Smith prsmith@bpa.gov, or Rachel Rounds rarounds@bpa.gov, BPA, 800-282-3713):

- Bonneville Power Administration, Yakama Indian Nation, Washington Department of Fish and Wildlife (BPA, YIN, WDFW). 1999a. Biological Assessment on Bull Trout for the Yakima/Klickitat Fisheries Project 1999-2004. March 1999.
- BPA, YIN, WDFW. 1999b. Biological Assessment on Mid-Columbia River Steelhead for the Yakima/Klickitat Fisheries Project 1999-2004. April 1999.
- National Marine Fisheries Service. 1999. Biological Opinion on Artificial Propagation in the Columbia River Basin. National Marine Fisheries Service, Northwest Region, Portland, OR.
- United States Department of Energy, Bonneville Power Administration (USDOE/BPA). 1996. Yakima Fisheries Project Final Environmental Impact Statement. DOE/EIS-0169. Portland, OR.
- USDOE/BPA. 1999. Supplement Analysis for Yakima Fisheries Project, DOE/EIS-0169-SA-01. Portland, OR
- USDOE/BPA. 1999. Supplement Analysis for Yakima Fisheries Project, DOE/EIS-0169-SA-02. Portland, OR
- USDOE/BPA. 2000. Supplement Analysis for Yakima Fisheries Project, DOE/EIS-0169-SA-03. Portland, OR
- USDOE/BPA. 2000. Supplement Analysis for Yakima Fisheries Project, DOE/EIS-0169-SA-04. Portland, OR
- USDOE/BPA. 2002. Supplement Analysis for Yakima Fisheries Project, DOE/EIS-0169-

SA-05. Portland, OR

- USDOE/BPA. 2003. Supplement Analysis for Yakima Fisheries Project, DOE/EIS-0169-SA-06. Portland, OR
- USDOE/BPA. 2003. Supplement Analysis for Yakima Fisheries Project, DOE/EIS-0169-SA-07. Portland, OR
- USDOE/BPA 2004. Supplement Analysis for Yakima Fisheries Project, DOE/EIS-0169-SA-08. Portland, OR
- USDOE/BPA 2005. Supplement Analysis for Yakima Fisheries Project, DOE/EIS-0169-SA-09. Portland, OR
- USDOE/BPA 2005. Supplement Analysis for Yakima Fisheries Project, DOE/EIS-0169-SA-10. Portland, OR

2.2) Provide descriptions, status, and projected take actions and levels for NMFS ESA-listed natural populations in the target area.

2.2.1) Description of NMFS ESA-listed salmonid population(s) affected by the program.

Include information describing: adult age class structure, sex ratio, size range, migrational timing, spawning range, and spawn timing; and juvenile life history strategy, including smolt emigration timing. Emphasize spatial and temporal distribution relative to hatchery fish release locations and weir sites

- Identify the NMFS ESA-listed population(s) that will be directly affected by the program. *(Includes listed fish used in supplementation programs or other programs that involve integration of a listed natural population. Identify the natural population targeted for integration).*

None.

- Identify the NMFS ESA-listed population(s) that may be incidentally affected by the program.
(Includes ESA-listed fish in target hatchery fish release, adult return, and broodstock collection areas).

Populations of wild steelhead *Oncorhynchus mykiss* in the Columbia River Basin have declined dramatically from historical levels (Nehlsen et al. 1991; NRC 1996; Williams et al. 1999). Average abundance of wild steelhead in the Yakima River Subbasin over the last two decades is only 2% of pre-1890 abundance levels reported by Howell et al. (1985). Causes of these declines include a host of environmental and human-induced factors (NRC 1996; Williams et al. 1999). In 1997 steelhead in the upper Columbia River were listed as endangered under the Endangered Species Act (ESA) and those in the Snake River were listed as threatened (62 FR 43937-43954). Stocks originating in mid-Columbia Basin tributaries (including the Yakima River) were listed as threatened in 1999 (64 FR 14517-14528). No hatchery fish have been released in the Yakima Subbasin since 1993. Regional plans recognize the need to protect and enhance weak upriver steelhead populations and their habitat while maintaining the genetic integrity of

those stocks (NPPC 1994).

Steelhead in the Yakima Basin are divided into four populations: the Satus Creek, Toppenish Creek, Naches River, and Upper Yakima River populations. The NOAA Interior Columbia Technical Recovery Team (ICTRT) identifies the Satus Creek population as steelhead that spawn in the Satus Creek drainage on the Yakama Indian Reservation, the mainstem Yakima River below Satus Creek, and tributaries to the lower mainstem. For management purposes, local planners have subdivided the Satus population into the Satus block, which spawns in the Satus Creek drainage, and a mainstem block, whose current and historic status is uncertain. The Toppenish population consists of steelhead that spawn in Toppenish Creek, its tributaries and the short stretch of the mainstem between Toppenish and Satus creeks, and is entirely on the Yakama Reservation. The Naches population includes steelhead spawning in the Naches River and its tributaries (including the Tieton, Little Naches, American, and Bumping rivers and Cowiche, Rattlesnake and Nile creeks), the mainstem Yakima from the Naches confluence to the Toppenish Creek confluence and the tributaries to that reach of the Yakima, including Ahtanum Creek. The Upper Yakima population consists of all steelhead that spawn in the Yakima River and its tributaries upstream of the Naches confluence. Together these four populations make up the Yakima MPG (see YBFWRB 2009 and Small et al. 2006).

Risks for the Yakima Basin fall Chinook program generally fall into three categories:

- Physical effects on environmental resources caused by facility development
- Effects on target fish (fall Chinook) and non-target taxa (NTT) caused by monitoring and broodstock collection activities (e.g., trapping, marking, handling, etc.)
- Interaction risks to non-target fish from the presence of released fall Chinook.

2.2.2) Status of NMFS ESA-listed salmonid population(s) affected by the program.

- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds (*see definitions in "Attachment 1").*

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data. *(Include estimates of juvenile habitat seeding relative to capacity or natural fish densities, if available).*

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Adult and juvenile passage estimates for Yakima Basin projects are available at www.ykfp.org and Columbia River DART. Estimated counts of juvenile steelhead migrating past Prosser for recent years are:

Table 2.2.1. Prosser Dam Steelhead Juvenile (Downstream) Migration Estimates

Juv. Migr. Year	Wild	Hatch.	Total	%Wild
1988	42,522	14,636	57,158	74.4%
1989	22,345	5,056	27,401	81.5%
1990	21,805	6,499	28,304	77.0%
1991	21,309	612	21,921	97.2%
1992	33,096	549	33,645	98.4%
1993	17,165	3,109	20,274	84.7%
1994	17,977	602	18,579	96.8%
1995	17,765	16	17,781	99.9%
1996	43,366	14	43,380	100.0%
1997	44,631	0	44,631	100.0%
1998	85,360	0	85,360	100.0%
1999	38,266	0	38,266	100.0%
2000	42,696	0	42,696	100.0%
2001	28,428	0	28,428	100.0%
2002	38,560	0	38,560	100.0%
2003	29,641	0	29,641	100.0%
2004	32,428	0	32,428	100.0%
2005	46,741	0	46,741	100.0%
2006	18,838	0	18,838	100.0%
2007	31,898	0	31,898	100.0%
2008	26,327	0	26,327	100.0%
2009	28,754	0	28,754	100.0%
Average:	33,389	1,413	34,591	95.9%

Data source: YN databases (YakRSthdDB.xls)

Table 2.2.2. Yakima Basin Adult Steelhead Escapement and Spawning Summary						
Run Year	Prosser Dam Count	Redd Counts by Survey Stream				Roza Dam Count
		Satus	Toppenish	Ahtanum	Naches	
1987-88	2,840	445				
1988-89	1,162	404	45			
1989-90	814	289	26			
1990-91	834	125				
1991-92	2,263					116
1992-93*	1,184	73				15
1993-94	554	114				28
1994-95**	925	85				23
1995-96	505	148				92
1996-97*	1,106	76	5			22
1997-98*	1,113	190	13			51
1998-99	1,070	130	78			14
1999-00	1,611	169	185	11		14
2000-01	3,089	102	355	8		140
2001-02**	4,525	240	111	13		238
2002-03	2,235	172	354	8		134
2003-04	2,755	93	56	12	94	213
2004-05	3,451	108	99	16	140	227
2005-06**	2,005	60	20	1	19	117
2006-07	1,537	87	42**	4**	44	61
2007-08	3,310	110	68*	8*	11**	169
2008-09	3,450	119	79	3	29**	230

Blank = no data available

* Partial survey.

**Survey affected by access problems, high flows, or poor redd visibility

Hatchery releases were discontinued in the early 1990s. Recent 9-year average (since 1998-99 run year) escapement over Prosser Dam has been >98% wild; since 1983-84 the annual steelhead escapement has averaged about 92% wild. Data source: YN databases (YakRSthdDB.xls, SthdReddSummary.doc).

Available data indicates smolt-to-adult survival for naturally produced smolts in the Yakima Basin ranged from approximately 0.35% to 4.21% for calendar years 1985 through 2002 (C. Frederiksen, Yakama Nation Fisheries, personal communication).

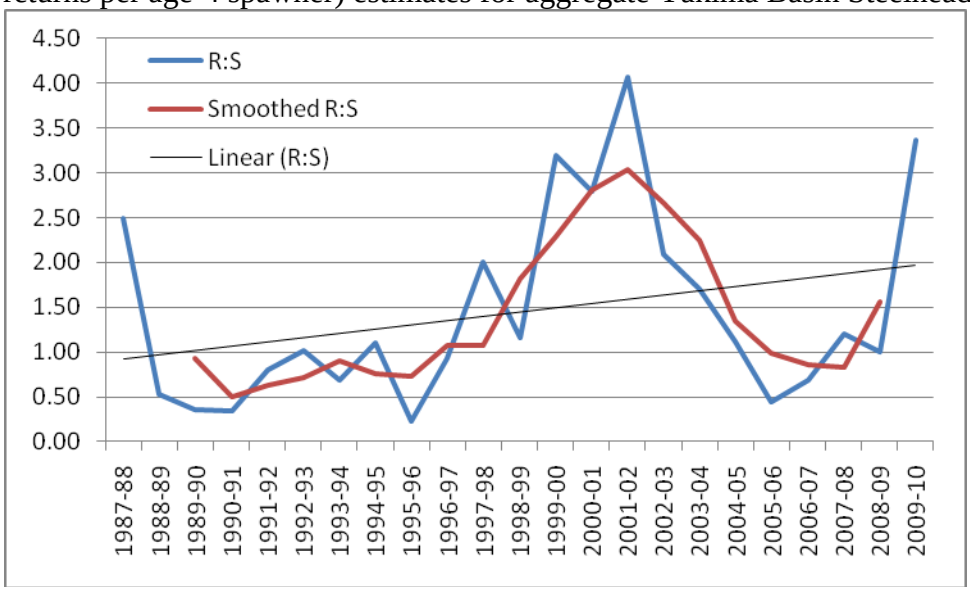
Table 2.2.3. Adult-to-adult productivity (age-4 returns per age-4 spawner) estimates for aggregate Yakima Basin Steelhead.

Run Year	Prosser Adult Count	Prosser Aggregate Age-4 Returns per Spawner	Smoothed Average Age-4 R:S
1983-84	1,140		
1984-85	2,194		
1985-86	2,235		
1986-87	2,465		
1987-88	2,840	2.49	
1988-89	1,162	0.53	
1989-90	814	0.36	0.93
1990-91	834	0.34	0.51
1991-92	2,263	0.80	0.63
1992-93	1,184	1.02	0.71
1993-94	554	0.68	0.90
1994-95	925	1.11	0.76
1995-96	505	0.22	0.74
1996-97	1,106	0.93	1.07
1997-98	1,113	2.01	1.08
1998-99	1,070	1.16	1.82
1999-00	1,611	3.19	2.29
2000-01	3,089	2.79	2.80
2001-02	4,525	4.07	3.03
2002-03	2,235	2.09	2.66
2003-04	2,755	1.71	2.25
2004-05	3,451	1.12	1.34
2005-06	2,005	0.44	0.99
2006-07	1,537	0.69	0.86
2007-08	3,310	1.20	0.83
2008-09	3,469	1.01	1.56
2009-10	6,743[1]	3.36	
Mean	2,108	1.44	1.39
Geometric Mean	1,740	1.10	1.20

[1] through May 6, 2010.

Data source: YN databases (YakRSthdDB.xls).

Figure 2.2.1. Graph of point and smoothed average adult-to-adult productivity (age-4 returns per age-4 spawner) estimates for aggregate Yakima Basin Steelhead.



The data in Table 2.2.3 and Figure 2.2.1 are admittedly gross representations of adult-to-adult productivity. However, the geometric means for these metrics over a 26-year data set are greater than one and show an increasing trend. This indicates with high likelihood that combined artificial production and habitat restoration activities in the Yakima Basin are having a neutral or net positive impact on listed steelhead in the Basin.

Please see Yakima Basin steelhead HGMP (submitted to NOAA fisheries in 2005; available from YN) and Yakima Basin steelhead recovery plan for further information.

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of NMFS listed fish in the target area, and provide estimated annual levels of take *(see "Attachment 1" for definition of "take")***.**

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.
(*e.g. "Broodstock collection directed at sockeye salmon has a "high" potential to take listed spring Chinook salmon, through migrational delay, capture, handling, and upstream release, during trap operation at Tumwater Falls Dam between July 1 and October 15. Trapping and handling devices and methods may lead to injury to listed fish through descaling, delayed migration and spawning, or delayed mortality as a result of injury or increased susceptibility to predation*").

Yakima Basin fall Chinook: Hatchery activities assessed include broodstock collection and transfer to and release from acclimation sites. M&E activities include: spawner surveys, PIT and radio tagging, juvenile and adult trapping and sampling operations, electroshocking, etc. See also Section 3.5 below.

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

Juvenile passage estimates at Prosser and adult counts of steelhead at Prosser and Roza Dam were given above in 2.2.2.

See also take table at end of this HGMP. Annual adult and juvenile passage estimates for Yakima Basin projects are also available at http://www.ykfp.org.

Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).
*Complete the appended "take table" (**Table 1**) for this purpose. Provide a range of potential take numbers to account for alternate or "worst case" scenarios.*

See Take Table at end of document.

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.
(*e.g. "The number of days that steelhead are trapped at Priest Rapids Dam will be reduced if the total mortality of handled fish is projected inseason to exceed the 1988-99 maximum observed level of 100 fish."*)

We do not anticipate exceeding take levels specified in this HGMP. At Prosser Dam, steelhead can use three ladders and only the right bank Denil ladder contains an adult sampling facility. Historically, only 10-20% of the annual steelhead run passes upstream at Prosser via the Denil ladder during adult monitoring facility operations in the fall (first 40-60% of the adult steelhead migration). Contingency plans for YKFP projects are addressed by the YKFP Policy Group on a timely basis using adaptive management.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.
(e.g. "The hatchery program will be operated consistent with the ESU-wide plan, with the exception of age class at release. Fish will be released as yearlings rather than as sub-yearlings as specified in the ESU-wide plan, to maximize smolt-to-adult survival rates given extremely low run sizes the past four years.").

A Yakima Basin salmon recovery plan is presently being developed as part of the Subbasin Planning Process. A draft document is available for public review at http://www.ybfwrb.org/Draft%20plan/RecPlanFinal.pdf. The proposed project is cognizant of and consistent with a number of other recent and on-going planning and recovery efforts in the area including the: Yakima/Klickitat Fisheries Project (see Sampson et al. 2009), Yakima Subbasin Plan (YSFWPB 2004), Yakima Subbasin Salmon and Steelhead Recovery Plans (YBFWRB 2009), Mid-Columbia Sub-Domain ESA Steelhead Recovery Plan (NOAA 2009b), Hatchery Scientific Review Group reform recommendations (HSRG 2005 and 2009), Yakama Nation Riparian / Wetlands Restoration, Yakama Reservation Watersheds Project, and Yakima Basin Side Channels Project. Increasing the viability of fall and summer run Chinook populations within the Yakima Subbasin can be supported from multiple standpoints.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates. *Indicate whether this HGMP is consistent with these plans and commitments, and explain any discrepancies.*

Document Title	Type
Treaty of 1855. Asserted the right of the Yakama Nation to "take fish at all usual and accustomed fishing areas". Federal courts have held that this right means more than the right of Indians to hang a net in an empty river (*Washington v Washington State Commercial Passenger Fishing Vessel Association, 1979*).	Federal Treaty
United States versus Oregon Columbia River Fish Management Plan and 2008-2017 Management Agreement. Appendix B of the CRFMP describes provisions for moving fall Chinook production to upriver areas. See 1.8 above.	Federal Court Order
US v Washington	Federal Court Order
Northwest Power and Conservation Council (NPCC), Fish and Wildlife Program.	Northwest Power Act
Mitchell Act annual Congressional Appropriations language. The primary purpose of the Mitchell Act is to mitigate for fishery losses due to hydroelectric development in the Columbia River Basin. Congress has recognized that it is appropriate to mitigate these losses in upriver areas where the losses occurred.	Mitchell Act
WY-KAN-USH-MI WA-KISH-WIT	Columbia River Anadromous Fish Restoration Plan of the Columbia River Tribes
Yakama Nation and US Bureau Reclamation Prosser Hatchery Agreement	MOU
Yakama Nation and US Fish & Wildlife Service Fish Health Agreement	MOU
Yakama Nation and Grant County PUD	MOU
Yakama Nation and Wasco County PUD	MOU
2008 Columbia Basin Fish Accords Memorandum of Agreement between the Three Treaty Tribes and FCRPS Action Agencies	MOA

3.3) Relationship to harvest objectives.
Explain whether artificial production and harvest management have been integrated to provide as many benefits and as few biological risks as possible to the listed species. Reference any harvest plan that describes measures applied to integrate the program with harvest management.

3.3.1) Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.
Also provide estimated future harvest rates on fish propagated by the program, and on listed fish that may be taken while harvesting program fish.

See Section 1.7 for overall program objectives.

Table 3.3.1.1. Estimated fall Chinook return, escapement, and harvest in the Yakima River, 1998-2008. Data from WDFW and YN databases, 6 March 2009.

			Escapement						
	Total Return		Above Prosser		Below Prosser		WA Recreational Harvest		
Year	Adult	Jack	Adult	Jack	Adult	Jack	Adult	Jack	Rate
1998	1,743	106	1,064	84	645	22	34	0	1.8%
1999	4,056	43	1,876	20	2,046	23	134	0	3.3%
2000	4,557	1,138	1,371	922	2,931	194	255	22	4.9%
2001	5,886	869	3,651	660	1,293	151	942	58	14.8%
2002	13,369	211	6,146	95	4,923	116	2,300	0	16.9%
2003	10,092	193	4,796	79	3,874	73	1,422	41	14.2%
2004	5,825	271	2,862	85	2,231	140	732	46	12.8%
2005	3,121	45	1,920	22	491	7	710	16	22.9%
2006	2,299	67	1,499	29	363	10	437	28	19.7%
2007	1,318	461	892	240	194	26	232	195	24.0%
2008			2,739	124			502	64	

Note: Because of the quantity and relatively higher quality of fall Chinook available to tribal fishers in Zone 6 Columbia River fisheries, Yakima River tribal harvest is typically at or near zero.

However, fall Chinook are also harvested in marine fisheries from Alaska south into Oregon and northern California, and in Columbia River fisheries from the mouth to the Hanford Reach. Out-of-basin harvest rates have not been estimated specifically for Yakima hatchery fish, but the total ocean and freshwater adult equivalent harvest rates for Upriver Bright fall Chinook for return years 1989-1996 ranged from 33% to 73%. It is assumed that Yakima River fall Chinook are harvested at the same rate in these fisheries as other upriver bright fall Chinook.

3.4) Relationship to habitat protection and recovery strategies.

Describe the major factors affecting natural production (if known). Describe any habitat protection efforts, and expected natural production benefits over the short- and long-term. For Columbia Basin programs, use NPPC document 99-15, section II.C. as guidance in indicating program linkage with assumptions regarding habitat conditions.

YN, state, federal, local (irrigation districts) entities are working together to improve habitat and water resources in the Yakima Subbasin, by overcoming major inhibiting factors to the recovery of fall Chinook populations.

Major inhibiting factors to fall Chinook production are:

1) Sublethal to lethal water temperatures typically by June below Prosser Dam (RM 47).

2) Low flow conditions (especially in poor water years) between Prosser Dam and the Chandler power plant outfall.

3) Predation by birds (especially in poor water years), and both native and exotic piscivorous fish (especially smallmouth bass).

4) Loss of structurally complex rearing habitat.

5) Excessive sediments from irrigation drains (though this is being slowly addressed in recent years) in major spawning areas.

6) Smolt mortality associated with predation in the vicinity of bypass outfalls at Wapato, Sunnyside and Prosser Dams, and a number of smaller Yakima Basin dams (e.g., Marion Drain re-use diversion, Columbia and Richland Ditches at Horn Rapids Dam).

7) Adult mortality associated with mainstem Columbia dams.

8) Smolt mortalities associated with traversing mainstem Columbia dams and impoundments.

In recent years the DOE and the Roza-Sunnyside irrigation districts have made a concerted effort to reduce the amount of TDS through project return drains or pipes. Most notably is Granger Drain, where turbidity levels have dropped from around 400 NTU's to 25-30 in 2000. This effort is being applied elsewhere in the basin to improve drain water quality.

The BOR is currently exploring the feasibility of eliminating the Chandler Canal irrigation withdrawal at Prosser Dam with a "pump exchange" using Columbia River water to improve instream flows in this reach.

The YN and WDFW through the YKFP are investigating the impact of smallmouth bass, pikeminnow, and bird predation on salmonid smolts in the Yakima Basin.

3.5) Ecological interactions. [Please review Addendum A before completing this section. If it is necessary to complete Addendum A, then limit this section to NMFS jurisdictional species. Otherwise complete this section as is.]
Describe salmonid and non-salmonid fishes or other species that could (1) negatively impact program; (2) be negatively impacted by program; (3) positively impact program; and (4) be positively impacted by program. Give most attention to interactions between listed and "candidate" salmonids and program fish.

The following species co-occur to a significant degree with the program fish in either freshwater or early marine life stages.

- Steelhead
- Chum
- Sockeye
- Coho
- Chinook
- Bull Trout

(1) negatively impact program

Smallmouth bass and gulls concentrating at the fish bypass outfalls and dams appear to be the two predators having the most impact on fall Chinook parr and smolts.

(2) be negatively impacted by program

At this time no negative impact by the hatchery fall Chinook program has been identified.

(3) positively impact program

Results from the YKFP indirect predation study have shown that fall Chinook smolt survival is positively correlated to both the total smolt (all salmonids) and total hatchery smolt (all salmonids) density at Prosser.

(4) be positively impacted by program

No benefits to other salmonid species have been identified. Generally, fall Chinook smolts outmigrate after the peak outmigrations of spring Chinook, coho and steelhead.

This stock of fall Chinook appears to be well suited for this river and is probably providing food for scavenging wildlife and raptors, as well as providing nutrient enhancement that could increase the productivity of the watershed.

To view recent reports on the YKFP's ecological interactions studies, see ykfp.org / technical reports and publications and Sampson et al. (2009).

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

For integrated programs, identify any differences between hatchery water and source, and "natal" water used by the naturally spawning population. Also, describe any methods applied in the hatchery that affect water temperature regimes or quality. Include information on water withdrawal permits, National Pollutant Discharge Elimination System (NPDES) permits, and compliance with NMFS screening criteria.

Prosser Hatchery has the ability to use 30 cfs Yakima River water (with the exception of mid-

November through December when canal maintenance is performed and canal flow can get as low as 1-2 cfs), and has three wells that contribute 3200 gallons per minute. The river water supply is used from March through July for juvenile fish rearing and September through January for adult broodstock. The surface water is gravity flow from Chandler Canal behind the fish screens. One well is used from September through April to incubate eggs. The well is capable of pumping 800 gallons per minute. The other two wells are used all year to rear juvenile salmon and adult steelhead kelts. Each well is able to pump 1,200 gallons per minute. The well water is constant 57 degrees (Fahrenheit), and the surface water temperature changes with the seasons.

Marion Drain has the ability to pump approximately 800 gallons per minute surface water directly from Marion Drain and has two wells for egg incubation and fry rearing. One well pumps 80 gallons per minute and another 300 gallons per minute. The surface water is used all year for fall Chinook and some trout/sturgeon rearing. The two wells are used from September through March for egg incubation and fry rearing. The well water is 58 degrees (Fahrenheit) and the surface water changes with seasons.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.
(e.g. "Hatchery intake screens conform with NMFS screening guidelines to minimize the risk of entrainment of juvenile listed fish.").

The facility operates in compliance with state or federal regulations for discharge. Discharge is covered under existing Bureau of Reclamation permits because the intake for the surface water is behind the USBOR fish screens in Chandler canal which is also in compliance with all guidelines for juvenile fish. The wells are 160 feet deep so no screening is necessary.

Marion Drain: The surface water pump station is fitted with meshed screen adequate to keep all sizes of fish from the pumps.

All production facilities operated by the Yakama Nation conform to NOAA screening guidelines as necessary. However, the YN is aware of several BOR facilities in the Yakima Basin that are likely not in compliance with these same guidelines. The Yakama Nation expects NOAA to hold all action agencies to the same standards with respect to ESA reporting and compliance.

SECTION 5. FACILITIES

Provide descriptions of the hatchery facilities that are to be included in this plan (see "Guidelines for Providing Responses" Item E), including dimensions of trapping, holding incubation, and rearing facilities. Indicate the fish life stage held or reared in each. Also describe any instance where operation of the hatchery facilities, or new construction, results in destruction or adverse modification of critical habitat designated for listed salmonid species.

5.1) Broodstock collection facilities (or methods).

The Prosser Hatchery consists of the following: Office, workshop, spawning shed, three adult/juvenile ponds, an incubation room, thirteen raceways (start tanks), 16 raceways, four circular tanks, adult collection raceways, chiller, two backup electrical generators, and a freezer.

Yakima local broodstock are collected from the wild/natural and hatchery-origin return either at the Prosser right bank steep-pass denil ladder or by seine net from the Chandler canal or other locations (see section 7.2 for additional information).

Marion Drain - A fish-wheel is operated in Marion Drain to collect fall Chinook broodstock. Broodstock are trucked 8 miles to the Marion Drain hatchery raceway(s). The Marion Drain hatchery is separate and unique from the Prosser Hatchery. All fish collected in Marion Drain are spawned at, and their progeny reared and released from the Marion Drain facility. Evaluation of the status of the Marion Drain fish is ongoing (see section 6.2); brood collection operations in Marion Drain may not be necessary in the future.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

Prosser and Marion Drain: Adult fish are transported in either a 400 gallon tank placed on the back of a pick up truck, or a three compartment 1500 gallon tank on a flatbed. Both are designed to safely haul fish equipped with oxygen and aeration system.

5.3) Broodstock holding and spawning facilities.

Spawning for this program takes place at the Prosser Hatchery, Rkm 75.6. Integrated Hatchery Operations Team (IHOT) adult holding guidelines are followed for adult holding, density, water quality, alarm systems and predator control measures to provide the necessary security for the broodstock.

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1 (Prosser fall)	Vinyl line Raceway	22000	150	50	4	1100
1 (Marion Dr fall)	Stainless raceway	375	25	5	3	65

5.4) Incubation facilities.

Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
Deep Trough with perforated plates (10 cells per trough)- Prosser Hatchery	5	5	nya	60000 per cell	nya
Vertical Stack (24 trays/stack)- Prosser Hatchery	23 stacks	5	nya	nya	5000
Vertical Stack – Marion Drain	6 half-stacks 2 deep troughs	5			

Prosser Hatchery has four deep troughs used for initial incubation (to eyed-stage) and 23 (24 trays/stack) vertical stacks (Heath trays) used for final incubation to hatch-out.
Marion Drain Hatchery has two deep troughs used for initial incubation (to eyed-stage) and 1 (8 trays/stack) vertical stack (Heath trays) used for final incubation to hatch-out.

5.5) Rearing facilities.

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Maximum Flow Index	Maximum Density Index
16 (Prosser)	Stainless Wall with Vinyl Line Raceways	3375	75	15	3	750	nya	0.75
4 (Marion Drain)	Stainless steel	375	25	5	3	65		0.75

Prosser Hatchery – Fry are ponded at 1,100 fpp from the vertical stacks into the three upper, outside raceways. When the parr reach 500 fpp they are transferred to the four lower, outside raceways.
Marion Drain Hatchery - The buttoned-up fry are transferred into a single raceway (5 ft by 25 ft) where they remain through acclimation and release.

5.6) Acclimation/release facilities.

Most fish are released on-station from the facilities described above in 5.5.
Prosser Hatchery - When the parr reach 150 fpp they are transferred to the larger, portable raceways where they will be released. Parr will be released directly into the river on-site at ~65 fpp.
Marion Drain Hatchery - See Rearing Section above. Smolts are released directly into the drain at (approximately RM 14) at ~65 fpp.

The Yakama Nation intends to use the following additional acclimation sites:

"Billy's Pond". This site is located near the city of Yakima, Washington and may ultimately be used to acclimate up to 200,000 smolts. The pond is not a natural pond; it was most likely a gravel pit created during construction of Interstate 82. It is located near River Mile 113 on the mainstem Yakima River, on the outskirts of the town of Union Gap next to a sewage treatment plant. Fish would be transferred from Prosser Hatchery into this pond in mid-March and a proportion would be PIT-tagged for experimental purposes. They would then be released volitionally to the river between mid-April and mid-May to migrate to the ocean. An aluminum screen is placed across the outlet to keep fish in the pond until the time for their release. Yakama Nation personnel feed and check on the fish daily. The pond is accessed by vehicle over an existing unimproved road through the Wastewater Treatment Plant. The YN received a "no effect determination" from BPA in March, 2007 for activities at this acclimation site relative to anticipated impacts to listed species and critical habitat.

Stiles Ponds. Stiles ponds are located at approximately RM 3.7 on the Naches River, which is located at RM 116.3 on the Yakima River. These ponds are entirely screened off from the

Naches River as part of the Chapman Nelson irrigation canal system. Approximately 200,000 mainstem in-basin stock fall Chinook would be acclimated at Stiles pond from February – April. Volitional release would begin in early April. To determine survival rate, approximately 2,500 within the group would be PIT-tagged and monitored for survival to Bonneville Dam.

Edler Pond. Edler Pond #3 is located in Union Gap, Washington. Edler Pond #3 is an old highway development gravel pit resulting in a pond at least 500 feet across and 15 feet deep, fluctuating with the Yakima River. Approximately 200,000 mainstem in-basin fall Chinook broodstock would be acclimated beginning in mid-March with two volitional release periods of mid-April and mid-May (75,000 to 100,000 fish in each release group).

BPA supplemental analysis DOE/EIS-0169-SA-10 determined that "the potential impacts from the addition of Stiles and Edler Ponds are not substantially different from those discussed in the Yakima Fisheries Project EIS (DOE/EIS-0169), ROD, Supplement Analyses (SA-01 through SA-09), and related biological assessments and biological opinions. No additional impacts would occur in connection with these activities. There are no new circumstances or information relevant to environmental concerns and bearing on the proposed actions or their impacts. Therefore, a supplement to the YFP EIS is not needed and no further NEPA documentation is required."

The Yakama Nation proposes to acclimate 10,000 of the Yakima Fisheries Project fall Chinook smolts (early and late) at two new locations, Elks Pond and Skov Pond, near the city of Yakima, Washington. Ultimately up to 250,000 fall Chinook smolts may be acclimated at each site.

Elks Pond is located at River Mile 117 on the mainstem Yakima River, one mile from the confluence with the Naches River. Elks Pond empties into a creek which enters the Yakima River under the North 1st Street Bridge in Selah. A screen or net will be placed near the top of the creek to prevent smolts from entering the Yakima River prematurely. Skov Pond is located at River Mile 122.5 (opposite of Wenas Creek) on the mainstem Yakima River. It is connected to the Yakima River by a six inch PVC underground pipe. Smolts in Skov Pond would be kept in a net pen. At the time of release a connection will be made from the existing PVC to the net pen to release the smolts to the river. The fall Chinook smolts are part of the Yakima/Klickitat Fisheries Project -Yakima Fall Chinook Supplementation Program. The smolts would be PIT-tagged for experimental purposes. The fish would be released into the ponds in mid-March. They would then be released volitionally into the Yakima River between mid-April and mid-May to migrate to the ocean. No modifications are needed to the ponds. Yakama Nation personnel would feed and check on the fish daily. Both ponds are accessible by vehicle.

The Yakama Nation is also investigating potential acclimation sites in the lower Yakima River (either ponds below Horn Rapids Dam or mobile units placed near Horn Rapids Dam). Additional information will be provided as it becomes available.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

No major mortality events have occurred to date for fall Chinook reared at YN Facilities. Refer to the out-of-basin facility HGMP links provided in section 1.5 for mortality information related

to these facilities.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.
(e.g. "The hatchery will be staffed full-time, and equipped with a low-water alarm system to help prevent catastrophic fish loss resulting from water system failure.").

Prosser Hatchery: Staff members are on-site 24/7 during critical phases of the program, and the facility is enclosed in chain linked fence, and periodic patrols of law enforcement (local and tribal) maintain a security envelope of facility. The hatchery is also equipped with a low-water alarm system to help prevent catastrophic fish loss resulting from water system failure. The Hatchery also has 3 backup power generators (2 at Prosser, 1 at Marion Drain) in case of power failure.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.
List all historical sources of broodstock for the program. Be specific (e.g., natural spawners from Bear Creek, fish returning to the Loon Creek Hatchery trap, etc.).

The brood sources chosen for the program described in this HGMP represent natural populations native or adapted to the watersheds in which hatchery fish will be released.

Until 1997 Little White Salmon National Fish Hatchery was the sole broodstock source used in the Yakima Basin through the release of 1.7 million smolts. The original source of the LWS stock was upriver bright (URB) fall Chinook trapped at the Bonneville State Fish Hatchery. The current source is from adult URB fall Chinook returning to the Little White Salmon River. The original stock used in the Priest Rapids spawning channel and at Priest Rapids Hatchery (considered a future brood source for this program) came from late-run Chinook trapped at Priest Rapids Dam. Beginning in 1997 to present Yakima (including Marion Drain) basin spawners were incorporated into the overall broodstock collection for the Prosser and Marion Drain facilities.

With respect to summer run Chinook, Wenatchee fish were originally considered the 'best fit' due to the watershed's proximity to the Yakima Basin. However, risks associated with pathogen introduction to the Yakima Basin, which is relatively clean compared to other basins, were considered much higher for Wenatchee fish relative to Okanogan fish. This is a legitimate concern given the diversity of anadromous species and their respective populations existing in the Yakima Basin. Additionally, the Wenatchee stock is not as suited to the Yakima Basin when comparing habitat conditions and water temperatures. The Okanogan stock is clearly better suited due to the similarities in temperatures endured during adult migration, especially in lower

portions of the river near its confluence with the Columbia. In theory, these fish have adapted to somewhat inhospitable conditions and have maintained an exceptional productivity given all the factors working against them. Temperature and flow conditions in the lower Yakima River are likely one of several factors contributing to the extirpation of summer run populations in the 1970s. For these reasons, the YN proposes to use summer run Chinook from Wells Hatchery or natural origin adults from the Okanogan or from Wells dam for its efforts to reestablish a summer run component in the Yakima Basin. Since the initial operation of the spawning channel in 1967, broodstock collected for Wells Hatchery has come from fish diverted out of fish ladders while passing Wells Dam or from volunteers that enter the trap at the upper end of the hatchery discharge.

For additional information on the history of out-of-basin brood sources proposed for this program, please refer to the HGMP links cited in section 1.5.

6.2) Supporting information.

6.2.1) History.

Provide a brief narrative history of the broodstock sources. For listed natural populations, specify its status relative to critical and viable population thresholds (use section 2.2.2 if appropriate). For existing hatchery stocks, include information on how and when they were founded, sources of broodstock since founding, and any purposeful or inadvertent selection applied that changed characteristics of the founding broodstock.

Based on an electrophoretic analysis of allozyme samples collected from spawning fish in Marion Drain and the mainstem near Benton City in 1989 and 1990, Busack et al (1991) concluded that there were two genetically distinct stocks in the basin: the Marion Drain 'stock' and the 'mainstem stock'. Subsequent analyses of allozymes from fish collected in the mainstem above Prosser Dam were indistinguishable from the Benton City samples. Therefore, all mainstem spawners appeared to belong to the same genetic group, which was indistinguishable from Hanford reach URB's. The Marion Drain 'stock', which genetically resembled Snake River fall Chinook and Deschutes River (OR) fall Chinook more than Hanford Reach URB's, appeared to occur only in Marion Drain.

Some phenotypic differences between Marion Drain and mainstem Yakima fall Chinook have also been observed. The Marion Drain spawner population appears to have an unusually high jack component. The mean fish per redd ratio (for 2 years of data) was 9.3. The exact fish per redd ratio for the 'mainstem stock' is unknown, but is thought to be in the normal 2.5 fish per redd range. Marion Drain fry emerge beginning in early February due to the warmer groundwater influence, compared with mid-April for the Yakima stock. As a result, Marion Drain juveniles are thought to initiate smolt outmigration past the Chandler Juvenile Monitoring Facility earlier than mainstem Yakima smolts.

There is some anecdotal evidence that the generally constant flows in Marion Drain may attract fall Chinook into the drain, especially in years when mainstem flows in the Yakima River are particularly low, which could provide some insight as to the unique traits observed for Marion Drain fish. However, as noted earlier, the YN program has released from 400,000 to >2.0 million fall Chinook URB smolts throughout the lower half of the Yakima mainstem since 1983.

These and other 'mainstem stock' fall Chinook have likely spawned to some extent in Marion Drain over the years and it is also probable that some 'Marion Drain' fall Chinook have spawned in the mainstem. Therefore, the probability of potentially substantial annual gene flow between these two 'populations' has always been reasonably high. Recent genetic samples (WDFW, 2005, unpublished data) were unable to find the genetic distinction observed in 1991. The WDFW and YN will continue to collect and evaluate samples through 2010 to determine if any differentiation still exists.

However, even if differences exist, there is only very limited empirical research to suggest that maintaining several small isolated populations with periodic mixing is more effective at reducing losses of genetic diversity and fitness than maintaining a single large population (NRC 1996; Fraser 2008; see also Narum et al. 2008). Considering habitat capacity within Marion Drain, the population dynamics of Yakima Basin fall Chinook, and other characteristics, the Marion Drain subgroup is probably not an "independent population" (McElhany et al 2000), but rather part of a "stock complex" as defined by WDFW (1998). Given these considerations, as well as logistical and economic factors, it is reasonable to manage Marion Drain fish as part of the larger Yakima River summer and fall run Chinook population.

See also 6.1.

6.2.2) Annual size.

Provide estimates of the proportion of the natural population that will be collected for broodstock. Specify number of each sex, or total number and sex ratio, if known. For broodstocks originating from natural populations, explain how their use will affect their population status relative to critical and viable thresholds.

The program goal is to maintain an annual release of 2.0 to 2.7 million fall Chinook consisting of:

- Up to 1.7 million Priest Rapids stock (presently LWS NFH) fall run Chinook. Brood stock (~800-1000 fish) collected at Priest Rapids Dam or Hatchery (presently LWS NFH).
- ~0.1 to 0.5 million local fall run Chinook. The brood stock would be collected from several locations: a) the Prosser Dam right bank denil ladder and fish trapping facility; b) from fish stranded in the Chandler canal during maintenance operations in October; c) from a denil ladder at the Prosser Hatchery outlet stream; d) potential retrofits at existing irrigation diversion dams; and e) potential seining or trapping operations at other locations in the lower Yakima River. It is anticipated that up to 600 adults would be collected annually for this program. Broodstock would be collected throughout the entire adult migration period to increase the diversity of life histories being reared at the hatchery. On average, about 400 fall Chinook passed upstream via the Denil ladder from 2000-2008 (Table 6.5.1.1 in Master Plan). Chandler canal collections ranged from about 50-500 and averaged about 100 fall Chinook since 1997 (YN, unpublished data). The denil ladder at the Prosser Hatchery has not yet been operated to capture fall Chinook, but biologists estimate another 100-200 fish could be captured there. Since fall Chinook collected at these three locations may consist largely of hatchery-origin returns, other collection options will be developed to increase the number of natural-origin fish used for

brood stock.

- ~0.2 to 0.5 million summer run Chinook (100-250 adults, initially from Wells Hatchery or Wells Dam brood source).
- The existing fall Chinook program at Marion Drain would be replaced with the summer run rearing program. Marion Drain fall Chinook would be treated as part of the aggregate Yakima fall run Chinook population (see Section 6.2).

6.2.3) Past and proposed level of natural fish in broodstock.
If using an existing hatchery stock, include specific information on how many natural fish were incorporated into the broodstock annually.

Because of the low levels of marking of hatchery-origin fish in the past, the proportion of natural-origin fish in the local broodstock program (since 1997) is unknown. Pending funding to implement marking strategies, in the future, we propose to work towards a point where the local (integrated) broodstock program would consist of a much greater proportion (at least 50%, and if possible, 100%) natural origin fish. See also Sections 6.2.2, 1.11.1 and 1.12.

6.2.4) Genetic or ecological differences.
Describe any known genotypic, phenotypic, or behavioral differences between current or proposed hatchery stocks and natural stocks in the target area.

Little White Salmon hatchery fall Chinook were chosen to start this program because they were an URB fall Chinook stock. The Yakima stock is similarly an URB stock. Priest Rapids, an URB stock, though geographically close to the Yakima Basin, were not available as they were dedicated to another mitigation program; however, these fish are now being reconsidered based on recommendations by the USFWS and regional hatchery review groups. Bonneville (Oregon) was the only other source of URB fall Chinook, but ruled out because of concerns with disease transfer issues across state lines.

There are no known differences between LWS and Yakima stocks. Given the release history of LWS fish into the basin dating back to 1983, one would expect similar genotypic and phenotypic traits between these two stocks. Priest Rapids stock fall Chinook (collected at the Dam or the Hatchery) are likely even more similar to Yakima fall chinook given their proximity. In addition, these populations are all part of the same URB population as defined by NOAA fisheries. See also 6.1 and 6.2.1 above.

6.2.5) Reasons for choosing.
Describe any special traits or characteristics for which broodstock was selected.

See 6.1, 6.2.1, and 6.2.4.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.
(e.g. "*The risk of among population genetic diversity loss will be reduced by selecting the indigenous Chinook salmon population for use as broodstock in the supplementation*

program.").

See above responses in this section and also section 7.2 below.

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

Adults.

7.2) Collection or sampling design.
Include information on the location, time, and method of capture (e.g. weir trap, beach seine, etc.) Describe capture efficiency and measures to reduce sources of bias that could lead to a non-representative sample of the desired broodstock source.

The program goal is to maintain an annual release of 2.0 to 2.7 million fall Chinook consisting of:

- Up to 1.7 million Priest Rapids stock (presently LWS NFH) fall run Chinook. Brood stock (~800-1000 fish) collected at Priest Rapids Dam or Hatchery (presently LWS NFH).
- ~0.1 to 0.5 million local fall run Chinook. The brood stock would be collected from several locations: a) the Prosser Dam right bank denil ladder and fish trapping facility; b) from fish stranded in the Chandler canal during maintenance operations in October; c) from a denil ladder at the Prosser Hatchery outlet stream; d) potential retrofits at existing irrigation diversion dams; and e) potential seining or trapping operations at other locations in the lower Yakima River. It is anticipated that up to 600 adults would be collected annually for this program. Broodstock would be collected throughout the entire adult migration period to increase the diversity of life histories being reared at the hatchery. On average, about 400 fall Chinook passed upstream via the Denil ladder from 2000-2008 (Table 6.5.1.1 in Master Plan). Chandler canal collections ranged from about 50-500 and averaged about 100 fall Chinook since 1997 (YN, unpublished data). The denil ladder at the Prosser Hatchery has not yet been operated to capture fall Chinook, but biologists estimate another 100-200 fish could be captured there. Since fall Chinook collected at these three locations may consist largely of hatchery-origin returns, other collection options will be developed to increase the number of natural-origin fish used for brood stock.
- ~0.2 to 0.5 million summer run Chinook (100-250 adults, initially from Wells Hatchery or Wells Dam brood source).
- The existing fall Chinook program at Marion Drain would be replaced with the summer run rearing program. Marion Drain fall Chinook would be treated as part of the aggregate Yakima fall run Chinook population (see Section 6.2).

Broodstock is collected from adults returning to Prosser Dam/Chandler Canal area, and these fish are derivatives of local, Yakima River fall Chinook and returns from imported URB stocks released in the subbasin. From 1997 through 2007, broodstock were nearly exclusively collected

from Chandler Canal in November using beach seines. This interim collection site/method has been used because the canal has been routinely dewatered in the late fall to remove salmon and steelhead entrained into the canal and because relatively few fall Chinook were thought to use the right bank denil ladder at Prosser Dam. Before 1997 fish seined from Chandler canal were released back into the river. When the canal is used for broodstock collection, fish are randomly captured in that no purposeful selection criteria are used. However, females that are ripe (dripping eggs) are taken, knowing that if released into the river their chances of spawning success are minimal. After being seined, fish are placed into individual PVC tubes, carried up the bank, and placed into the hatchery truck. The fish are then transported (less than ¼-mile) and released into the adult holding pond. Any steelhead captured (very few if any steelhead are typically entrained into the canal) are handled the same as fall Chinook and released back into the river at the Prosser boat ramp located in the forebay approximately ½-mile upstream of the dam.

Beginning in 2008, the project proposes to use the Prosser steep-pass ladder for broodstock collection. The Prosser denil trap is operated continuously from September through early December. The trap is checked at least every 2 hours during operation. Passage of fall Chinook through the denil ladder ranged from 125 to 960 fish (7-23% of total Prosser passage) from 2001-2008 (Table 6.5.1.1 of Master Plan). Observed sex ratios (based on physical observation of secondary sexual characteristics of fish passing the denil) for this same period were: 45.5% female, 46.3% adult male, 8.2% jack. Since availability of fall Chinook at the denil may not meet the program goal for local broodstock in some years, the project may also use seining or trapping methods (in the Chandler Canal, Sulfur Drain, and other locations) to collect additional broodstock.

Some broodstock have been collected using a fish wheel located in Marion Drain at RM 6.2. The fish wheel has been operated and manned 24 hours a day. Fish were transported from the fish wheel using individual PVC tubes and placed in the waiting hatchery truck. Fish were transported about 8 miles to the hatchery, where they are released into the holding raceway. All fish collected were taken for broodstock. Collections were generally fewer than about 25 fish per year. No known selection biases were associated with the fish wheel. No steelhead were collected in the fish wheel since the beginning of its operation in 1999. The Marion Drain broodstock collection program is expected to be discontinued in the near future.

7.3) Identity.

Describe method for identifying (a) target population if more than one population may be present; and (b) hatchery origin fish from naturally spawned fish.

The Yakima integrated program broodstock collection will be based on examination of adipose, CWT, VIE and possibly other marks to distinguish fish of hatchery- and natural-origin and for experimental and non-experimental reasons. Presently these fish are not identified as to origin due to the fact that so few fish are marked.

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):

The program goal is to maintain an annual release of 2.0 to 2.7 million fall Chinook consisting of:

- Up to 1.7 million Priest Rapids stock (presently LWS NFH) fall run Chinook. Brood stock (~800-1000 fish) collected at Priest Rapids Dam or Hatchery (presently LWS NFH).
- ~0.1 to 0.5 million local fall run Chinook. The brood stock would be collected from several locations: a) the Prosser Dam right bank denil ladder and fish trapping facility; b) from fish stranded in the Chandler canal during maintenance operations in October; c) from a denil ladder at the Prosser Hatchery outlet stream; d) potential retrofits at existing irrigation diversion dams; and e) potential seining or trapping operations at other locations in the lower Yakima River. It is anticipated that up to 600 adults would be collected annually for this program. Broodstock would be collected throughout the entire adult migration period to increase the diversity of life histories being reared at the hatchery. On average, about 400 fall Chinook passed upstream via the Denil ladder from 2000-2008 (Table 6.5.1.1 in Master Plan). Chandler canal collections ranged from about 50-500 and averaged about 100 fall Chinook since 1997 (YN, unpublished data). The denil ladder at the Prosser Hatchery has not yet been operated to capture fall Chinook, but biologists estimate another 100-200 fish could be captured there. Since fall Chinook collected at these three locations may consist largely of hatchery-origin returns, other collection options will be developed to increase the number of natural-origin fish used for brood stock.
- ~0.2 to 0.5 million summer run Chinook (100-250 adults, initially from Wells Hatchery or Wells Dam brood source).
- The existing fall Chinook program at Marion Drain would be replaced with the summer run rearing program. Marion Drain fall Chinook would be treated as part of the aggregate Yakima fall run Chinook population (see Section 6.2).

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

Table 7.4.2.1. Actual numbers of fall Chinook spawned at Prosser and Marion Drain facilities, 1998-2006.

Year	Prosser Hatchery[a]		Marion Drain	
	Females	Males[b]	Females	Males[b]
1998	45	60	2	6
1999	70	95	7	25
2000	93	107	3	9
2001	42	53	4	7
2002	133	117	8	15
2003	186	161	2	6
2004	34	37	9	21

Year	Prosser Hatchery[a]		Marion Drain	
	Females	Males[b]	Females	Males[b]
2005	91	101	12	5
2006	42	50	7	15

[a] Ripe fish from Chandler canal rescue; others were released generally around Granger or above.
[b] Including jacks.

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.
Describe procedures for remaining within programmed broodstock collection or allowable upstream hatchery fish escapement levels, including culling.

Because most fish have been collected from Chandler canal during annual "rescue" operations, fish determined to be surplus to spawning needs are trucked upstream several miles and released directly back to the Yakima River. In the future, procedures will be developed to minimize the chances of collecting surplus and any surplus will either be released to the river to spawn naturally or distributed to tribal members for ceremonial and subsistence use.

7.6) Fish transportation and holding methods.
Describe procedures for the transportation (if necessary) and holding of fish, especially if captured unripe or as juveniles. Include length of time in transit and care before and during transit and holding, including application of anesthetics, salves, and antibiotics.

Broodstock are held for spawning in holding ponds or raceways until ready for spawning. Fish are checked weekly for ripeness and spawned. A formalin drip is applied weekly into the holding ponds to treat for fungus on the gills and any open wounds.

Equipment Type	Capacity (gallons)	Supplemental Oxygen (y/n)	Temperature Control (y/n)	Normal Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Adult Transfer Tanker Truck-Prosser Hatchery	700	Y	N	5	Light dose MS	nya

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1 (Prosser)	Vinyl line Raceway	4500	75	15	4	1100
1 (Marion Dr)	Stainless Raceway	375	25	5	3	65

7.7) Describe fish health maintenance and sanitation procedures applied.

Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC), state or tribal guidelines are followed for broodstock fish health inspection, transfer of eggs or adults and broodstock holding and disposal of carcasses. Fish transfers into the subbasin are inspected and accompanied by notifications as described in these guidelines. USFWS fish health specialists are present annually for spawning and sample every fish for presence of known salmon viruses and pathogens. USFWS sampling to date indicates

that the Yakima Basin remains among the most pathogen-free systems in the Columbia Basin.

7.8) Disposition of carcasses.

Include information for spawned and unspawned carcasses, sale or other disposal methods, and use for stream reseeding.

Following USFWS protocol, hatchery carcasses are eviscerated, heads are removed, and heated at 100^{o} F for 3 hours, then frozen. This process effectively kills any viruses or pathogens potentially hosted by these fish. Carcasses are distributed by staff (generally in December) within the subbasin to provide ecological benefits. Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC), state or tribal guidelines are followed for broodstock fish health inspection, transfer of eggs or adults and broodstock holding and disposal of carcasses.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

(e.g. "The risk of fish disease amplification will be minimized by following Co-manager Fish Health Policy sanitation and fish health maintenance and monitoring guidelines").

Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC), state or tribal guidelines are followed for broodstock fish health inspection, transfer of eggs or adults and broodstock holding and disposal of carcasses.

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

Specify how spawners are chosen (e.g. randomly over whole run, randomly from ripe fish on a certain day, selectively chosen, or prioritized based on hatchery or natural origin).

Prosser Hatchery: Ripe fish on a weekly basis are randomly spawned using three males and females at a time. No directed selection of which males are spawned with females or visa versa.

Marion Drain: Fish are spawned randomly on a 1 female to 1 male basis as fish are trapped and become ripe.

8.2) Males.

Specify expected use of backup males, precocious males (jacks), and repeat spawners.

At both Prosser and Marion Drain, precocious males are used as they occur naturally during collection and are dipped from adult holding ponds at spawn time. The number of precocials used represents 0-2% of male spawners annually. At Prosser and Marion Drain Hatcheries, backup males are used approximately 30 seconds after the primary male's milt is infused into the

egg bucket.

Prosser Hatchery: Jacks will be collected in the proportions in which they occur during denil and seining operations and incorporated into the mating scheme in a random fashion.
Marion Drain: Jacks are randomly incorporated into collection and mating as they occur in relation to female collection and spawning protocol.

8.3) Fertilization.

Describe spawning protocols applied, including the fertilization scheme used (such as equal sex ratios and 1:1 individual matings; equal sex ratios and pooled gametes; or factorial matings). Explain any fish health and sanitation procedures used for disease prevention.

At Prosser Hatchery, the eggs from 1 female are pooled in a bucket and fertilized with milt from 1 male with a backup male's milt added approximately 30 seconds later. Since fewer fish are available at Marion Drain, 2 males selected at random are spawned per female. IHOT and PNFHPC tribal guidelines are followed for culture practices for this program. Disinfection procedures that prevent pathogen transmission between stocks of fish are implemented during spawning.

8.4) Cryopreserved gametes.

If used, describe number of donors, year of collection, number of times donors were used in the past, and expected and observed viability.

Cryopreserved gametes are not used.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

(*e.g. "A factorial mating scheme will be applied to reduce the risk of loss of within population genetic diversity for the small chum salmon population that is the subject of this supplementation program".*).

Males and females available on a given day are mated randomly. Back-up males are used in the spawning protocol. Precocious males are used as they occur. See also above comments in section 8.

SECTION 9. INCUBATION AND REARING

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

Provide data for the most recent twelve years (1988-99), or for years dependable data

are available.

Prosser Hatchery Component: The egg-take for local origin brood has ranged from 190,000 to 670,000 since broodstock collection was initiated in 1997. To date, we have experienced a 92% survival rate from egg-to-subyearling-smolt at both Prosser and Marion Drain hatcheries:
a) Collection to spawning: 99%.
b) Green eggs to eyed eggs: 95%.
c) Eyed eggs to release: 90%.

Mean fecundity ranges from 4,000 to 5,000 eggs/female for the Prosser and Marion Drain hatcheries.

9.1.2) Cause for, and disposition of surplus egg takes.
Describe circumstances where extra eggs may be taken (e.g. as a safeguard against potential incubation losses), and the disposition of surplus fish safely carried through to the eyed eggs or fry stage to prevent exceeding of programmed levels.

Prosser Hatchery: Surplus adults are released to the river, so no surplus egg production has occurred. No culling of juveniles occurs.
Marion Drain: Collection is minimal, so no surplus has occurred.

9.1.3) Loading densities applied during incubation.
Provide egg size data, standard incubator flows, standard loading per Heath tray (or other incubation density parameters).

Prosser Hatchery: Egg size is approximately 0.23 grams per egg, flows are about 4-9 gallons per minute per incubation stack (23 incubation trays) with about 5,000 eggs per incubation tray. Data are the same for the Marion Drain facility.

9.1.4) Incubation conditions.
Describe monitoring methods, temperature regimes, minimum dissolved oxygen criteria (influent/effluent), and silt management procedures (if applicable), and any other parameters monitored.

At Prosser Hatchery, well water (about 52-54^{o} F) is used for incubation. Fish are reared to a target of 1,600 total temperature units prior to ponding. Dissolved oxygen is measured weekly and typically ranges from 8-12 ppm. Monitoring of temperature and dissolved oxygen levels is done manually on a daily basis. The facility has had no problems with silt. For Marion Drain, all information is the same.

9.1.5) Ponding.
Describe degree of button up, cumulative temperature units, and mean length and weight (and distribution around the mean) at ponding. State dates of ponding, and whether swim up and ponding are volitional or forced.

For both Marion Drain and Prosser facilities: Fry are ponded at nearly 100% button up. This

occurs at approximately 1,600 TUs. The approximate fork length is 37mm at ponding. Ponding takes places around mid-January.

9.1.6) Fish health maintenance and monitoring.
Describe fungus control methods, disease monitoring and treatment procedures, incidence of yolk-sac malformation, and egg mortality removal methods.

See 7.7. For both facilities, heath trays are monitored and culled for dead or diseased eggs twice (at eye-up and at emergence). Culled fish are thrown in a dumpster.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.
(*e.g. "Eggs will be incubated using well water only to minimize the risk of catastrophic loss due to siltation.")*

See previous comments in this section.

9.2) Rearing:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available.

See 9.1.1.

9.2.2) Density and loading criteria (goals and actual levels).
Include density targets (lbs fish/gpm, lbs fish/ft3 rearing volume, etc).

The rearing density criteria for both facilities are less than 0.50 lb fish per cubic foot of rearing space.

9.2.3) Fish rearing conditions
(Describe monitoring methods, temperature regimes, minimum dissolved oxygen, carbon dioxide, total gas pressure criteria (influent/effluent if available), and standard pond management procedures applied to rear fish).

For both facilities: Fish are reared on well water (about 57^{o} F) for about the first 4 weeks (until fish are about 500/lb). Then fish are transferred to river water. Intake screens are cleaned daily and mortalities are also picked daily. Rearing containers are cleaned weekly. Rearing ponds are monitored manually on a daily basis for temperature and dissolved oxygen levels.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Rearing Period	Length (mm)	Weight (fpp)
December	37	1100
January	41	800

February	55	330
March	75	130
April	80	107
May	90	75

Above information applies to fish reared at Prosser Hatchery. Weight is recorded regularly in terms of fpp throughout the rearing period. Length information is derived using Piper et al. (1982). Marion Drain fish are slightly larger by month due to slightly warmer water at that facility.

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Contrast fall and spring growth rates for yearling smolt programs. If available, indicate hepatosomatic index (liver weight/body weight) and body moisture content as an estimate of body fat concentration data collected during rearing.

Both facilities use BioOregon dry pellets appropriate to size of fish being fed. Fry are fed at 5% of their body weight, and fingerlings and presmolts 2-5%. Food conversion rates range from 1.0-1.3. Additional growth rate and energy reserve information is collected by the USFWS through their routine fish health checks.

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Both facilities use BioOregon dry pellets appropriate to size of fish being fed. Fry are fed at 5% of their body weight, and fingerlings and presmolts 2-5%. Feeding rates range from 8 times daily (fry) to twice daily as fish near smoltification. Food conversion rates range from 1.0-1.3. Additional growth rate and energy reserve information is collected by the USFWS through their routine fish health checks.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

IHOT fish health guidelines are followed to prevent transmission between lots of fish on site or transmission or amplification to or within the watershed. The juvenile rearing density and loading guidelines used at the facility are based on standardized agency guidelines and staff experience (e.g. trial and error). Vaccines are not used in this program. Juveniles are screened monthly for routine bacteria, viruses and parasites by USFWS according to USFWS procedures and guidelines in 713 FW, and IHOT.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

The migratory state of the release population is determined by volitional release and/or the best judgment of experienced aquaculture staff.

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size such that smoltification occurs within nearly the entire population, which will reduce retention in the streams after release. Rearing on parent river water or acclimation for several weeks to parent river water is done to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations.

At Prosser Hatchery local broodstock fish are released in mid-April (non-volitional, direct releases from the hatchery), and out-of-basin fish are released volitionally beginning at the end of May. For out-of-basin fish, all remaining fish are forced out at the end of June. The one exception to these release dates occurs if extremely poor smolt survival conditions (i.e., high water temperatures and predation) are expected or are occurring.

The Marion Drain smolts are released at the end of March directly from the hatchery.

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation. (*e.g. "Fish will be reared to sub-yearling smolt size to mimic the natural fish emigration strategy and to minimize the risk of domestication effects that may be imparted through rearing to yearling size.")*

IHOT standards are followed for: water quality, alarm systems, predator control measures to provide the necessary security for the cultured stock, loading and density. The facility is continuously staffed to assure the security of fish stocks on-site. Fish are released at sizes similar to natural fish of the same life stage and species. Fish transfers into the subbasin are inspected and accompanied by notifications as described in IHOT and PNFHPC guidelines. Fish are released in the same subbasin as the final rearing facility. See also preceding responses to section 9 questions.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program. *Specify any management goals (e.g. number, size or age at release, population uniformity, residualization controls) that the hatchery is operating under for the hatchery stock in the appropriate sections below.*

10.1) Proposed fish release levels. *(Use standardized life stage definitions by species presented in **Attachment 2**. "Location" is watershed planted (e.g. "Elwha River").)*

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Fingerling	~ 2.0 to 2.7 million (some summer run fish may be released as yearling)	~50 to 75	April-June	See 5.6 and 10.2
Yearling	~ 30,000 (for research and survival evaluation)			

See 7.4.1.

10.2) Specific location(s) of proposed release(s).
Stream, river, or watercourse: *(include name and watershed code (e.g. WRIA number)*
Release point: (*river kilometer location, or latitude/longitude*)
Major watershed: (e.g. "Skagit River")
Basin or Region: *(e.g. "Puget Sound")*

Fish are released in the same subbasin as the final rearing facility.

Fish have been released directly from the Prosser Hatchery located at RM 46.8 into the Yakima mainstem. In the future, some of these fish may be released from selected acclimation sites in the Yakima subbasin above and below Prosser Dam (see Section 5.6).

Fish are also released directly from the Marion Drain Hatchery into the drain located at approximately RM 8.

Prosser Hatchery is located on the left bank of the Yakima River at RM 46.8 (latitude 46" 12' 51.36" N, longitude 119" 45' 42.53" W). Marion Drain Hatchery is located on the left bank of Marion Drain at RM 14.1 (latitude 46" 20' 17.60" N, longitude 120" 28' 45.38" W).

See also section 1.

10.3) Actual numbers and sizes of fish released by age class through the program.
For existing programs, provide fish release number and size data for the past three fish generations, or approximately the past 12 years, if available. Use standardized life stage definitions by species presented in ***Attachment 2****. Cite the data source for this information.*

See 1.11.2. Fish generally released as subyearlings at 50-65 fish per pound. In years when colder water conditions prevail into late spring, fish have been as small as 90 fish per pound.

10.4) Actual dates of release and description of release protocols.
Provide the recent five year release date ranges by life stage produced (mo/day/yr). Also indicate the rationale for choosing release dates, how fish are released (volitionally, forced, volitionally then forced) and any culling procedures applied for non-migrants.

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size such that smoltification occurs within nearly the entire population, which will reduce retention in the streams after release. Rearing on parent river water or acclimation for several weeks to parent river water is done to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations.

At Prosser Hatchery local broodstock fish are released in mid-April (non-volitional, direct releases from the hatchery), and out-of-basin fish are released volitionally beginning at the end of May. For out-of-basin fish, all remaining fish are forced out at the end of June. The one exception to these release dates occurs if extremely poor smolt survival conditions (i.e., high water temperatures and predation) are expected or are occurring.

The Marion Drain smolts are released at the end of March directly from the hatchery.

10.5) Fish transportation procedures, if applicable.

Describe fish transportation procedures for off-station release. Include length of time in transit, fish loading densities, and temperature control and oxygenation methods.

Equipment Type	Capacity (gallons)	Supplemental Oxygen (y/n)	Temperature Control (y/n)	Normal Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Adult Transfer Tanker Truck-Prosser Hatchery	700	Y	N	5	Light dose MS	nya

10.6) Acclimation procedures (*methods applied and length of time***).**

Local river water is used at both facilities (Prosser and Marion Drain) for at least the final two months of rearing. Fish are generally forced out of rearing ponds in mid-April with out-of-basin fish releases in mid-May (see 10.4).

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

Draft marking strategies (Table 10.7.1) are presently under development and review as part of the Master Plan. Marking rates for each release group will be documented. For M&E purposes, the goal is to mark 100% of all hatchery-origin releases. However, due to the large number of releases, associated marking costs, and tribal policies relative to mass marking and selective fisheries, it may be necessary to modify M&E measures to monitor performance based on less than 100% marking. Marking rates will be sufficient to determine relative survival differences between different release groups.

Table 10.7.1: DRAFT Hatchery release numbers, number marked, and mark type by species and hatchery component DRAFT – subject to change as noted above.

Species	# Released	# Marked	Tag or Mark[1]

Summer Run Chinook (upper Columbia stock)	200,000-500,000	200,000-500,000	100% CWT
Fall Chinook (Priest Rapids stock)	~1.7 million	~1.7 million	100% AD clip + 250K CWT
Fall Chinook (Yakima stock)	100,000-500,000	100,000-500,000	100% either PIT tagged or AD clip + some portion CWT

[1] subject to change as noted above.

The Yakima integrated program broodstock collection will be based on examination of adipose, CWT, VIE and possibly other marks to distinguish fish of hatchery- and natural-origin and for experimental and non-experimental reasons. Presently these fish are not identified as to origin due to the fact that so few fish are marked. There is a chance that some Marion Drain origin fish could have been incorporated into the Yakima local broodstock, however, the level of incorporation of these fish is thought to be very low.

The Yakima broodstock collection is based on adipose and ventral fin clips used to externally mark the fish for experimental and non-experimental reasons. To date, adults taken from Chandler Canal have predominately been clipped indicating their identity to the Yakima Hatchery. A small portion of the broodstock are adipose present fish, but this does not necessarily mean the fish is natural-origin, since hatchery-origin fish are not presently 100% marked. Presently these fish are not identified as to origin based on scale analysis. There is a chance that a Marion Drain origin fish could be one of these adipose present broodstock, however, the probability is thought to be very low. Most of the adipose present fish are likely to be Yakima hatchery fish originally released from the Prosser Hatchery.

To evaluate the Prosser Hatchery (out-of-basin origin) accelerated and non-accelerated smolt release groups, ten to twenty thousand PIT tags have been used for each group. PIT tags have also been used to evaluate survival of in-basin versus out-of-basin production. Approximately 10% of out-of-basin releases have been adipose-clipped and coded-wire-tagged. Beginning in 2008, all in-basin production at Prosser Hatchery was 100% marked (either PIT-tagged or adipose clipped). Summer run chinook will be differentially marked with coded-wire tags only (no other fish should be coded wire tagged with an adipose fin present).

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

See 7.5 and 9.1.2.

10.9) Fish health certification procedures applied pre-release.

All fish are examined by USFWS personnel for the presence of “reportable pathogens” as defined in the PNFHPC disease control guidelines, within 3 weeks prior to release. Fish transfers into the subbasin are inspected and accompanied by notifications as described in IHOT and PNFHPC guidelines.

10.10) Emergency release procedures in response to flooding or water system failure.

Pull screens and boards, and allow fish to exit the facility volitionally.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.
(*e.g. "All yearling coho salmon will be released in early June in the lower mainstem of the Green River to minimize the likelihood for interaction, and adverse ecological effects, to listed natural Chinook salmon juveniles, which rear in up-river areas and migrate seaward as sub-yearling smolts predominately in May").*

Fish are released at sizes similar to natural fish of the same life stage and species. Fish are released at a time and size specified in an established juvenile production goal. Fish are released within the historic range for that stock. See also preceding responses to Section 10 questions.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

This section describes how "Performance Indicators" listed in Section 1.10 will be monitored. Results of "Performance Indicator" monitoring will be evaluated annually and used to adaptively manage the hatchery program, as needed, to meet "Performance Standards".

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Response to Section 11.1.1 is extracted directly from Chapter 7 of the Master Plan (YN 2010 under development; current as of 29Jan2010) and includes the numbering scheme used in the Master Plan.

The proposed monitoring and evaluation program deals only with the hatchery and harvest components of the Master Plan. Habitat actions are not included because these measures are addressed in the Yakima Subbasin and Recovery planning documents developed by the Yakima Basin Fish and Wildlife Recovery Board, YN, WDFW, and the federal agencies. This will assure that the program proposed for the Yakima River habitat strategy is consistent with M&E protocols being used throughout the Columbia River Basin.

Summer and fall run Chinook M&E activities will be coordinated through the Yakima YKFP M&E "umbrella" project (BPA project id 199506325) and will leverage existing activities to the maximum extent practical to accomplish objectives stated here. The results of M&E activities under the Master Plan will be presented in PISCES status reports and annual reports. Fall Chinook study findings will also be reviewed annually at both internal and external intra-agency meetings (e.g., Yakima Subbasin Science and Management Conference). Study results and

workshop materials will be stored on the web at www.ykfp.org. Data may also be presented in peer-reviewed scientific publications.

YKFP's M&E data collection and reporting protocols will be consistent with the Columbia River Basin regional strategies including Inter-tribal data management initiatives, HSRG, regional framework and PNAMP.

7.1 Hatchery Monitoring and Evaluation

Objective 7.1.1. Operate adult trap(s) at the Prosser Denil ladder and _____ to collect brood stock and to sample returning fish for stock composition. Hold and spawn fish maintaining established fish health standards.

Approach: YN biologists and technical staff will operate adult fish traps at the Prosser Denil ladder and other locations for endemic broodstock development. YN staff have been operating the Prosser denil facility for years to sample returning fish in the fall and to collect coho brood stock. Factors such as weir/trap impedance/avoidance, run timing, spawn timing, population demographics, phenotypic and genetic characteristics, and return rates are part of the necessary evaluation that should be conducted to facilitate future development of this program. Evaluation staff is responsible for daily record keeping of all species captured, passed, or hauled for broodstock, along with any biological samples collected. These adult traps are also used for estimating adult returns (see 7.3).

Task 7.1.1.1. Operate adult trap(s) and collect and transport broodstock for the Prosser hatchery complex summer/fall run Chinook program.

Task 7.1.1.2. Hold broodstock and document mortalities during holding.

Task 7.1.1.3. Compile all data from trapping and spawning, and calculate return rates for program evaluation.

Task 7.1.1.4. Utilize USFWS fish health professionals during spawning to collect and analyze appropriate fish health samples. Cull fish as necessary per established USFWS and YKFP fish health protocols.

Objective 7.1.2. Determine the origin and stock of summer and fall run Chinook salmon used as broodstock. Monitor and evaluate changes in the phenotypic and genotypic characteristics of summer and fall run chinook used at Prosser Hatchery complex.

Approach: YN uses an assortment of endemic and non-endemic stocks of summer and fall run chinook for production at Prosser Hatchery complex. Summer run fish will start out as imports from Wells Hatchery and/or Columbia River dams (e.g., Priest Rapids or Wells Dams). An endemic stock will be developed over time using returns from these releases. Fall run fish will be comprised of non-endemic Priest Rapids hatchery stock (Little White Salmon Hatchery stock was used through 2010) and endemic stock (both natural and hatchery-origin). YN, WDFW co-managers and NMFS desire to maintain the integrity of the salmon stocks for use in the program and to minimize the potential negative effects of hatchery operations on ESA listed populations. In addition, the project has goals of protecting the health of natural populations while using these stocks for harvest mitigation production.

Broodstock Management

To monitor the phenotypic and genotypic integrity of populations cultured for the program, YN staff strives to collect and mate adults for broodstock to monitor stock demographics (e.g. run/spawn timing, age structure, sex ratios and size of fish) for gametes retained for production. Ideally this would be accomplished by selecting broodstock from throughout the run/spawning season.

YN will use CWTs, fin clips, scale readings, or DNA sampling to identify and remove stray hatchery fish from broodstock. We will estimate the numbers of untagged stray fish associated with decoded CWTs to derive the stray

component of fish that were processed.

Since all endemic stock fish are from unmarked/untagged natural origin fish, any external or internal marks that identify them as hatchery origin fish can quickly be identified and enable them to be removed from the broodstock.

Task 7.1.2.1. Collect scale samples on all untagged fish processed at Prosser Hatchery complex. Scales from each fish will be used to document age-structure and to assist in differentiation of hatchery and naturally produced fish.

Task 7.1.2.2. Examine all Chinook for marks and tags, and determine sex. Recover and decode all tags.

Task 7.1.2.3. Calculate the rate at which natural origin Chinook are included in broodstock.

Task 7.1.2.4. Estimate the rate at which unmarked/untagged hatchery strays were included in broodstock (goal = not exceed 5% of the broodstock).

Task 7.1.2.5. Estimate stock composition (summer, fall, in-basin or out-of-basin brood, etc.) of fish retained for broodstock.

Task 7.1.2.6. Examine Chinook for marks, wire (CWT), sex, and collect scales to determine age composition after spawning.

Task 7.1.2.7. Collect length and weight samples from hatchery and natural origin spawned female Chinook. Estimate fecundity for each and create relationships with body size information to track for long-term changes.

Task 7.1.2.8. Determine length frequency ranges for jack fall Chinook based on CWTs.

Task 7.1.2.9. Enumerate jacks retained in broodstock each week to assist with reporting and to assure jacks are incorporated in broodstock within the spawning protocol guideline.

Task 7.1.2.10. Document brood year specific phenotypic characteristics for chinook stocks used at Prosser Hatchery complex (endemic, conventional production/supplementation), and compare and report changes that have occurred over time. Methods will be similar to those described in Knudsen et al 2006 and Knudsen et al 2008.

Objective 7.1.3. Monitor and evaluate the survival of hatchery summer and fall run Chinook salmon produced and reared at Prosser Hatchery complex.

Approach: YN staff will collect data on growth and survival of summer and fall run Chinook produced and reared at the Prosser Hatchery complex by life stage, from egg to release as pre-smolts.

Task 7.1.3.1. Using gravimetric methods, estimate the number of eggs spawned.

Task 7.1.3.2. Enumerate live eggs at “shock” time using an egg counter.

Task 7.1.3.3. Document fry mortalities during incubation.

Task 7.1.3.4. Estimate the number of fish ponded as the live egg count less documented fry mortalities.

Task 7.1.3.5. Document mortalities during rearing by pond and month.

Task 7.1.3.6. Document size of fish (length and weight) using sub-sample by rearing pond and month.

Task 7.1.3.7. Document feed type and food conversion (weight gained divided by pounds of food fed) by rearing pond and month.

Task 7.1.3.8. Estimate the number of fish released as the number of fish marked (see 7.1.4) less documented mortalities from ponding to release.

Objective 7.1.4. Comply with HSRG guidelines and program goals for natural stock restoration and local, natural-origin brood stock development.

Approach: Establish and maintain program marking protocols that allow returning fish to be distinguished by origin and stock. Marking strategies (Table 7.1) are still under development and review. Marking rates for each release group will be documented. For M&E purposes, the goal is to mark 100% of all hatchery-origin releases. However, due to the large number of releases, associated marking costs, and tribal policies relative to mass marking and selective fisheries, it may be necessary to modify M&E measures to monitor performance based on less than 100% marking. Marking rates will be sufficient to determine relative survival differences between different release groups.

Table 7.2: DRAFT Hatchery release numbers, number marked, and mark type by species and hatchery component DRAFT – subject to change as noted above.

Species	# Released	# Marked	Tag or Mark[1]
Summer Run Chinook (upper Columbia stock)	200,000-500,000	200,000-500,000	100% CWT
Fall Chinook (Priest Rapids stock)	~1.7 million	~1.7 million	100% AD clip + 250K CWT
Fall Chinook (Yakima stock)	100,000-500,000	100,000-500,000	100% either PIT tagged or AD clip + some portion CWT

[1] subject to change as noted above.

Task 7.1.4.1. Mark hatchery-origin summer and fall run Chinook salmon produced at Prosser Hatchery complex as documented in Table 7.1.

Task 7.1.4.2. Estimate the total number of fish on hand at marking.

Task 7.1.4.3. Observe marks on returning fish and use these data to manage proportion of natural fish in brood stock (PNoB – Objective 7.1.2) and proportion of hatchery fish on the spawning grounds (PHoS – Objective 7.3.1) per guidelines established by the YKFP Policy Group (as recommended by the fall Chinook MIPT and STAC).

Objective 7.1.5. Monitor and evaluate the quality and release of hatchery summer and fall run Chinook salmon produced at Prosser Hatchery complex.

Approach: Evaluation staff will analyze marking data and releases of juvenile salmon to determine survival rates between life stages and examine potential variables that may influence observed survivals. To document the percent precocious male fish in all of our release groups, visual sampling of summer and fall run Chinook salmon juveniles will occur. To document PIT tag loss that occurs between tagging and release of Chinook, we will install a PIT tag arrays in the outlet channels at all release sites.

Task 7.1.5.1. Evaluate mark quality and tag retention before release.

Task 7.1.5.2. Evaluate fish health of a sub-sample of fish at release. Document and report release size and general condition of juvenile salmonids prior to release.

Task 7.1.5.3. Summarize hatchery records for each brood year to document and report green egg-to-fry, fry-to-smolt, and green egg-to-smolt survival rates for each species, and for each release strategy where appropriate (e.g. - yearling/subyearling Chinook releases).

Task 7.1.5.4. Recommend changes in rearing, marking, and/or tagging based on above monitoring to hatchery and YKFP management to maximize production.

Task 7.1.5.5. Install and maintain PIT tag antenna array in the outlets of _____.

Task 7.1.5.6. Document the number of PIT tagged fish in the release and calculate the number of PIT tags shed between tagging and release.

Task 7.1.5.7. Document the number of CWT tagged fish in the release and calculate the number of CWT tags shed between tagging and release.

Task 7.1.5.8. Report tagged release data to regional PTAGIS and RMIS data bases.

Objective 7.1.6: Evaluate summer and fall run Chinook release strategies, release sites, and smolt out-migration timing and survival from Prosser Hatchery complex releases to downstream detection sites.

Approach: Acclimation facilities are located throughout the Yakima River basin to promote homing of summer and fall run Chinook to their historical spawning grounds. Out-migration timing can be derived from PIT tag detections at smolt monitoring facilities in the Columbia basin. Our primary evaluations will be performed on sub-yearling and yearling fish released from Prosser hatchery complex facilities. PIT tags will be used to document arrival, duration, and travel times between dams. These data along with size at release data, projected flow data, and projected spill data will be used to determine the optimal release date. Marks/tags applied for the yearling program are used for adult return calculations and for spawning procedures. Calculated SARs for the releases will be used to compare and contrast performance, and will be the primary metric for determining relative success of subyearling and yearling releases. Marking strategies were given above under objective 7.1.4, Table 7-1.

Task 7.1.6.1. Maintain services of a qualified biometrician with experience in estimating smolt-to-smolt and smolt-to-adult survival rates for Yakima Basin fish.

Task 7.1.6.2. PIT tag 27,000 yearlings from the onstation release, and 3,500 subyearlings each from _____.

Task 7.1.6.3. Document migration timing and survival for yearling and subyearling summer and fall run Chinook using PIT tag detections at Columbia River dams.

Task 7.1.6.4. Document survival (SAR) differences between yearling and subyearling summer and fall run Chinook released from Prosser hatchery complex.

Task 7.1.6.5. Document survival (SAR) based on PIT tag detections and SARs derived from CWTs to determine if post-release CWT loss is occurring and to what extent.

Objective 7.1.7. Assist in the planning, spawning, record keeping, and summarizing data for spawned summer and fall run Chinook salmon at Prosser Hatchery Complex.

Approach: YN biologists annually assist in the spawning operations of summer and fall run Chinook salmon at Prosser Hatchery complex. The role of the evaluation staff has been and will be to collect the biological data (date of spawning, sex, length, scales, marks/tags, extraction of CWTs, DNA and scale sampling, fecundity estimation, etc.) from all fish retained/spawned for broodstock from each of the species. This collaborative role will be critical for optimizing production strategies. In addition, evaluation staff will work closely with the hatchery staff to provide weekly /monthly /yearly summaries of the data for hatchery reports and ESA compliance.

Task 7.1.7.1. Develop or update spawning protocols as needed for review and approval by YKFP MIPT and Fish Management staffs prior to the onset of spawning for all species.

Task 7.1.7.2. Assist in the spawning of summer and fall run Chinook salmon at Prosser Hatchery complex.

Task 7.1.7.3. Collect biological data from all (or representative sample) spawned fish (sex, length, scales, DNA, marks/tags, CWT extraction and verification, fecundity estimation)

Task 7.1.7.4. Where applicable, assist or provide hatchery staff with the necessary data summaries for completion of hatchery records from spawning activities.

7.2 Harvest Monitoring and Evaluation

Harvest monitoring of Yakima River-origin salmonids will be performed by WDFW and The Yakama Nation. The WDFW is responsible for monitoring non-tribal sport and commercial fisheries in the Columbia River, Yakima River, and ocean. The fisheries monitoring methodologies used by WDFW and other state and federal agencies are outside the scope of this document.

The Tribal harvest monitoring program is designed to achieve project goals through:

- sampling subsistence fisheries below Bonneville Dam and at Cascade Locks, The Dalles Dam, John Day Dam, and McNary Dam on the mainstem Columbia River
- sampling all Tribal fisheries in the Yakima River

Objective 7.2.1. Monitor Tribal Subsistence Fisheries in the Columbia River

Approach: YN biologists and technicians annually monitor tribal ceremonial and subsistence fisheries in the Columbia River from the newly established tribal fishing area below Bonneville Dam upstream to McNary Dam. Fishing areas are observed to record total effort in a monitored time frame, with a subsample of effort monitored for observed catch. Biologists expand recorded data for each fishing area and time frame to estimate total catch.

Task 7.2.1.1. Monitor Tribal fisheries below Bonneville Dam and at Cascade Locks, The Dalles, John Day, and McNary dams daily whenever fisheries are conducted.

Task 7.2.1.2. Each fishing day will be divided into three 8-hour periods. A different observer will be used to monitor each 8-hour period.

Task 7.2.1.3. Every 2 hours, the observer will record the number of active gear, the number of fish captured per gear type, and the length of the observation period.

Task 7.2.1.4. Catch estimates will be calculated by expanding the counts for both time and gear.

Task 7.2.1.5. Caught fish will be randomly sub-sampled for marks. Fish species and (if possible) sex will be identified for each fish and each fish will be examined for marks. Length measurements will be taken for each fish caught. Scale samples will be collected on each fish for aging. DNA samples will also be collected on a sub-sample of fish if required as part of genetic studies being undertaken by YN or other research groups.

Task 7.2.1.6. Recovered CWTs will be sent to WDFW for processing. WDFW will report tag recoveries and information to the appropriate regional databases.

Task 7.2.1.7. YN will be responsible for reporting PIT-tag recoveries to PITAGIS (the PIT-Tag Information System) and other regional databases.

Task 7.2.1.8. YN reports estimated harvest in these fisheries through the U.S. v Oregon Technical Advisory Committee (TAC). Annual harvest in these fisheries are maintained as part of the TAC record.

Task 7.2.1.9. YN biologists will analyze available data and estimate the number of Yakima summer and fall run Chinook by origin caught in these fisheries.

Objective 7.2.2. Monitor Fisheries in the Yakima River Basin

Approach: The majority of Tribal fishing activities in the Yakima River occur below the four irrigation diversion dams on the mainstem: Horn Rapids, Prosser, Sunnyside, and Wapato/Parker. This fishery will be monitored in a manner similar to that described in Objective 7.2.1. Non-tribal recreational fisheries also occur in the Yakima and are monitored by WDFW using standard creel methods.

Task 7.2.2.1. YN staff will monitor tribal subsistence fisheries in the Yakima Baisn using methods described in Objective 7.2.1.

Task 7.2.2.2. YN staff will conduct interviews with Tribal fishers. Their catch may be subsampled as described in Objective 7.2.1 above.

Task 7.2.2.3. WDFW will monitor recreational fisheries in the lower Yakima River using standard creel methods.

Objective 7.2.3. Estimate harvest of Yakima Basin summer and fall run Chinook in Marine Fisheries.

Approach: The Regional Mark Information System (RMIS) will be queried regularly for any CWT recoveries of Prosser hatchery complex releases in ocean or Columbia River mainstem fisheries. The results of these queries will be analyzed to estimate the number of fish harvested in marine and lower Columbia River non-tribal fisheries.

Task 7.2.3.1. YN staff will maintain a database of CWT codes released in Prosser hatchery complex summer and fall run Chinook program.

Task 7.2.3.2. YN staff will run annual queries of the regional RMIS database, searching for recoveries of Prosser hatchery complex CWT codes.

Task 7.2.3.3. YN staff will estimate harvest of Prosser hatchery complex summer and fall run Chinook in marine and lower Columbia river fisheries and report these estimates in annual reports.

7.3 Escapement Monitoring and Evaluation

Objective 7.3.1. Estimate escapement of summer and fall run Chinook to the mouth of the Yakima River by stock and origin.

Approach: YN staff utilize video cameras at all ladders at Prosser Dam and maintain a database of counts of fish by date, ladder, and species. In addition, YN biologists and technical staff will operate adult fish traps at the Prosser Denil ladder and other locations for endemic broodstock development and biological sampling. YN staff have been operating the Prosser denil facility for years to sample returning fish in the fall and to collect coho brood stock. Adult trap data and Prosser PIT and CWT detection data will also be used for estimating adult return composition (stock and origin).

Task 7.3.1.1. Enumerate returning fish using video counting equipment, databases, and present methods.

Task 7.3.1.2. Operate Prosser denil (and other) trapping operations and conduct fish sampling per established protocols.

Task 7.3.1.3. Evaluate trapping operation and tag detection databases to estimate composition of returning fish by stock and origin.

Task 7.3.1.4. Evaluate harvest estimates for lower Yakima Basin fisheries and spawning survey data for areas below Prosser dam to estimate escapement below Prosser Dam.

Task 7.3.1.5. Summarize and report above data.

Objective 7.3.2: Estimate adult returns, collect life history characteristics, and document distribution of adults to spawning areas.

Approach: Measuring adult returns to the point of release and to other intermediate areas is necessary to determine program success. YN monitors the returns of salmon and summer steelhead throughout the Yakima Basin via video counts and adult trap operations at Prosser and Roza Dams, spawning ground surveys, and harvest monitoring. Trapped and/or spawned broodstock fish and carcasses provide data concerning origin, stray rates, sex ratios, and composition of each year's run. Spawning surveys provide numbers of redds, spawn timing, and distribution of fish in each of the surveyed reaches and tributaries. These are primary actions to track program performance and progress toward meeting goals.

Task 7.3.2.1. Conduct spawning ground surveys to count redds, determine distribution of spawners, and sample carcasses (sex, length, scales for age composition, and tissue for genetic typing) to document life history characteristics of summer and fall run Chinook in the Yakima Basin.

Task 7.3.2.2. Process scales and CWTs for age composition.

Task 7.3.2.3. Estimate stray rates from the PTAGIS and RMIS regional databases.

7.4 Productivity Monitoring and Evaluation

Objective 7.4.1. Estimate juvenile smolt production of summer and fall run Chinook by stock and origin.

Approach: YN staff will maintain and operate the Chandler juvenile monitoring facility. A number of summer and fall run juvenile migrants will be diverted and sub-sampled at this facility annually. Staff will maintain a database containing length, weight, marks, DNA, etc. information collected from these samples. These and available PIT data will be analyzed to estimate smolt outmigration past Prosser Dam and smolt-to-adult productivity (return) rates.

Task 7.4.1.1. Operate Chandler juvenile monitoring facility and collect phenotypic and genotypic data from a subsample of migrating juveniles.

Task 7.4.1.2. Maintain a database of these sample data.

Task 7.4.1.3. Use PIT or acoustic tags and technologies to evaluate flow and entrainment relationships to estimate annual smolt outmigration at Prosser by stock and origin.

Task 7.4.1.4. Evaluate available PIT data to estimate smolt-to-smolt and smolt-to-adult survival indices (see objective 7.1.6).

Objective 7.4.2. Estimate adult-to-adult productivity of summer and fall run Chinook in the Yakima Basin.

Approach: YN staff will compile and maintain annual run reconstruction tables using the data collected from the

objectives and tasks described above. Available age-at-return data will be used to develop brood/cohort return tables and adult return per spawner productivity.

Task 7.4.2.1. Compile available escapement, harvest, and age-at-return data. Update and maintain these data annually in appropriate databases and spreadsheets.

Task 7.4.2.2. Report these data in annual reports and other appropriate technical fora.

7.5 Predation Monitoring and Evaluation

Objective 7.5.1. Estimate juvenile smolt mortalities of summer and fall run Chinook and identify mortality "hot spots" in the Yakima system during outmigration. Utilize collected data to develop and make recommendations to policy makers that will improve juvenile survival through the Yakima system migration corridor.

Approach: YN staff will continue avian and northern pikeminnow predation studies conducted under the YKFP M&E umbrella project, 199506325.

Task 7.5.1.1. Monitor, evaluate, and index the impact of avian predation on annual salmon and steelhead smolt production in the Yakima Subbasin. The index consists of two main components: 1) an index of bird abundance along sample reaches of the Yakima River and 2) an index of consumption along both sample reaches and at key dam and bypass locations (called hotspots).

Task 7.5.1.2. Examine roosting and nesting sites for the presence of salmon PIT tags. Link tag detections to sources of release and correlate with river flows. Analyze and utilize these data to recommend changes in present water and irrigation facility management practices to policy makers that will improve juvenile survival through the Yakima River system migration corridor.

Task 7.5.1.3. Monitor, evaluate, and index impact of piscivorous fish on annual smolt production of Yakima Subbasin salmon and steelhead.

Task 7.5.1.4. Develop methods (e.g., bounty fisheries) to remove some salmonid predators from the Yakima system.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

BPA Fish & Wildlife Program (Project # 199506325) and 2008 Fish Accords funding available for Yakima Fisheries Project M&E activities.

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

(*e.g. "The Wenatchee River smolt trap will be continuously monitored, and checked every eight hours, to minimize the duration of holding and risk of harm to listed spring Chinook and steelhead that may be incidentally captured during the sockeye smolt emigration period.)"*

See Section 6. Assessment of ecological effects of fall Chinook production activities are addressed in "umbrella" M&E activities for the Yakima Basin (Project 199506325).

SECTION 12. RESEARCH

Provide the following information for any research programs conducted in ***direct association with the hatchery program described in this HGMP. Provide sufficient detail to allow for the independent assessment of the effects of the research program on listed fish****. If applicable, correlate with research indicated as needed in any ESU hatchery plan approved by the co-managers and NMFS. Attach a copy of any formal research proposal addressing activities covered in this section. Include estimated take levels for the research program with take levels provided for the associated hatchery program in* ***Table 1****.*

12.1) Objective or purpose.

Indicate why the research is needed, its benefit or effect on listed natural fish populations, and broad significance of the proposed project.

Research will focus on determining changes in viable population parameters, e.g., abundance, productivity, spatial distribution, and diversity. This will be done by monitoring performance indicators as described in 1.10 and 11.1.1 (Chapter 7 of the Master Plan). Life history research is being conducted on the natural population in the Yakima mainstem and Marion Drain. The focus is on describing their growth rate, relative spatial distribution. A rotary trap is operated in Marion Drain to learn the juvenile outmigration timing, duration spent in the drain, growth rates, and survival to CJMF.

Supporting research from YKFP predation studies are providing information on the impacts of predation upon the natural and hatchery fall Chinook smolts (see ykfp.org technical reports and publications and Sampson et al. 2009).

12.2) Cooperating and funding agencies.

Yakama Nation (Co-Manager)

Washington Department of Fish & Wildlife (Co-Manager; Priest Rapids and Wells Hatchery production)

Bonneville Power Administration (Funding entity for YKFP Project)

U.S. Fish & Wildlife Service (Little White Salmon NFH production and tagging)

12.3) Principle investigator or project supervisor and staff.

Dr. David Fast (YKFP Research Manager, Yakama Nation Fisheries)
Melinda Davis (biologist, Yakama Nation Fisheries)
Joe Blodgett (Prosser Hatchery complex manager, Yakama Nation Fisheries)

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

See Section 2.

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.

The hatchery accelerated and non-accelerated treatment study being conducted at Prosser requires that a portion of these fish be PIT tagged, as well as, CWT tagged to evaluate differences in smolt-to-smolt and smolt-to-adult survivals. The PIT tagging is conducted at the Prosser hatchery, and the CWT tagging at LWS NFH prior to being transported to the Prosser Hatchery. See 10.7 and 11.1.1 for proposed future marking and M&E activities.

Beach seines are used to sample naturally produced fall Chinook for the life history study. Fish are anesthetized using MS-222, measured and weighted, and released on site after recovery.

12.6) Dates or time period in which research activity occurs.

Research activities for all field activities begin in February and end in late November after the fall Chinook smolt and adult migrations are over.

The marking activities associated with the hatchery fish are completed the fall prior to release.

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.

Egg transfers from PRH will be conducted by YN staff using standard YN/PRH protocols. As stated previously, both Yakima and Marion Drain broodstock are transported from their respective collection site to their respective hatchery holding ponding using the Yakama Nation hatchery truck. The transportation duration for Prosser is a few minutes, and Marion Drain about 15 minutes.

12.8) Expected type and effects of take and potential for injury or mortality.

YKFP projects have been operating under a "BPA Letter" dated 4/6/01 from Robert Beraud to Rob Jones which states that NMFS has no concern that YKFP activities would violate 7d rules. An electronic copy of the letter is not available but could be mailed via U.S. mail if desired. In addition, the BPA environmental coordinator for the YKFP has prepared NEPA documents which cover all the environmental aspects of the project, including ESA coverages. Copies of this documentation are available from Patricia R. Smith, BPA, 800-282-3713 (prsmith@bpa.gov). See also Section 2.

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

See 12.8 and Section 2.

12.10) Alternative methods to achieve project objectives.

Alternatives for the fall Chinook programs described in this HGMP were discussed in section 1.16.

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

See 12.8, Section 2, and take table at the end of this document.

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.
(*e.g. "Listed coastal cutthroat trout sampled for the predation study will be collected in compliance with NMFS Electrofishing Guidelines to minimize the risk of injury or immediate mortality.").*

See previous sections in this HGMP.

SECTION 13. ATTACHMENTS AND CITATIONS

Include all references cited in the HGMP. In particular, indicate hatchery databases used to provide data for each section. Include electronic links to the hatchery databases used (if feasible), or to the staff person responsible for maintaining the hatchery database referenced (indicate email address). Attach or cite (where commonly available) relevant reports that describe the hatchery operation and impacts on the listed species or its critical habitat. Include any EISs, EAs, Biological Assessments, benefit/risk assessments, or other analysis or plans that provide pertinent background information to facilitate evaluation of the HGMP.

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SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Table 1. Estimated annual take of *O. Mykiss* for all activities associated with the Yakima Basin summer and fall Chinook program, including research, monitoring and evaluation conducted under BPA project id 199506325.

Activity Description	Amount of Annual Take	Life Stage of Take	Type of Take (a-h)	Associated Permit or HGMP
Broodstock Collection (Prosser Dam Denil operation)	<1500 <5	Adult	d g	The main purpose of this activity is fall Chinook and **coho** brood collection and data sampling.
Spawning Ground Surveys	0	-	-	-
Juvenile sampling activities (shocking, seining, Screw trapping,etc.)	<25	Juvenile/smolt	d	

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.
2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).
3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.

Attachment 1. Definition of terms referenced in the HGMP template.

Augmentation - The use of artificial production to increase harvestable numbers of fish in areas where the natural freshwater production capacity is limited, but the capacity of other salmonid habitat areas will support increased production. Also referred to as "fishery enhancement".

Critical population threshold - An abundance level for an independent Pacific salmonid population below which: depensatory processes are likely to reduce it below replacement; short-term effects of inbreeding depression or loss of rare alleles cannot be avoided; and productivity variation due to demographic stochasticity becomes a substantial source of risk.

Direct take - The intentional take of a listed species. Direct takes may be authorized under the ESA for the purpose of propagation to enhance the species or research.

Evolutionarily Significant Unit (ESU) - NMFS definition of a distinct population segment (the smallest biological unit that will be considered to be a species under the Endangered Species Act). A population will be/is considered to be an ESU if 1) it is substantially reproductively isolated from other conspecific population units, and 2) it represents an important component in the evolutionary legacy of the species.

Harvest project - Projects designed for the production of fish that are primarily intended to be caught in fisheries.

Hatchery fish - A fish that has spent some part of its life-cycle in an artificial environment and whose parents were spawned in an artificial environment.

Hatchery population - A population that depends on spawning, incubation, hatching or rearing in a hatchery or other artificial propagation facility.

Hazard - Hazards are undesirable events that a hatchery program is attempting to avoid.

Incidental take - The unintentional take of a listed species as a result of the conduct of an otherwise lawful activity.

Integrated harvest program - Project in which artificially propagated fish produced primarily for harvest are intended to spawn in the wild and are fully reproductively integrated with a particular natural population.

Integrated recovery program - An artificial propagation project primarily designed to aid in the recovery, conservation or reintroduction of particular natural population(s), and fish produced are intended to spawn in the wild or be genetically integrated with the targeted natural population(s). Sometimes referred to as "supplementation".
Isolated harvest program - Project in which artificially propagated fish produced primarily for harvest are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Isolated recovery program - An artificial propagation project primarily designed to aid in the recovery, conservation or reintroduction of particular natural population(s), but the fish produced are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Mitigation - The use of artificial propagation to produce fish to replace or compensate for loss of fish or fish production capacity resulting from the permanent blockage or alteration of habitat by human activities.

Natural fish - A fish that has spent essentially all of its life-cycle in the wild and whose parents spawned in the wild. Synonymous with *natural origin recruit (NOR).*

Natural origin recruit (NOR) - See *natural fish* .

Natural population - A population that is sustained by natural spawning and rearing in the natural habitat.

Population - A group of historically interbreeding salmonids of the same species of hatchery, natural, or unknown parentage that have developed a unique gene pool, that breed in approximately the same place and time, and whose progeny tend to return and breed in approximately the same place and time. They often, but not always, can be separated from another population by genotypic or demographic characteristics. This term is synonymous with stock.

Preservation (Conservation) - The use of artificial propagation to conserve genetic resources of a fish population at extremely low population abundance, and potential for extinction, using methods such as captive propagation and cryopreservation.

Research - The study of critical uncertainties regarding the application and effectiveness of artificial propagation for augmentation, mitigation, conservation, and restoration purposes, and identification of how to effectively use artificial propagation to address those purposes.

Restoration - The use of artificial propagation to hasten rebuilding or reintroduction of a fish population to harvestable levels in areas where there is low, or no natural production, but potential for increase or reintroduction exists because sufficient habitat for sustainable natural production exists or is being restored.

Stock - (see “Population”).

Take - To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

Viable population threshold - An abundance level above which an independent Pacific salmonid population has a negligible risk of extinction due to threats from demographic variation (random or directional), local environmental variation, and genetic diversity changes (random or directional) over a 100-year time frame.

Attachment 2. Age class designations by fish size and species for salmonids released from hatchery facilities.

(generally from Washington Department of Fish and Wildlife, November, 1999).

	SPECIES/AGE CLASS	SIZE CRITERIA Number of fish/pound	SIZE CRITERIA Grams/fish
X	Chinook Yearling	<=20	>=23
X	Chinook (Zero) Fingerling	>20 to 150	3 to <23
X	Chinook Fry	>150 to 900	0.5 to <3
X	Chinook Unfed Fry	>900	<0.5
X	Coho Yearling 1/	<20	>=23
X	Coho Fingerling	>20 to 200	2.3 to <23
X	Coho Fry	>200 to 900	0.5 to <2.3
X	Coho Unfed Fry	>900	<0.5
X	Chum Fed Fry	<=1000	>=0.45
X	Chum Unfed Fry	>1000	<0.45
X	Sockeye Yearling 2/	<=20	>=23
X	Sockeye Fingerling	>20 to 800	0.6 to <23
X	Sockeye Fall Releases	<150	>2.9
X	Sockeye Fry	> 800 to 1500	0.3 to <0.6
X	Sockeye Unfed Fry	>1500	<0.3
X	Pink Fed Fry	<=1000	>=0.45
X	Pink Unfed Fry	>1000	<0.45
X	Steelhead Smolt	<=10	>=45
X	Steelhead Yearling	<=20	>=23
X	Steelhead Fingerling	>20 to 150	3 to <23
X	Steelhead Fry	>150	<3
X	Cutthroat Trout Yearling	<=20	>=23
X	Cutthroat Trout Fingerling	>20 to 150	3 to <23
X	Cutthroat Trout Fry	>150	<3
X	Trout Legals	<=10	>=45
X	Trout Fry	>10	<45

1/ Coho yearlings defined as meeting size criteria and 1 year old at release, and released prior to June 1st.
2/ Sockeye yearlings defined as meeting size criteria and 1 year old.