HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Wells Hatchery Summer Chinook
Species or Hatchery Stock	Summer Chinook
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Mid-Upper Columbia Sub-basin/Columbia Cascade Province
Date Submitted	
Date Last Updated	August 26, 2005

Section 1: General Program Description

1.1 Name of hatchery or program.

Wells Hatchery Summer Chinook

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

Upper Columbia River Summer chinook salmon (*Oncorhynchus tshawytscha*); summer-run component upstream of Priest Rapids Dam.

ESA Status: Not listed and not a candidate for listing. In the 1997 "Status Review of Chinook Salmon from Washington, Idaho, Oregon, and California", NMFS indicated that summer/fall chinook salmon in this ESU were not in danger of extinction, nor were they likely to become so in the foreseeable future (Myers et al.1998).

1.3 Responsible organization and individuals.

Name (and title):	Rick Stilwater
	Eastbank/Wells Hatchery Complex Manager
Agency or Tribe:	Washington Department of Fish & Wildlife
Address:	13246 Lincoln Road, East Wenatchee, WA 98802
Telephone:	(509) 884-8301
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

The Anadromous Fish Agreements and Habitat Conservation Plans (Mid-C. HCP) for Wells, Rocky Reach and Rock Island hydropower projects established a formal decision making body for the artificial production programs operated within the region and covered by the Mid-C. HCP. The decision making body, referred to as the Hatchery Committee, is composed of one (1) representative of each Party to include both Douglas and Chelan County PUD representatives (districts), the United States Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), the Washington Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (Colville), the Confederated Tribes and Bands of the Yakama Indian Nation (Yakama), the Confederated Tribes of the Umatilla Indian Reservation (Umatilla) (collectively, the Joint Fisheries Parties or the JFP); and American Rivers, Inc., (American Rivers) a Washington D.C., nonprofit corporation.

The Hatchery Committee is tasked with oversight development of recommendations for implementation of the hatchery elements of the Mid-C. HCP. The Hatchery and Genetic Management Plans (HGMPs) are reflective of the decisions and implementation of actions as deemed appropriate and consistent with the Mid-C. HCP Hatchery Committee. Decisions and implementation actions made by the HCP Hatchery Committee will be dynamic and in the future, current DRAFT HGMPs would need to be updated during this on-going iterative process. Furthermore, the Hatchery Committee is responsible for determining program adjustments considering the methodology described in Biological Assessment and Management Plan (BAMP 1998) and providing recommended implementation plans to the District.

The districts are responsible for funding to include facility improvements, changes to artificial production programs, monitoring and evaluation of programs as identified in the Hatchery Compensation Plan, the Permit and the Agreement. The Districts or its designated agents shall operate the hatchery facilities according to the terms of the Section 8 "Hatchery Compensation Plan", the ESA Section 10 permit(s), and in consultation with the Hatchery Committee.

Co-operators	Role
Public Utility District No.1 (PUD) of Douglas County	Funding Sources
Involved parties include those associated with the Columbia River Fish Management Plan and the U.S. v. Oregon court decision	Program Coordination, Co Management, and Policy

The summer chinook salmon run size enhancement program is funded by Public Utility District (PUD) No. 1 of Chelan County and PUD No. 1 of Douglas County for the purpose of mitigation for lost fish production as a result of fish mortality at the Rock Island, Rocky Reach, and Wells hydroelectric projects. The program is consistent with the Mid-Columbia Mainstem Conservation Plan ("MCMCP" - BAMP 1998), and the parties to this plan are involved in short and long-term production planning.

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

Funding Sources
Public Utility District (PUD) No. 1 of Douglas County

Operational Information	Number
Full time equivalent staff	6
Annual operating cost (dollars)	$900,594.00

Program is the funded by Public Utility District No. 1 of Douglas County for the purpose of mitigation for lost fish production associated with hydroelectric power system development in the region. Costs cannot be broken out for individual programs specifically from the total staff and operating budget at Wells Hatchery.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Wells Hatchery
Broodstock collection location (stream, RKm, sub-basin)	Wells Hatchery/Columbia River/RKm 829.0/Mid-Upper Columbia
Adult holding location (stream, RKm, sub-basin)	Wells Hatchery/Columbia River/RKm 829.0/Mid-Upper Columbia
Spawning location (stream, RKm, sub-basin)	Wells Hatchery/Columbia River/RKm 829.0/Mid-Upper Columbia
Incubation location (facility name, stream, RKm, sub-basin)	Wells Hatchery/Columbia River/RKm 829.0/Mid-Upper Columbia
Rearing location (facility name, stream, RKm, sub-basin)	Wells Hatchery/Columbia River/RKm 829.0/Mid-Upper Columbia

1.6 Type of program.

Integrated Harvest*

*Some straying of Wells Hatchery summer chinook occurs into tributaries above Wells Dam, providing opportunity for commingling of the Wells Hatchery stock and tributary populations of summer chinook. The degree of straying and potential impacts of Wells Hatchery summer chinook contribution to the natural spawning population should be assessed (risk containment). Modification of this proposed strategy may occur in the future as additional information is collected and analyzed while local summer chinook broodstock collection facilities in the Upper Columbia (Methow and Okanogan) systems are being planned.

1.7 Purpose (Goal) of program.

The goal of the summer chinook artificial propagation program at Wells Hatchery is to mitigate for the loss of summer chinook salmon adults and fishing opportunity (harvest) that would have been available in the region in the absence of the Wells hydroelectric project. This goal can be met through the use of the artificial environment of fish rearing facilities to increase the number of summer chinook adults that return to the basin by increasing survival at life-history stages where competitive or environmental bottlenecks occur. The goal to mitigate for habitat and harvest losses with a “production program” is distinctly different than “supplementation programs” designed to rebuild and increase natural production of indigenous stocks. Mainstem Columbia River, rather than tributary releases are employed to minimize the impact of “production programs” on “supplementation programs” and indigenous, naturalized stocks. Some straying of Wells Hatchery summer chinook occurs into tributaries above Wells Dam, providing opportunity for commingling of the Wells Hatchery stock and tributary populations of summer chinook. The program is characterized as a “segregated” production program; therefore, straying of Wells hatchery summer chinook into tributary populations is in conflict with those programs. The degree of straying and potential impacts of Wells Hatchery summer chinook contribution to the natural spawning population should be assessed (risk containment). Broodstock are collected from existing facilities at the Wells FH volunteer channel and are adequate in most years. Adults holding, spawning, incubation, rearing and release occur at the Wells FH.

1.8 Justification for the program.

Wells FH began operation in 1967 and is located on the west bank of the Wells tailrace. This facility was constructed and is funded by Douglas PUD to mitigate for loss of summer chinook salmon spawning area inundated by Wells Dam. Originally built as a spawning channel, it was reprogrammed to serve as an extended rearing facility in 1977. It now produces both sub-yearling (484,000 smolts at 20 fpp) and yearling (320,000 smolts at 10 fpp) summer chinook salmon (Appendix F). For the 1976 to 1990 broods, the average survival rates (which includes freshwater fishery contribution and returns to the Mid- Columbia Region) are 0.410% for yearlings and 0.098% for sub-yearlings (Table 12.). Despite the obvious survival advantage of the yearlings, Wells FH is severely constrained from additional yearling production because of the shortage of late summer rearing water (Section 1.5.2). Adults are collected throughout the entire run to ensure that the run timing for these populations is maintained. Adult collection is managed throughout the season in response to fish counts at Rocky Reach Dam to ensure adequate escapement above Wells Dam. Adults are spawned at 1:1 male to female spawning ratio. A portion of each day's egg take is used for on-site hatchery production. Summer chinook salmon smolts are released directly from the hatchery (sub-yearlings in June, yearlings in April). About 80% of the broodstock is collected from adults returning to the hatchery; the remaining 20% are collected from the east ladder of Wells Dam. This strategy is used to prevent formation of a distinct hatchery population. Varying numbers of natural summer chinook salmon volunteer into Wells FH on an annual basis and are incorporated into the broodstock. Salmon from the Carlton (Methow River), Similkameen (Okanogan River), and Dryden (Wenatchee River) programs also volunteer into Wells FH, yet they are identified by CWT and placed into their program of origin (Eltrich et al. 1995). Wells FH operates in a manner that emphasizes the production and release of smolts that are ready to migrate to the ocean and spend a minimum amount of time in the freshwater environment. This should minimize interactions and thus, impacts to natural fish in the migration corridor. Research is done at Wells FH on the time and size at release of hatchery fish to avoid coinciding with the migration of natural species. Wells FH has an aggressive program to develop externally distinguishable marks, which can be applied to hatchery fish, to allow the discrimination between them and natural fish.

Summer chinook migrate past Wells Dam from July through August, and spawn in the lower mainstem reaches of the Methow River from the town of Winthrop down to the Methow's confluence with the Columbia River. Annual dominant age class varies between age 4 and age 5. Preliminary carcass recoveries indicate the higher the recovery rate of hatchery fish, the older the modal age (T. Miller, WDFW, personal communication). Spawning begins in late September and continues through mid-November. The eggs incubate through the winter, with fry emergence the following spring. Historic data indicated smoltification and seaward migration occurred during the summer months when the fish were sub-yearlings. Current data suggests as much as 60% of the natural production over-winter in the reservoirs of the Columbia River hydropower system (Langness 1991; Chapman et al. 1994a; Sneva, WDFW, personal communication). The juveniles migrate seaward as yearlings the following spring. It has not yet been determined if this is an artifact of the artificial production (Bugert et al. DRAFT) and higher carcass sample rates on spawning and hatchery grounds or if the fish have undergone an environmental adaptation.

At this time, these fish have a low risk of extinction in the Mid-Columbia Region. There, they predominately have an "ocean-type" life-history, which has among many traits, a tendency to migrate to the ocean as sub-yearlings (less than a year after they hatch). Most hatcheries rear them to a yearling stage because they survive better at that age than sub-yearlings. Current hatchery production is: Wenatchee River, 864,000 yearlings; Methow River, 400,000 yearlings; Okanogan River, 576,000 yearlings; Columbia River at Wells Fish Hatchery (FH), 320,000 yearlings and 484,000 sub-yearlings; Rocky Reach FH 200,000 yearlings and 1,078,000 sub-yearlings; and Priest Rapids FH, 5,000,000 sub-yearlings (2,360,000 yearlings and 7,104,000 sub-yearlings total). Since yearling chinook salmon released from hatcheries survive at much higher rates than sub-yearlings (up to 15 times higher), fewer fish need to be propagated as yearlings to meet the compensation levels required under the second objective. In the short-term, this strategy appears to have fewer ecologic impacts to natural fish (although some indicators are inconclusive). However, the Hatchery Work Group recognized that this strategy, in combination with relatively high numbers of naturally spawning hatchery fish, may have deleterious long-term genetic effects to natural fish. This may be impossible to detect in a timely manner. Given these constraints, the chosen strategy is to continue to propagate yearlings to compensate for dam mortalities; evaluate the genetic, ecologic, and demographic characteristics of the natural populations throughout the hatchery program; and recognize the risk that potential impacts may not be detected in sufficient time to correct them. Additional production to compensate for hydropower losses are 750,000 yearlings on Wenatchee River, 150,000 yearlings on Entiat River, 150,000 yearlings on Chelan River, 120,000 yearlings on Methow River, 300,000 yearlings near Chief Joseph Dam, and 1,000,000 sub-yearlings at Priest Rapids FH (1,470,000 yearlings and 1,000,000 sub-yearlings total). Means to identify and collect local broodstock on the Methow and Okanogan river are being studied.

Authorization through Section 10(a)(1)(B) Permit Number #1347. WDFW and joint permit holders including the Public Utility District No. 1 of Chelan County (Chelan PUD), and the Public Utility District No. 1 of Douglas County (Douglas PUD) have authorization for this program through a Section 10 Permit allowing incidental take of upper Columbia spring chinook and steelhead resulting from the propagation of unlisted sockeye, summer and fall chinook at Eastbank, Wells, Priest Rapids, Lake Wenatchee sockeye, and cooperative releases. The permit expires on October 22, 2013.

The Washington Department of Fish and Wildlife (WDFW), the Public Utility District No. 1 of Chelan County (Chelan PUD), and the Public Utility District No. 1 of Douglas County (Douglas PUD) are authorized to take endangered Upper Columbia River (UCR) steelhead (*Oncorhynchus mykiss*) and endangered UCR spring chinook salmon (*O. tshawytscha*) as a result of artificial propagation programs for the enhancement of UCR steelhead, as cited in the WDFW application and the *Anadromous Fish Agreement and Habitat Conservation Plan (HCP)Wells hydroelectric Project FERC License No. 2149* with Douglas PUD for the operation of Wells Dam (DPUD 2002), the *Anadromous Fish Agreement and Habitat Conservation Plan Rocky Reach Hydroelectric Project FERC License No. 2145* (CPUD 2002a) with Chelan PUD for the operation of Rocky Reach Dam, and the *Anadromous Fish Agreement and Habitat Conservation Plan Rock Island Hydroelectric Project FERC License No. 943* with Chelan PUD for the operation of Rock Island Dam (CPUD 2002b), subject to the provisions of Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. §§ 1531-1543), NOAA's National Marine Fisheries Service (NMFS) regulations governing ESA-listed species permits (50 CFR Parts 222-226), and the conditions hereinafter set forth.

The permit authorizes the WDFW, the Chelan PUD, the Douglas PUD annual incidental take of adult and juvenile, endangered, naturally produced and artificially propagated, UCR spring chinook salmon and UCR steelhead of ESA-listed species associated with the implementation of non-ESA-listed salmon artificial propagation programs in the UCR region. The programs are intended to supplement naturally spawned unlisted summer chinook salmon, fall chinook salmon, and sockeye salmon (*O. nerka*) production occurring upstream from the vicinity of Priest Rapids Dam on the mainstem Columbia River, including the mainstem Columbia River and the Wenatchee, Methow, and Okanogan Rivers and their tributaries. The artificial propagation programs exist to mitigate for lost salmon, or lost salmon productivity, resulting from the construction and operation of hydroelectric dams on the mainstem Columbia River. With the exception of the Priest Rapids fall chinook salmon program, all of the programs authorized in this permit are required mitigation in the three long-term HCP agreements mentioned above. The artificial propagation programs may lead to incidental take of migrating ESA-listed adult spring chinook salmon and steelhead during unlisted salmon broodstock trapping activities, and incidental take of rearing and emigrating ESA-listed juvenile spring chinook salmon and steelhead resulting from the release of artificially-propagated unlisted salmon juveniles into the natural environment, and during monitoring and evaluation activities of the hatchery programs that occur in the natural environment. Limitations on unlisted adult salmon broodstock collection locations and timing; limits on the number, timing, and location of juvenile salmon releases; and operational guidelines applied to minimize the risks of disease transmission, water quality impairment, and fish loss through hatchery fish screening or water withdrawals for facility operations are some strategies that the WDFW, the Chelan PUD, and the Douglas PUD will employ to minimize risks to listed fish. Unlisted salmon survival and straying levels will be monitored through externally marking hatchery fish, and/or through internal coded wire or passive integrated transponder (PIT) tagging of a representative proportion of annual juvenile fish releases. The Chelan PUD and the Douglas PUD, as joint permit holders with the WDFW, have specific conditions relating to their involvement and obligation under the HCPs and the permit. The WDFW as the primary operator of the hatchery facilities and as a managing agency of the fish resources of the state, also has specific conditions and responsibilities. The failure of one permit holder to satisfy their conditions may result in the loss of take authorization for all permit holders. Thereby, an interdependent and cooperative relationship should be encouraged in carrying out the authorized activities.

Unlisted salmon artificial propagation program activities will include:

- The collection of broodstock through trapping operations at: Wells Dam for Methow and Okanogan River summer chinook salmon populations, Wells Hatchery for summer chinook salmon releases from Wells and Turtle Rock hatcheries, Dryden and Tumwater Dams for Wenatchee River summer chinook salmon and Wenatchee sockeye salmon, and Priest Rapids Hatchery for Priest River hatchery-origin fall chinook salmon.
- The holding and artificial spawning of collected adults at Wells, Eastbank, and Priest Rapids Hatcheries, and Lake Wenatchee Net Pens.
- The incubation and propagation from the fertilized egg through the fingerling, pre-smolt or smolt life stage at the Wells, Eastbank, and Priest Rapids Hatchery complex facilities.
- The transfer of summer chinook salmon and sockeye salmon fingerlings or pre-smolts from the hatcheries for rearing at facilities in the Wenatchee, Methow, and Okanogan Rivers' watersheds, and to net-pens in Lake Wenatchee.
- The release of summer chinook salmon, fall chinook salmon, and sockeye salmon smolts into the Wenatchee, Methow, and Okanogan Rivers' basins, and into the mainstem Columbia River from the hatcheries, acclimation ponds, and net-pens on those systems.
- The monitoring and evaluation of these artificial propagation programs in the natural environment through activities such as redd counts and carcass surveys, and formal monitoring and evaluation plans to be developed by the HCP Hatchery Committees as called for in the HCPs.

Included in the incidental take are conditions of the permit including:

Section A. Take Description and Levels
Section B. Production Levels
Section C. Program Management and Operating Conditions
Section D. Reports and Annual Authorization
Section E. Penalties and Sanctions

Operation of WDFW Facilities and Practices:

- Water rights are formalized thru trust water rights from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports.
- *National Pollutant Discharge Elimination System Permit Requirements* This facility operates

under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE). This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired. Conduct routine water monitoring to ensure that the levels of total suspended solids, settleable solids, and water temperature at each facility to remain compliant with NPDES permits issued by Washington Department of Ecology.

- *Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).
- Conduct routine, generally monthly, fish growth monitoring during rearing at each facility;
- Dispose of juvenile and adult carcasses via the local solid waste management system, on-station burial, or distributing carcasses into the river system of origin for nutrient enhancement after appropriate fish health certification. WDFW proposes to implement the following measures into the propagation program operation to minimize potential negative impacts on ESA-listed species.
- *Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington*. These guidelines define practices that promote maintenance of genetic variability in propagated salmon. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).
- *Spawning Guidelines for Washington Department of Fisheries Hatcheries*. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be use to maintain genetic variability within the hatchery populations. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 7, IHOT 1995).
- *Stock Transfer Guidelines*. This document provides guidance in determining allowable stocks for release for each hatchery. It is designed to foster development of locally-adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).
- *WDFW Steelhead Rearing Guidelines.* Details rearing guidelines and rearing parameters statewide (July 31, 2001), but would not supercede Section 10 permit parameters.

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.

See Section 1.10 below.

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.*").

1.10 Benefits:

Performance Standards	Performance Indicators	Monitoring and Evaluation
1.Increase the number of naturally spawning and naturally produced adults of the target population relative to a non-supplemented population and the changes in the natural replacement rate (NRR) of the supplemented population (reference population) is similar to that of the non-supplemented population.	Natural Replacement Rate (NRR). Ho: Δ Total spawners $_{\text{Supplemented population}}$ > Δ Total spawners $_{\text{Non-supplemented population}}$ Ho: Δ NOR $_{\text{Supplemented population}} \geq \Delta$ NOR $_{\text{Non-supplemented population}}$ Ho: Δ NRR $_{\text{Supplemented population}} \geq \Delta$ NRR $_{\text{Non-supplemented population}}$	Spawning escapement and spawning origin composition of supplemented and non-supplemented (reference) populations.
2. Maintain run timing, spawn timing, and spawning distribution of endemic populations.	Ho: Migration timing $_{\text{Hatchery}}$ = Migration timing $_{\text{Naturally produced}}$ Ho: Spawn timing $_{\text{Hatchery}}$ = Spawn timing $_{\text{Naturally produced}}$ Ho: Redd distribution $_{\text{Hatchery}}$ = Redd distribution $_{\text{Naturally produced}}$	Monitor and evaluated supplemented and non supplemented (reference) population run-timing, spawn timing and redd distribution.
3. Maintain endemic population genetic diversity, population structure, and effective population size Additionally, determine if hatchery programs have caused changes in phenotypic characteristics of natural populations.	Ho: Allele frequency $_{\text{Hatchery}}$ = Allele frequency $_{\text{Naturally produced}}$ = Allele frequency $_{\text{Donor pop.}}$ Ho: Genetic distance between subpopulations $_{\text{Year x}}$ = Genetic distance between subpopulations $_{\text{Year y}}$ Ho: Δ Spawning Population = Δ Effective Spawning Population Ho: Age at Maturity $_{\text{Hatchery}}$ = Age at Maturity $_{\text{Naturally produced}}$ Ho: Size at Maturity $_{\text{Hatchery}}$ = Size at Maturity $_{\text{Naturally produced}}$	Periodic (each 5 years) genetic analysis of hatchery and naturally adult and juvenile fish in the supplemented population and natural origin fish in the non-supplemented population. Monitor and evaluate run timing, spawn timing, redd distribution, size and age at maturity, and effective population size of supplemented and non-supplemented populations.
4. Achieve/maintain adult-to-adult survival (i.e., hatchery replacement	Ho: HRR $_{\text{Year x}}$ > NRR $_{\text{Year x}}$	Monitor and evaluate hatchery and natural adult-to-adult replacement rate

rate) that is greater than the natural adult-to-adult survival (i.e., natural replacement rate) and equal to or greater than the program specific HRR expected value based on survival rates listed in the BAMP (1998).	Ho: HRR ≥ Expected value per assumptions in BAMP	in the supplemented populations.	
5. Maintain the stray rate of hatchery fish below the acceptable levels to maintain genetic variation between stocks.	Ho: Stray rate $_{\text{Hatchery fish}}$ < 5% of total brood return Ho: Stray hatchery fish < 5% of spawning escapement of other independent populations. Ho: Stray hatchery fish < 10% of spawning escapement of any non-target streams within independent population.	Monitor and evaluate hatchery stray rates and proportional contribution to natural spawning aggregates.	
6. Provide release of hatchery fish consistent with programmed size and number.	Ho: Hatchery fish $_{\text{Size}}$ = Programmed $_{\text{Size}}$ Ho: Hatchery fish $_{\text{Number}}$ = + 10% of Programmed $_{\text{Number}}$	Monitor fish size and number at release.	
7. Maintain the proportion of hatchery fish on the spawning grounds at a levels that minimize negative affects to freshwater productivity (i.e., number of smolts per redd) of supplemented streams when compared to non-supplemented streams with similar adult seeding levels.	Ho: Δ smolts/redd $_{\text{Supplemented population}}$ > Δ smolts/redd $_{\text{Non-supplemented population.}}$	Monitor and evaluate annual smolt production in supplemented and non-supplemented populations. Monitor and evaluate redd deposition in supplemented and non-supplemented populations.	
8. Provide no significant increase in incidence of BKD in the natural and hatchery populations.	Ho: Conc. $_{\text{BKD}}$ supplemented fish $_{\text{Time x}}$ = Conc. $_{\text{BKD}}$ supplemented fish $_{\text{Time x}}$ Ho: Conc. $_{\text{BKD}}$ supplemented stream $_{\text{Time x}}$ = Conc. $_{\text{BKD}}$ non-supplemented stream $_{\text{Time x}}$ Ho: Conc. $_{\text{BKD}}$ hatchery effluent $_{\text{Time x}}$ = Conc. $_{\text{BKD}}$ hatchery effluent $_{\text{Time x}}$ Ho: Conc. $_{\text{BKD}}$ supplemented stream $_{\text{Upstream Time x}}$ = Conc. $_{\text{BKD}}$ hatchery effluent $_{\text{Time x}}$ = Conc. $_{\text{BKD}}$ supplemented stream $_{\text{Downstream Time x}}$ Ho: Hatchery disease $_{\text{Year x}}$ = Hatchery disease $_{\text{Year y}}$	Perform diagnostic disease investigations in the hatchery population and natural population, in supplemented and non-supplemented streams.	
9. Minimize adverse impacts to non-target taxa of concern (NTTOC).	Ho: NTTOC abundance $_{\text{Year x through y}}$ = NTTOC abundance $_{\text{Year y through z}}$ Ho: NTTOC distribution $_{\text{Year x through y}}$ = NTTOC distribution $_{\text{Year y through z}}$ Ho: NTTOC size $_{\text{Year x through y}}$ = NTTOC size $_{\text{Year y through z}}$		

1.10 Risks:

Performance Standards	Performance Indicators	Monitoring and Evaluation
1. Artificial propagation activities comply with ESA responsibilities to minimize impacts and/or interactions to ESA listed fish	Project complies with Section 10 permit conditions including juveniles are raised to yearling smolt-sizes (20 and 10 fish/lb). All fish are adipose fin clipped and CWT to identify them from naturally produced fish.	As identified in the HGMP: Monitor size, number, date of release and mass mark quality. Additional WDFW projects: straying, instream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds, fish health documented. Required data are generated through the M & E plan and provided to NOAA Fisheries as required per annual report compliance.
2. Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring.	All facilities meet WDFW water right permit compliance and National Pollution Discharge Elimination System (NPDES) requirements - WAG-5009.	Flow and discharge reported in monthly NPDES reports. Environmental monitoring of total suspended solids, settle-able solids, in-hatchery water temperatures, in-hatchery dissolved oxygen, nitrogen, ammonia, and pH will be conducted and reported as per permit conditions.
3. Water intake systems minimize impacts to listed wild salmonids and their habitats.	Water withdrawal – permits have been obtained to establish water rights for each hatchery facility. Intake screens – designed and operated to assure approach velocities and operating conditions provide protection to wild salmonid species.	Intake system designed to deliver permitted flows. Operators monitor and report as required Hatcheries participating in the programs will maintain all screens associated with water intakes in surface water areas to prevent impingement, injury, or mortality to listed salmonids.
4. The risk of catastrophic fish loss due to hatchery facility or operation failure is minimized.	Staffing allows for rapid response for protection of fish from risk sources (water loss, power loss, etc.). Backup generators to provide an alternative source of power to supply water during power outages. Protocols in place to test standby generator and all alarm systems on a routine basis. Multiple rearing sites or footprints for captive broodstock rearing. Alarm systems installed and operating at each rearing vessel to detect loss of or reduced flow and reduced operating head in rearing vessels. Densities at minimum to reduce risk of loss to disease. Sanitation – all equipment is disinfected between uses on different lots of fish including nets, crowders, boots, raingear, etc.	Hatchery engineering design and construction accommodate security measures. Operational funding accommodates security measures. Training in proper fish handling, rearing, and biological sampling for all staff. Staff are trained to respond to alarms and operate all emergency equipment on station. Maintenance is conducted as per manufacturer's requirements and according to hatchery maintenance schedules.
5. Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus

protocols including IHOT, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	bacteria, parasites and/or pathological changes, as needed
6. The risk of catastrophic fish loss due to hatchery facility or operation failure is minimized.	Staffing allows for rapid response for protection of fish from risk sources (water loss, power loss, etc.). Backup generators to provide an alternative source of power to supply water during power outages. Protocols in place to test standby generator and all alarm systems on a routine basis. Multiple rearing sites or footprints for captive broodstock rearing. Alarm systems installed and operating at each rearing vessel to detect loss of or reduced flow and reduced operating head in rearing vessels. Densities at minimum to reduce risk of loss to disease. Sanitation – all equipment is disinfected between uses on different lots of fish including nets, crowders, boots, raingear, etc.	Hatchery engineering design and construction accommodate security measures. Operational funding accommodates security measures. Training in proper fish handling, rearing, and biological sampling for all staff. Staff are trained to respond to alarms and operate all emergency equipment on station. Maintenance is conducted as per manufacturer's requirements and according to hatchery maintenance schedules.
7. Broodstock collection and juvenile hatchery releases minimize ecological effects on listed wild fish.	Summer chinook reared to sufficient sizes such that smoltification occurs within nearly the entire population, reducing residence time in streams after release (CV length ≤ 10%, condition factor 0.9 – 1.0). All listed fish encountered in hatchery broodstock collection operations will be held for a minimal duration in the traps; generally less than 24 hrs and follow permit protocols. Listed fish trapped in excess of broodstock collection goals will be released upstream or returned to natal streams immediately. Smolts acclimated and imprinted on surface water from the natal steam to enhance smoltification and reduce residence time in the tributaries and mainstem migration corridors.	Fish culture and evaluation staff monitor behavior, coefficient of variation in length, and condition. Fish health specialists will certify all hatchery fish before release. Downstream juvenile smolt traps can be used to monitor the outmigration of hatchery and wild fish. Outmigration may also be monitored through PIT tag detection systems at mainstem passage facilities. Broodstock collection protocols will developed each season and reviewed by the HCP Hatchery committees.

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

Permit (#1347) protocols for the summer chinook programs allow for the annual collection of 980 Wells Fish Hatchery volunteers equally divided among sexes including jacks that are used for the Wells Hatchery Programs including releases at Wells and Turtle Rock Facilities. Approximately 440 broodstock are needed for the Wells release programs only.

1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.

The egg take goal portion for Wells is 969,400 eggs. Mitigation is for 56,200 pounds of total production. WDFW shall limit annual production of summer chinook salmon for release into the Columbia River from Wells Hatchery to not exceed 320,000 yearling juveniles released in April and 484,000 sub-yearling juveniles released in June. These juveniles shall be externally marked with an adipose fin-clip and internally tagged prior to release.

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Fingerling	484,000	20	Mid-June	Columbia River	829	Mid-Upper Columbia	Columbia Cascade
Yearling	320,000	10	Mid-April	Columbia River	829	Mid-Upper Columbia	Columbia Cascade

1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

In the Columbia River, ocean-type chinook salmon released as yearlings have consistently survived better than those released as sub-yearlings In the Columbia River, the benefits of rearing juveniles through a yearling stage include (1) improved passage through hydroelectric dams, through coincidental timing of releases with increased flows and spill (Raymond 1988); (2) better fish guidance efficiency of yearlings at the dams because of behavioral and buoyancy changes (Giorgi et al. 1988); (3) decreased susceptibility to predators (Poe et al. 1991); and (4) improved swimming performance of larger smolts (Park 1969). Based upon smolt production numbers to necessary to achieve hatchery compensation objectives, the difference in production required between yearling and sub-yearling ocean-type chinook salmon is on the order of 0.24. In other words, for every 1,000 sub-yearling summer chinook smolts to be produced for compensation, 240 yearling smolts could be produced in lieu of the sub-yearlings. This ratio was derived from observed differences in survival between yearling and sub-yearling releases from Wells FH. The appropriate mix of yearling and sub-yearling smolts has been evaluated through the Mid Columbia Hatchery Plan to minimize the risk of this increased hatchery production on the existing natural production. For adult production, see also HGMP Section 3.3.1.

SARs:
Smolt to adult survival rates for summer/fall chinook produced in WDFW hatchery programs within the region have been estimated to range from 0.07 % to 3.62 %, averaging 1.49 % (smolt to adult overall survival estimates for brood year 1982-87 for Rocky Reach Hatchery releases from Chapman et al. 1994). In the mid-1990’s, fish have been released at different sizes (Table 1). A comparison of other summer chinook programs of yearling releases are provided in Table 2.

Escapement:
The most recent five-year average annual escapement for Wells summer chinook 38,807. This compares with a 5 year average of only 4,027 for 1989-1993 and a 5 year average of 4,832 for the period from 1994-1998 (Table 3), while overall spawning escapement to Upper Columbia tributaries is increasing (Table 4).

Table 1. Data available for fingerling and yearling SARs to brood year 1999. Data from the APRE website and RMIS (1998 & 1999).

Brood Year	Wells Yearling Releases (20 fish/lb or smaller)	Wells Yearling Releases (10 fish/lb or smaller)
	Smolt to Adult Survival (%) 0+	Smolt to Adult Survival (%)
1990	0.05	-
1991	0.01	-
1992	0.25	-
1993	0.57	-
1994	0.03	-
1995	0.05	0.40
1996	0.15	0.47
1997	0.04	2.78
1998	0.10	2.19
1999	0.12	0.39*
2000	Na	Na
2001	Na	Na
2002	Na	Na
2003	Na	Na

*Preliminary numbers only.

Table 2 Estimated survival rates for WDFW summer yearling smolt releases from Wells, Turtle Rock, Wenatchee, Methow and Okanogan River systems. Years 1976-1989 are taken from the Mid-Columbia Hatchery Plan (BAMP 1998) with recent data through BY 1999 derived from RMIS.

Hatchery	Age at Release	Release years	Release years survival rate (%)	Brood Years 1995 – 1999	Release years survival rate (AVG %)
Wells	1+	1976-1989	0.410	0.40 (1995) 0.46 (1996) 2.78 (1997) 2.19 (1998) 0.39 (1999)*	1.244%
Rocky Reach (Turtle Rock)	1+	1984-1989	1.366	0.69 (1995) 0.76 (1996) 2.35 (1997) 2.57 (1998)	1.404%

				0.65 (1999)*	
Methow River (Carlton Pond)	1+	Na	Na	0.06 (1995) 0.03 (1996) 0.16 (1997) 1.82 (1998) 0.005 (1999)*	0.383%
Similka-meen Pond	1+	Na	Na	0.48 (1995) 0.009 (1996) 3.10 (1997) 2.63 (1998) 0.27 (1999)*	1.297%
Wenat-chee (Dryden Pond)	1+	Na	Na	0.22 (1995) 0.09 (1996) 1.84 (1997) 1.12 (1998) 0.18 (1999)*	0.69%

* Preliminary numbers only.

Table 3 Methow/Okanogan Escapement from 1989 – 2003 based on adult escapement over Wells Dam.

Return Year	Number of Adults	Return Year	Number of Adults
1989	4,800	1998	5,316
1990	4,160	1999	10,336
1991	2,892	2000	13,443
1992	3,491	2001	47,314
1993	4,795	2002	69,311
1994	8,001	2003	53,632
1995	4,238	2004	NA
1996	3,307	2005	NA
1997	3,298		

Table 4 Upper Columbia natural summer chinook spawning escapement estimates (return years 1979-2004 from WDF and WDFW 1995 - 2004). Peak number of summer chinook redds estimates or counted during spawning surveys on the Wenatchee, Methow, Okanogan and Similkameen Rivers

Year	**Wenatchee**	**Methow**		**Okanogan**		**Similkameen**	
	Spawning Estimates	Aerial	Ground	Aerial	Ground	Aerial	Ground
1980	8,995	345	-	118	-	172	-
1981	4,515	195	-	55	-	121	-
1982	4,113	142	-	23	-	56	-
1983	3,937	65	-	36	-	57	-
1984	8,420	162	-	235	-	301	-
1985	9,185	164	-	138	-	309	-
1986	10,021	169	-	197	-	300	-
1987	9,831	211	-	201	-	164	-
1988	10,389	123	-	113	-	191	-
1989	12,764	126	-	134	-	221	370
1990	9,343	229	-	88	47	94	147
1991	7,144	-	153	55	64	68	91
1992	9,312	-	107	35	53	48	57

1993	7,469	-	154	144	162	152	288
1994	8,006	-	310	372	375	463	777
1995	6,178	-	357	260	267	337	616
1996	4,879	-	181	100	116	252	419
1997	4,719	-	205	149	158	297	486
1998	3,984	-	225	75	88	238	276
1999	4,376	-	448	222	369	903	1,275
2000	4,448	-	500	384	549	549	993
2001	9,142	-	675	883	1,108	865	1,540
2002	Na	-	2,013	1,958	2,667	2,000	3,358
2003	Na	-	1,624	1,099	1,035	103	378
2004	Na	-	973	1,310	1,327	2,127	1,660
2005							

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

The WDFW hatcheries currently producing summer chinook smolts were constructed in the mid-1960s (Turtle Rock), 1967 (Wells), 1989 (Eastbank), and 1990 (Similkameen Pond, Dryden Pond, and Carlton Pond).

1.14 Expected duration of program.

The supplementation program will continue with the objective of mitigating for the loss of summer chinook salmon productivity caused by hydroelectric dams in the Columbia River Basin; in particular the Rock Island, Rocky Reach, and Wells hydroelectric projects.

1.15 Watersheds targeted by program.

Summer chinook salmon propagated and released through the Wenatchee River and Methow/Okanogan river (Wells) supplementation programs originated from natural and hatchery-origin broodstock returning to those systems. The targeted watersheds are tributary to the upper Columbia River (WRIA 48-0001). The Wells and Rocky Reach enhancement programs are not specifically designed and operated to achieve supplementation objectives, although returning summer chinook are known to contribute to hatchery broodstocks and to natural escapement of the larger, homogenous summer/fall chinook ESU.

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

WELLS SUMMER CHINOOK (WELLS HATCHERY)

1.16.1 OVERVIEW

Wells Hatchery summer chinook hatchery program level is 804,000 smolts (320,000 yearling smolts (10 fpp) and 484,000 sub-yearling smolts (50 fpp). Historically, the program has produced the entire production allotment. The program is the result of mitigation/compensation agreements for mainstem habitat losses and lost fishing opportunity associated with the construction of Wells Dam. The goal of the summer chinook artificial propagation program at Wells Hatchery is to mitigate for the loss of summer chinook salmon adults and fishing opportunity (harvest) that would have been available in the region in the absence of the Wells hydroelectric project. This goal can be met through the use of the artificial environment of fish rearing facilities to increase the number of summer chinook adults that return to the basin by increasing survival at life-history stages where competitive or environmental bottlenecks occur. The goal to mitigate for habitat and harvest losses with a "production program" is distinctly different than "supplementation programs" designed to rebuild and increase natural production of indigenous stocks. Mainstem Columbia River, rather than tributary releases are employed to minimize the impact of "production programs" on "supplementation programs" and indigenous, naturalized stocks. Some straying of Wells Hatchery summer chinook occurs into tributaries above Wells Dam, providing opportunity for commingling of the Wells Hatchery stock and tributary populations of summer chinook. The program is characterized as a "segregated" production program; therefore, straying of Wells hatchery summer chinook into tributary populations is in conflict with those programs. The degree of straying and potential impacts of Wells Hatchery summer chinook contribution to the natural spawning population should be assessed (risk containment). Broodstock are collected from existing facilities at the Wells FH volunteer channel and are adequate in most years. Adults holding, spawning, incubation, rearing and release occur at the Wells FH.

1.16.2 POTENTIAL ALTERNATIVES

ALTERNATIVE 1

The Wells Hatchery summer chinook program will continue to produce the planned production. Hatchery rearing environments will continue to be adequate to provide programmed production. The return to Wells Hatchery will be sufficient to provide substantial harvest opportunity. Some straying of Wells Hatchery summer chinook will continue and contribute to both the "production" and "supplementation" hatchery production and contribute to the natural spawning component.

ALTERNATIVE 2 (WDFW endorsed)

Provide a definitive acclimation water source to enhance homing fidelity to point of release or other areas that minimize straying into tributaries (e.g., chemical imprinting). Higher site(s) fidelity would reduce the stray potential into tributaries and increase the harvest opportunity in the area of mitigation impact.

1.16.3 **POTENTIAL REFORMS AND INVESTMENT**

INVESTMENT OR REFORM 1

Providing a definitive water source and increased homing fidelity for Wells Hatchery summer chinook may reduce straying and improve adult fidelity to the Wells Dam tailrace and Wells Hatchery volunteer channel. Adult returns to these locations will provide enhanced fishing opportunity and reduce the potential for this production to stray into tributary habitats and commingle with chinook stocks managed for increased natural production (supplemented populations). A reduction in straying will also reduce the contribution of the Wells Hatchery summer chinook to the summer chinook "supplementation" hatchery broodstock collected at the east ladder of Wells Dam and minimize the potential risk of incorporating a more domesticated stock into the supplementation program. Improved homing fidelity will improve the programs ability to operate as a "segregated" production program, minimizing potential impact (harvest and ecological) to supplemented populations. Homing fidelity to the Wells Dam tailrace and to the Wells Hatchery volunteer channel may be improved through development of a chemically enhanced acclimation/homing water source (e.g., morphaline).

Section 2: Program Effects on ESA-Listed Salmonid Populations

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

WDFW has the following permits for hatchery operations in the Upper and Mid-Columbia:

Section 10(a)(1)(B) Permit Number 1347 Permit Type: Incidental take of upper Columbia spring chinook and steelhead resulting from the propagation of unlisted sockeye, summer and fall chinook at Eastbank, Wells, Priest Rapids, Lake Wenatchee sockeye, and cooperative releases. Expires October 22, 2013.

Section 10(a)(1)(B) Permit Number 1196 Permit Type: Artificial production of upper Columbia spring chinook. Expires Dec 31, 2007. Activities described in the application for this permit have been authorized under terms and conditions of the Biological Opinion on Artificial Propagation in the Columbia River Basin (NMFS 1999).

Section 10(a)(1)(B) Permit Number: 1395 Permit Type: Direct Take (artificial propagation of listed steelhead) authorizes the WDFW, the Chelan PUD, and the Douglas PUD annual take of ESA listed adult and juvenile, endangered, naturally produced and artificially propagated, UCR steelhead and UCR spring chinook salmon associated with the implementation of UCR steelhead artificial propagation enhancement programs in the UCR region. The programs are intended to supplement naturally spawning UCR steelhead production occurring upstream from Priest Rapids Dam on the mainstem Columbia River, including the Wenatchee, Methow, and Okanogan Rivers, and their tributaries. Expires October 2, 2013.

Section 10(a)(1)(B) Permit Number: **1248 Permit Type:** Incidental take of ESA-listed anadromous fish species associated with seven recreational fishery programs to be conducted above Priest Rapids Dam on the Columbia River. This permit expired at the end of 2004 and is being renewed to include all fisheries above the Highway 395 Bridge in Pasco. This permit was submitted to NOAA for a renewal March 16, 2005 and is awaiting approval.

Section 10(a)(1)(B) Permit Number: 1482 (1203) Authorizes the take of ESA-listed upper Columbia River salmon and steelhead associated with research activities in the upper Columbia River Basin. This permit was modified in 2004 and the issue date is pending NOAA approval.

Authorizations

FERC processes:
Under current settlement agreements and stipulations, the three mid-Columbia PUDs pay for the operation of hatchery programs within the Columbia Cascade Province. These programs determine the levels of hatchery production needed to mitigate for the construction and continued operation of the PUD dams.

Habitat Conservation Plans:
In 2002, habitat conservation plans (HCPs) were signed by Douglas and Chelan PUDs, WDFW, USFWS, NOAA Fisheries, and the Colville Confederated Tribes. The overriding goal of the HCPs are to achieve no-net impact on anadromous salmonids as they pass Wells (Douglas PUD), Rocky Reach, and Rock Island (Chelan PUD) dams. One of the main objectives of the hatchery component of NNI is to provide species specific hatchery programs that may include contributing to the rebuilding and recovery of naturally reproducing populations in their native habitats, while maintaining genetic and ecologic integrity, and supporting harvest.

Biological Assessment and Management Plan:
The biological assessment and management plan (BAMP) was developed by parties negotiating the HCPs in the late 1990s. The BAMP was developed to document guidelines and recommendations on methods to determine hatchery production levels and evaluation programs. It is used within the HCP as a guiding

document for the hatchery programs.

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

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

Identify the NMFS ESA-listed population(s), that will be directly affected by the program.
None.
Identify the NMFS ESA-listed population(s), that may be directly affected by the program.

Upper Columbia River ESU spring chinook (*Oncorhynchus tshawytscha*). All spring chinook in the Upper Columbia ESU were listed as Endangered under the ESA. Listed as an endangered species on March 24, 1999. The ESU includes all naturally spawned populations of chinook salmon in all river reaches accessible to chinook salmon in Columbia River tributaries upstream of the Rock Island Dam and downstream of Chief Joseph Dam in Washington, excluding the Okanogan River. Chinook salmon (and their progeny) from the following hatchery stocks are considered part of the listed ESU: Chiwawa River (spring run); Methow River (spring run); Twisp River (spring run); Chewuch River (spring run); White River (spring run); and Nason Creek (spring run).

Upper Columbia River ESU summer steelhead trout (*Oncorhynchus mykiss).* On August 18, 1997 summer steelhead in the Upper Columbia River ESU were listed as Endangered under the ESA. Listed as an endangered species on August 18, 1997. The ESU includes all naturally spawned populations of steelhead (and their progeny) in streams in the Columbia River Basin upstream from the Yakima River, Washington, to the U.S.-Canada border. Wells Hatchery stock steelhead are also part of the listed ESU.

Bull Trout populations (*Salvelinus confluentus*). Columbia River Distinct Population Segment) On June 12, 1998 bull trout in the Upper Columbia Distinct Population Segment (DPS) were listed as threatened under federal ESA by the USFWS.

Other salmonid species -
Sockeye salmon in the region were judged as neither in danger of extinction or likely to become so in the foreseeable future by NMFS in the west coast sockeye salmon species status review (Gustafson et al. 1997).

Other ESA-listed species of significance to the summer chinook programs include those that originate in other watersheds within the Columbia River Basin: Middle Columbia River ESU steelhead - “threatened”; Snake River ESU sockeye - “endangered”; Snake River ESU spring chinook - “threatened”; Snake River ESU fall chinook - “threatened”; Snake River ESU steelhead - “threatened”; Lower Columbia River ESU chinook - “threatened”; Lower Columbia River ESU chum - “threatened”; Lower Columbia River ESU steelhead - “threatened”; and Lower Columbia/Southwest Washington ESU coastal cutthroat - “threatened”.

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

Describe the status of natural population relative to critical and viable population thresholds.
Critical habitat was designated for UCR spring chinook salmon and UCR steelhead in 2000 when NMFS published a final rule in the Federal Register (February 16, 2000 65 FR 7764). However, the critical habitat designations were vacated and remanded to NMFS for new rulemaking pursuant to a court order in April 2002. The designation of critical habitat for the UCR spring chinook salmon ESU or UCR steelhead ESU will trigger a re-initiation of ESA consultation.

- **Provide the most recent 12 year (e.g. 1988-present) progeny to parent ratios, survival data by life stage, or other neasures of productivity for the listed population. Indicate sources of these data.**
- **Provide the most recent 12 year (e.g. 1988-present) estimates of annual spawning abundance estimates, or any other abundance information. Indicate sources of these data.**
- **Provide the most recent 12 year (e.g. 1988-present) estimates of annual proportions of direct hatchery origin and listed natural origin fish on the natural spwning grounds, if known. Indicate sources of these data.**

Sources for these sections are taken from the Section 10 Direct Take Permit (#1395, #1196), WDFW Application for Permits # 1395 and #1196 and ESA Section 7 Consultations for Permit # 1395 – 2002, and #1196 - 1998).

Upper Columbia River ESU summer steelhead: The ESU includes naturally-spawned populations of steelhead in tributaries of the Columbia River upstream from the Yakima River, including the Okanogan River. The Wells Hatchery stock steelhead were included in the listed ESU. Critical habitat for the ESU was designated on February 16, 2000 and included all river reaches accessible to listed steelhead (and associated riparian zones) in Columbia River tributaries between the Yakima River and Chief Joseph Dam (NPPC 2001). Survival of natural-origin steelhead has been severely depressed such that 81% of the natural spawning escapement is hatchery-origin fish (Busby 1996 as quoted in Bugert 1998). The Wells Hatchery steelhead stock is considered essential for recovery, and is included in the listing. Since 1997, the WDFW has been developing a Wenatchee River stock for the juvenile released into the Wenatchee basin. Currently, there is probably a close resemblance between the natural and hatchery populations in this ESU because of the incorporation of naturally-spawning adults into the hatchery program and the large number of hatchery fish that have been spawning in the natural environment (65-80 percent of the spawning population in the Methow basin; Busby *et al.* 1996). Since natural replacement rates of UCR steelhead are low (0.3:1), the hatchery supplementation programs were determined to be essential for recovery and included in the endangered listing under the ESA. These hatchery fish could be used to reduce the short-term risk of extinction and aid in the recovery of the UCR steelhead ESU.

Although the life history of this ESU is similar to that of other inland steelhead, smolt ages are some of the oldest on the west coast (up to 7 years old), probably due to the ubiquitous cold water temperatures (Mullan *et al.* 1992). Adult steelhead from this ESU enter the lower Columbia between May and September with fish arriving at Wells Pool in early July. Fish enter the Wenatchee and Methow Rivers in mid-July and peak between mid-September and October. During winter, adult steelhead generally return to the warmer Columbia River and re-enter the Methow to begin spawning in mid-March after the ice has thawed. Spawning continues through May and many fish seek out higher reaches in the tributaries. Fry emergence occurs that summer and juveniles rear for two to four years prior to spring downstream migration. On April 4, 2002, NOAA Fisheries defined interim abundance recovery targets for each spawning population in this ESU (Table 5). These targets are intended to represent the number and productivity of naturally produced spawners that may be needed for recovery, in the context of whatever take or mortality is occurring. They should not be considered in isolation, as they represent the numbers that, taken together, may be needed for the population to be self-sustaining in its natural ecosystem. For UCR steelhead, the interim recovery levels are 2,500 spawners in the Wenatchee River, 500 spawners in the Entiat River, and 2,500 spawners in the Methow River (Table 5).

Table 5. Interim abundance targets of naturally produced steelhead by basin and approximate natural origin broodstock collection goal.

Basin	Interim Abundance Target	Broodstock Goal
Wenatchee	2,500	at least 104 [a]
Entiat	500	- -
Methow	2,500	maximum 123 [b]
Okanogan	600	16
Small Tributaries	200	- -
Total	**6,300**	**243**

[a] *Proportional to run-at-large in years when run is composition is 50% or greater natural origin steelhead, otherwise goal is 50% naturally produced steelhead. Total broodstock collection goal is generally about 208 steelhead.*

[b] *Combined WDFW Methow/Okanogan programs will not exceed 30% natural origin steelhead in the broodstock. Up to 373 steelhead may be collected for broodstock total.*

Returns of both hatchery and naturally produced steelhead to the UCR basin have increased in recent years. The average 1997-2001 return counted through the Priest Rapids Dam fish ladder was approximately 12,900 fish. The average for the previous five years (1992-1996) was 7,800 fish. Abundance estimates of returning naturally produced UCR steelhead have been based on extrapolations from mainstem dam counts and associated sampling information (e.g.,hatchery/natural fraction, age composition). The natural component of the annual steelhead run over Priest Rapids Dam increased from an average of 1,040 (1992-1996), representing about 15 percent of the total adult count, to 2,200 (1997-2001), representing about 17 percent of the adult count during this period of time (BRT 2003). In terms of natural production, recent population abundances for both the Wenatchee/Entiat river aggregate population and the Methow population remain well below the interim recovery levels developed for these populations (BRT 2003). A 5-year geometric mean (1997-2001) of approximately 900 naturally produced steelhead returned to the Wenatchee and Entiat rivers (combined) compared to a combined abundance target of 3,000 fish. Although this is well below the interim recovery target, it represents an improvement over the past (an increasing trend of 3.4 percent per year). However, the average percentage of natural fish for the recent 5-year period dropped from 35 to 29 percent, compared to the previous status review. For the Methow population, the 5-year geometric mean of natural returns over Wells Dam was 358. Although this is well below the interim recovery target, it represents an improvement over the past (an increasing trend of 5.9 percent per year). In addition, the estimated 2001 return (1,380 naturally produced spawners) was the highest single annual return in the 25-year data series. However, the average percentage of natural origin spawners dropped from 19 percent for the period prior to the 1998 status review to 9 percent for the 1997 to 2001 returns. Naturally produced steelhead made up an average of 17.8 percent of the steelhead run at Priest Rapids Dam during the 18-year period from 1986 to 2001. These natural origin steelhead are not equally distributed among the UCR tributary basins. Mullen *et al*. (1994) reported annual escapement to the Methow basin at only 10 percent natural origin steelhead; however, in recent years the WDFW (2002) report natural origin steelhead composition of 5 to 11 percent in 1998 through 2000 at Wells Dam. The escapement to the Wenatchee basin from 1998 to 2000 averages 430 natural origin steelhead.

The average 2000- 2003 return counted through the Priest Rapids Dam fish ladder was approximately 18,620 fish with 3049 wild fish. The 1997-2001 return counted through the Priest Rapids Dam fish ladder was approximately 12,900 fish. The average for the previous five years (1992-1996) was 7,800 fish. By October 2004, over 18,000 steelhead had passed Priest Rapids Dam by early October. The natural component of the annual steelhead run over Priest Rapids Dam increased from an average of 1,040 (1992-1996), representing about 15 percent of the total adult count, to 2,200 (1997-2001), representing about 17 percent of the adult count during this period of time (BRT 2003). In terms of natural production, recent population abundances for both the Wenatchee/Entiat river aggregate population and the Methow population remain well below the interim recovery levels developed for these populations (BRT 2003).

Upper Columbia River ESU Spring Chinook:

The UCR spring chinook salmon ESU, listed as endangered on March 24, 1999 (64 FR 14308), includes all natural-origin stream-type chinook salmon from river reaches above Rock Island Dam and downstream of Chief Joseph Dam, including the Wenatchee, Entiat, and Methow River Basins (Myers *et al.* 1998). All stocks, with the exception of the Methow stock, were considered by WDF *et al.* (1993) to be of native origin, of natural production type, and as depressed in status. When listing the UCR spring chinook salmon as endangered, NMFS included six hatchery populations as part of the ESU: Chewuch River, Methow River, Twisp River, Chiwawa River, White River, and Nason Creek. These six hatchery populations were considered to be essential for recovery and were therefore listed as part of the ESU. Hatchery populations that were derived from Carson spring chinook salmon stock at Leavenworth, Entiat and Winthrop National Fish Hatcheries were not included as part of the ESU.

NMFS has proposed Interim Recovery Abundance Levels and Cautionary Levels (Ford *et al.*2001). Cautionary Levels were characterized as natural origin abundance levels that the population fell below only about 10 percent of the time during a historical period when it was considered to be relatively healthy. The three independent populations of spring chinook salmon identified for the ESU include those that spawn in the Wenatchee, Entiat, and Methow Basins (Ford *et al.* 2001).

All three of the existing UCR spring chinook salmon naturally reproducing populations have exhibited similar downward trends and patterns in abundance over the past 40 years (NMFS 2003c, 2003d, 2003e). Assuming that population growth rates were to continue at 1980-2000 levels, UCR spring chinook salmon populations are projected to have very high probabilities of 90 percent decline within 50 years (87 to 100 percent). Redd counts in the three basins have improved in recent years, largely because of natural spawning by artificially propagated spring chinook salmon (Grassell 2003; Grassell 2004; Mosey and Murphy 2002; Hamstreet and Carie 2004; Humling and Snow 2004). Artificially propagated juvenile spring chinook salmon are released into the Chiwawa River with the expectation that as adults they will return and spawn in the Chiwawa River. In reality, these hatchery released fish have contributed an average of 50 percent of the spawners in the Chiwawa River and an average of 25 percent of the spawners in Nason Creek (Andrew Murdoch, WDFW, pers. com.). The propagation program spring chinook salmon that return to spawn in Nason Creek are considered strays and of potential adverse risk to the Nason Creek component of the population; measures to improve the fidelity of hatchery reared spring chinook salmon to the Chiwawa River are being explored. Additionally, a new artificial propagation program that releases locally derived juveniles into Nason Creek is likely to occur within the next five years. The reproductive effectiveness of these hatchery-origin salmon is not known at this time. However, preliminary indications in the Wenatchee River Basin suggest that the Chiwawa spring chinook salmon program is contributing to natural reproduction in successive generations (Andrew Murdoch, WDFW, pers. com.). Successful reproduction over generations has not been demonstrated for the other basins as yet. A summary of recent redd count data and spawner composition is provided in Table 10. All three of the existing UCR spring chinook salmon naturally reproducing populations have exhibited similar downward trends and patterns in abundance over the past 40 years (NMFS 2003c, 2003d, 2003e). Assuming that population growth rates were to continue at 1980-2000 levels, UCR spring chinook salmon populations are projected to have very high probabilities of 90 percent decline within 50 years (87 to 100 percent). Redd counts in the three basins have improved in recent years, largely because of natural spawning by artificially propagated spring chinook salmon (Grassell 2003; Grassell 2004; Mosey and Murphy 2002; Hamstreet and Carie 2004; Humling and Snow 2004). Artificially propagated juvenile spring chinook salmon are released into the Chiwawa River with the expectation that as adults they will return and spawn in the Chiwawa River. In reality, these hatchery released fish have contributed an average of 50 percent of the spawners in the Chiwawa River and an average of 25 percent of the spawners in Nason Creek (Andrew Murdoch, WDFW, pers. com.). The propagation program spring chinook salmon that return to spawn in Nason Creek are considered strays and of potential adverse risk to the Nason Creek component of the population; measures to improve the fidelity of hatchery reared spring chinook salmon to the Chiwawa River are being explored. Additionally, a new artificial propagation program that releases locally derived juveniles into Nason Creek is likely to occur within the next five years. The reproductive effectiveness of these hatchery-origin salmon is not known at this time. However, preliminary indications in the Wenatchee River Basin suggest that the Chiwawa spring chinook salmon program is contributing to natural reproduction in successive generations (Andrew Murdoch, WDFW, pers. com.). Successful reproduction over generations has not been demonstrated for the other basins as yet.

While some improvement can be seen in recent years, the ESU is still at critically low levels compared to both historic production and the desired escapement levels—particularly for natural fish. Therefore, while there is some cause for guarded optimism, NMFS finds that there has been no genuine change in the species' status since they were listed as endangered, and the biological requirements are not being met with respect to abundance, distribution, or overall trend.

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.

UCR Spring Chinook:
The NRR for the Wenatchee, Entiat, and Methow populations has ranged from 1.4 to 0.4 from 1958 to 1995 broodyears. The NRR has not been above 1.0 since the mid-1970's for the Wenatchee and Methow populations and the mid-1980's for the Entiat population (Ford et al., 2001). Even with planned increases in mainstem juvenile passage survival anticipated from the Habitat Conservation Plan, additional survival of 20 to 50% is necessary to achieve NRR greater than 1.0 (Cooney, 2000 Draft). UCR Spring Chinook are extinct in the Okanogan River basin.

UCR Steelhead: The Natural Return Ratios (NRR) or wild adult-to-adult survival rates for the Methow/Okanogan populations have been estimated as between 0.05 – 0.35 from 1975 to 1991. For the Wenatchee/Entiat populations, the NRR are estimated to have ranged from 0.1 – 0.9 during this same time (Ford et al., 2001). The Biological Requirements Committee concluded that the UCR steelhead populations are not able to sustain themselves naturally, but it is not clear if they would go extinct without ongoing supplementation. The uncertainty surrounding the reproductive success of hatchery steelhead confounds these analyses. Even with planned increases in mainstem juvenile passage survival anticipated from the Habitat Conservation Plan, additional survival of 20 to 50% is necessary to achieve NRR greater than 1.0 (Cooney, 2000 Draft).

In areas above Priest Rapids Dam, several methods have been used to estimate the number of steelhead spawners and juveniles that the available habitat may be capable of supporting. These estimates for the UCR basin range from 1,603 to 8,281 depending on the estimation method (Ford *et al*. 2001). The Interior Columbia Basin Technical Recovery Team (TRT) is reviewing the available data and is expected to provide escapement recommendations for recovery of all ESA-listed UCR species. The WDFW proposes to manage artificially propagated steelhead at levels above the interim abundance targets developed by NMFS (Lohn 2002) until the TRT recommendations are available. NMFS has not developed abundance targets for the Okanogan basin or other smaller tributaries.

Wild production -
The population status of listed steelhead smolts produced in the region has been estimated by WDFW (L. Brown, WDFW pers. comm). The number of steelhead juveniles that may be produced are indicated by the following sub-basin production capacities for wild steelhead smolts in the region (WDF et al. 1993;

MCMCP 1997):

- Wenatchee 62,167
- Entiat 12,739
- Methow 58,552
- Okanogan 17,570
- Total 151,028

Recent ten-year (1987-96) average seeding levels estimated for the region indicate potential wild smolt production at 109.5% of the modeled production capacities (MCMCP 1997):

- Wenatchee 73,371
- Entiat 10,728
- Methow 65,586
- Okanogan 15,660
- Total 165,345

Provide the most recent 12 year (e.g. 1988-present) annual spawning abundance estimates, or any other abundance information. Indicate source of these data.

UCR Steelhead:

Table 6. Upper Columbia River steelhead run composition at Wells Dam (Methow and Okanogan basins) (Letter from Kirk Truscott, WDFW, July 9, 2003).

	Artificially Propagated		Naturally Produced		
Year	Number	Percent	Number	Percent	Total Run
1998	2,849	92%	234	8%	3,083
1999	3,511	89%	447	11%	3,958
2000	6,142	92%	541	8%	6,683
2001	18,034	95%	889	5%	18,923
2002	9,098	93%	706	7%	9,804

Wenatchee and Entiat Rivers

Between 1967 and 2003, an average of 761 naturally produced steelhead spawned in the Wenatchee River (range; 70-2,864). In the Entiat River, spawning escapement has ranged from 9 to 366, averaging 97 fish. The 12-year geometric mean of spawners in the Wenatchee River has ranged from 185 to 919, and is currently (2003) 716 (Table 8). For the Entiat River, the 12-year geometric mean has ranged from 24 to 118 and is currently 92. The returning number of fish to both tributaries is auto-correlated since they were derived from the same aggregate. Therefore, the return per spawner is reported for both populations combined. In the Wenatchee and Entiat rivers, the return per spawner has averaged 1.42 (range; 0.13-4.73) if hatchery fish produce the equivalent number of returning spawners as naturally produced fish, and averages 0.28 (range; 0.05-0.79) if hatchery fish do not produce any returning spawners. The 12-year geometric mean of the return per spawner has averaged 1.22 (range 0.71-1.96) if hatchery fish are equivalents to naturally produced fish, or 0.26 (0.18-0.32) if they do not contribute (Table 7).

Table 7. Summary statistics for determining naturally produced (NP) steelhead escapement and run reconstruction for the Wenatchee and Entiat Rivers

	Stlhd. Passed	% NP	NP Escapement		NP escpmt.		GEO-M NP escpmt.		Returns		Return per spawner for Wenatchee and Entiat			
				> harvest & presp.									GEO-M	GEO-M
	(RI-WLS)	Wen., Ent.	<hrvst.	mortality	Wen.	Ent.	Wen.	Ent.	Wen.	Ent.	H. eff. = 0	effect. = 1	H. eff. = 0	H. eff. = 1
1984	8,464	0.17	1463	919	683	87	220	28	1883	241	2.76	0.43	1.96	0.32
1985	12,132	0.21	2515	1859	1382	177	257	33	1406	180	1.02	0.19	1.91	0.32
1986	9,582	0.21	1967	1770	1315	168	323	41	1011	129	0.77	0.20	1.66	0.30
1987	7,239	0.41	2980	2682	1993	255	416	53	723	92	0.36	0.16	1.40	0.28
1988	4,840	0.33	1588	1430	1062	136	482	62	1125	144	1.06	0.36	1.37	0.29
1989	4,751	0.53	2507	2256	1676	214	538	69	536	69	0.32	0.18	1.31	0.30
1990	3,131	0.28	888	800	594	76	604	77	524	67	0.88	0.26	1.22	0.29
1991	3,176	0.49	1550	1395	1036	133	669	86	432	55	0.42	0.26	1.08	0.29
1992	5,451	0.23	1241	1117	830	106	761	97	485	62	0.58	0.15	0.90	0.25
1993	2,335	0.32	759	683	507	65	784	100	437	56	0.86	0.28	0.81	0.23
1994	3,457	0.20	704	634	471	60	919	118	301	39	0.64	0.13	0.79	0.22
1995	3,233	0.31	1006	906	673	86	919	117	369	47	0.55	0.18	0.71	0.22
1996	3,177	0.19	588	529	393	50	877	112	1111	142	2.82	0.56	0.71	0.22
1997	3,619	0.17	614	552	410	52	793	101	1941	248	4.73	0.74	0.81	0.25
1998	1,979	0.21	408	367	273	35	696	89						
1999	2,765	0.24	663	597	443	57	614	78						
2000	4,236	0.42	1789	1610	1196	153	620	79						
2001	10,084	0.42	4284	3855	2864	366	648	83						
2002	5,817	0.33	1931	1738	1291	165	691	88						
2003	17,481	0.28	2375	2137	1588	203	716	92						
Avg.:	**4,825**	**0.29**	**1,352**	**1,024**	**761**	**97**	**534**	**68**	**643**	**82**	**1.42**	**0.28**	**1.22**	**0.26**
Min.:	**1,305**	**0.14**	**196**	**94**	**70**	**9**	**185**	**24**	**110**	**14**	**0.13**	**0.05**	**0.71**	**0.18**
Max.:	**17,481**	**0.80**	**4,284**	**3,855**	**2,864**	**366**	**919**	**118**	**1,941**	**248**	**4.73**	**0.79**	**1.96**	**0.32**

RI-WLS Rock Island dam to Wells Dam; Wen = Wenatchee, Ent = Entiat; Stlhd = Steelhead; hrvst = harvest; escpmt = escapement; Geo-M = Geometric mean; H. eff = Hatchery Effective

Data from the Upper Columbia Salmon Recovery Plan June 2005 Draft.

UCR Spring Chinook

Table 8. Estimates of the number of natural-origin spring chinook returning to subbasins for each independent population of Upper Columbia River spring chinook salmon and preliminary Interim Recovery Abundance and Cautionary levels.

Year	Subbasin		
	Wenatchee River	Entiat River	Methow River
1979	1,154	241	554
1980	1,752	337	443
1981	1,740	302	408
1982	1,984	343	453
1983	3,610	296	747
1984	2,550	205	890
1985	4,939	297	1,035
1986	2,908	256	778
1987	2,003	120	1,497
1988	1,832	156	1,455
1989	1,503	54	1,217
1990	1,043	223	1,194
1991	604	62	586
1992	1,206	88	1,719
1993	1,127	265	1,496
1994	308	74	331
1995	50	6	33
1996	201	28	126
1997	422	69	247
1998	218	52	125
1999[1]	119	64	73
2000	*1,295*	*180*	*811*
1996-2000 average	451	79	276
Recovery Abundance	**3,750**	**500**	**2,000**
Cautionary Abundance	**1,200**	**150**	**750**

[1] Estimates for 1999 are preliminary; estimates for 2000 (italics) are based on the preseason forecast (actual return data not available 10/17/00).

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

UCR Steelhead:

See Table 6.

UCR Spring chinook:

Table 9. Annual total redd counts and proportion of artificially propagated to natural origin spring chinook salmon by tributary basin (Andrew Murdoch, WDFW, pers. comm.).

	Return Year								
Basin	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Redd Count									
Wenatchee Basin [a]									
Chiwawa River	82	13	23	82	39	34	128	1,046	
Nason Creek	27	7	33	55	29	8	100	367	
White River	3	2	12	15	5	1	8	93	
Entiat Basin	34	13	20	37	24	27	73	202	112
Methow Basin									
Twisp River	32	4	0	32	0	7	99	370	109
Chewuch River	27	2	0	55	0	6	20	1,037	301
Methow River	64	9	0	56	0	17	232	2,828	722
Proportion of Hatchery to Natural Origin Spawners [b]									
Wenatchee Basin [a]									
Chiwawa River	0.40	0.05	0.43	0.70	0.56	0.33	0.56	0.74	
Nason Creek	0.23	0	0.33	0.63	0.19	0	0.24	0.61	
White River	0	0	0	0	0	0	0	0.21	
Entiat Basin [c]	0	0	0.20	??	0	0	0.58	0.25	0.18
Methow Basin									
Twisp River	0	0	0	0.25	0	0.64	0.96	0.33	027
Chewuch River	0.29	0	0	0.33	0	0.64	0.42	0.64	087
Methow River	.014	0	0	0.37	0	0.39	0.91	0.95	0.95

[a] *Areas upstream of Tumwater Dam*

[b] *Based on coded-wire tag recoveries*

[c] *Minimum values, some carcasses were of unknown origin*

Activities approved through Section 10 Incidental Take Permit 1347 authorizes the WDFW, the Chelan PUD, the Douglas PUD annual incidental take of adult and juvenile, endangered, naturally produced and artificially propagated, UCR spring chinook salmon and UCR steelhead of ESA-listed species associated with the implementation of non-ESA-listed salmon artificial propagation programs in the UCR region. The programs are intended to supplement naturally spawned unlisted summer chinook salmon, fall chinook salmon, and sockeye salmon (*O. nerka*) production occurring upstream from the vicinity of Priest Rapids Dam on the mainstem Columbia River, including the mainstem Columbia River and the

Wenatchee, Methow, and Okanogan Rivers and their tributaries.

Unlisted salmon artificial propagation program activities will include:

- The collection of broodstock through trapping operations at: Wells Dam for Methow and Okanogan River summer chinook salmon populations, Wells Hatchery for summer chinook salmon releases from Wells and Turtle Rock hatcheries, Dryden and Tumwater Dams for Wenatchee River summer chinook salmon and Wenatchee sockeye salmon, and Priest Rapids Hatchery for Priest River hatchery-origin fall chinook salmon.
- The holding and artificial spawning of collected adults at Wells, Eastbank, and Priest Rapids Hatcheries, and Lake Wenatchee Net Pens.
- The incubation and propagation from the fertilized egg through the fingerling, pre-smolt or smolt life stage at the Wells, Eastbank, and Priest Rapids Hatchery complex facilities.
- The transfer of summer chinook salmon and sockeye salmon fingerlings or pre-smolts from the hatcheries for rearing at facilities in the Wenatchee, Methow, and Okanogan Rivers' watersheds, and to net-pens in Lake Wenatchee.
- The release of summer chinook salmon, fall chinook salmon, and sockeye salmon smolts into the Wenatchee, Methow, and Okanogan Rivers' basins, and into the mainstem Columbia River from the hatcheries, acclimation ponds, and net-pens on those systems.
- The monitoring and evaluation of these artificial propagation programs in the natural environment through activities such as redd counts and carcass surveys, and formal monitoring and evaluation plans to be developed by the HCP Hatchery Committees as called for in the HCPs.

Trapping Operations: The collection of summer chinook broodstock occurs at: Wells Dam for Methow and Okanogan River summer chinook salmon populations, Wells Hatchery for summer chinook salmon releases from Wells and Turtle Rock hatcheries, Dryden and Tumwater Dams for Wenatchee River summer chinook salmon and Wenatchee sockeye salmon, and Priest Rapids Hatchery for Priest River hatchery-origin fall chinook salmon. As run-of-the-river operations, the three summer chinook broodstock trapping programs may lead to the direct take of co-migrating listed species, including Upper Columbia River ESU steelhead, Upper Columbia River ESU spring chinook, and Columbia River population segment bull trout. Direct takes of these listed species at these traps are authorized through Section 10 direct take permits #1395 (steelhead) and # 1395 (spring chinook), and under a Section 6 cooperative management agreement with the USFWS (bull trout). Risk aversion measures associated with the trapping operations are detailed in WDFW permit applications for these authorizations and within the permits themselves. No other portions of the summer chinook program are expected to lead to the direct take of listed fish. The Wells Dam left and right bank ladder traps, and the Wells Hatchery trap, operate from early May through November to collect spring chinook, summer chinook, and steelhead broodstock. Water loss is not considered a risk factor for fish held in the traps, as the ladders are supplied with water passing through Wells Dam. The Dryden Dam traps will be in operation 7 days per week from July 1 through mid-November each year for summer chinook broodstock collection. Water loss is not a potential risk factor, as the ladders where the fish are trapped are supplied directly by the Wenatchee River at the head of Dryden Dam. The Tumwater Trap will be operated three days per week from early June through mid-November each year. The trap will be in active operation 16 hours per day during the three days per week that it will be open. Downstream migrating fish can pass the trapping operation freely. Frequent monitoring and operation of the trap minimizes the risk of fish loss. Water loss is not a potential risk factor, as the ladder where the fish are trapped is supplied directly by the Wenatchee River at the head of Tumwater Dam.

Genetic and Ecological Effects on Natural Populations: The genetic risks to naturally produced populations from artificial propagation include reduction in the genetic variability (diversity) among and within populations, genetic drift, selection, and domestication which can contribute to a loss of fitness for the natural populations (Hard *et al.*1992; Cuenco *et al.* 1993; NRC 1996; and Waples 1996). Disease interactions between hatchery fish and listed fish in the natural environment may be a source of pathogen transmission. Because the pathogens responsible for diseases are present in both hatchery and natural-origin populations, there is some uncertainty associated with determining the extent of disease transmission from hatchery fish (Williams and Amend 1976; Håstein and Lindstad 1991). To address concerns of potential disease transmission from hatchery to natural fish, the Pacific Northwest Fish Health Protection Committee (PNFHPC) has established guidelines to ensure hatchery fish are released in good condition, thus minimizing impacts to natural fish (PNFHPC 1989). Also, the IHOT (1995) developed detailed hatchery practices and operations designed to prevent the introduction and/or spread of any fish diseases with the Columbia River Basin. Direct competition for food and space between hatchery and listed fish may occur in spawning and/or rearing areas, the migration corridor, and ocean habitat. These impacts are assumed to be greatest in the spawning and nursery areas and at points of highest fish density (release areas) and to diminish as hatchery smolts disperse (USFWS 1994). Competition for space and cover in the Methow and Ojkanogan River probably occurs between hatchery and natural fish shortly after release and during downstream migration, but based on the smolt travel times the duration of interaction is minimal in the river (WDFW 1998a). Rearing and release strategies at all WDFW salmon and steelhead hatcheries are designed to limit adverse ecological interactions through minimizing the duration of interaction between newly liberated hatchery salmon and steelhead and naturally produced fish.

Competition, predation, cannibalism, and residualism:

Direct competition for food and space between hatchery and natural fish may occur in spawning and/or rearing areas, the migration corridor, and in ocean habitat. These impacts are assumed to be greatest in the spawning and nursery areas and at points of highest fish density (release areas) and to diminish as hatchery smolts disperse (USFWS 1994). Competition continues to occur at some unknown, but probably lower, level as smolts move downstream through the migration corridor (NMFS 1995). Release of large numbers of pre-smolts in a small area is believed to have greater potential for competitive effects because of the extended period of interaction between hatchery fish and natural fish. Release of hatchery smolts that are physiologically ready to migrate is expected to minimize competitive interactions as they should quickly migrate out of the spawning and rearing areas. 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 reduces retention time in the streams after release (Bugert et al. 1991). Rearing on parent river water, or acclimation for several weeks to parent river water, also contributes to the smoltification process and reduced retention time in the streams. Adult hatchery fish that stray to natural spawning areas, rather than return to the hatchery, may also be competing for spawning gravel. However, when spawning populations are at depressed levels, the degree of this impact should be small: there is thought to be a relationship between high spawner density and greater egg loss in the natural environment (Chebanov 1991). Stray hatchery adults may also breed with native fish, potentially altering genetic fitness and influencing their ability to survive in the ecosystem . Hatchery fish may prey upon natural fish. Due to their location, size, and time of emergence, newly emerged chinook salmon fry are likely to be the most vulnerable to predation by hatchery released fish. Their vulnerability is believed to be greatest as they emerge and decreases somewhat as they move into shallow, shoreline areas (USFWS 1994). migration out of hatchery release areas and foraging inefficiency of newly released hatchery smolts may minimize the degree of predation on chinook salmon fry (USFWS 1994). Rearing and acclimation pond management strategies in the Mid-Columbia Hatchery Program will be designed to reduce impacts to natural fish. Predation by hatchery fish on natural-origin smolts is less likely to occur than predation on fry. USFWS (1994) presented information indicating salmonid predators are generally thought to prey on fish approximately 1/3 or less their length. Coho salmon and chinook salmon, after entering the marine environment, generally prey upon fish one-half their length or less and consume, on average, fish that is less than one-fifth their length (Brodeur 1991). Consequently, predation by hatchery fish on natural salmon and steelhead smolts in the migration corridor is believed to be low. In general, predation on natural fish may be reduced by using appropriate fish cultural practices. Hatchery fish may prey upon listed fish. Due to their location, size, and time of emergence, newly emerged Chinook salmon fry are likely to be most vulnerable to predation by hatchery released fish. Their vulnerability is believed to be greatest as they emerge and decreases somewhat as they move into shallow, shoreline areas (USFWS 1994). Emigration out of hatchery release areas and foraging inefficiency of newly released hatchery smolts may minimize the degree of predation on Chinook salmon fry (USFWS 1994). Hatchery salmonids that do not emigrate after release are said to have residualized. These fish that residualize can adversely affect naturally produced fish through competition and predation. Chinook salmon though, do not tend to residualize (Groot and Margolis 1991).

Monitoring:

Associated monitoring Activities:

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).

Hatchery activities are covered under Incidental take Permit 1347 for unlisted salmon propagation program activities including:

- The collection of broodstock through trapping operations at: Wells Dam for Methow and Okanogan River summer chinook salmon populations, Wells Hatchery for summer chinook salmon releases from Wells and Turtle Rock hatcheries, Dryden and Tumwater Dams for Wenatchee River summer chinook salmon and Wenatchee sockeye salmon, and Priest Rapids Hatchery for Priest River hatchery-origin fall chinook salmon.
- The holding and artificial spawning of collected adults at Wells, Eastbank, and Priest Rapids Hatcheries, and Lake Wenatchee Net Pens.
- The incubation and propagation from the fertilized egg through the fingerling, pre-smolt or smolt life stage at the Wells, Eastbank, and Priest Rapids Hatchery complex facilities.
- The transfer of summer chinook salmon and sockeye salmon fingerlings or pre-smolts from the hatcheries for rearing at facilities in the Wenatchee, Methow, and Okanogan Rivers' watersheds, and to net-pens in Lake Wenatchee.
- The release of summer chinook salmon, fall chinook salmon, and sockeye salmon smolts into the Wenatchee, Methow, and Okanogan Rivers' basins, and into the mainstem Columbia River from the hatcheries, acclimation ponds, and net-pens on those systems.
- The monitoring and evaluation of these artificial propagation programs in the natural environment through activities such as redd counts and carcass surveys, and formal monitoring and evaluation plans to be developed by the HCP Hatchery Committees as called for in the HCPs

Because of the inherent biological attributes of aquatic species, such as salmon and steelhead, the dimensions and variability of the Columbia River system and tributaries, and the operational complexities of hatchery actions, determining precise incidental take levels of ESA-listed species attributable to the hatchery activities is not possible at present. The existence of concurrent WDFW broodstock collection programs for listed steelhead at Wells Dam, Dryden Dam, and Tumwater Dam (previously authorized by NMFS through Section 10 direct take Permit 1395), and for listed spring chinook salmon at Tumwater Dam (previously authorized by NMFS through Section 10 direct take Permit 1196), further complicates the ability to identify incidental take occurring through the unlisted salmon programs. Indirect takes from hatchery releases such as predation and competition is highly uncertain and dependant on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. Estimated annual levels of take or take tables for these activities cannot be submitted with this 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.

Any additional mortality from this operation on a yearly basis would be communicated to WDFW Fish Program staff for additional guidance. For other listed species, if significant numbers of wild salmonids are observed impacted by this operation, then staff would inform the WDFW District Biologist, Fish Health Specialist or Area Habitat Biologist who, along with the Hatchery Complex Manager, would determine an appropriate plan and consult with NOAA Fisheries for adaptive management review and protocol.

Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.
No data available.

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.

The summer chinook production programs are fully consistent with standards and guidelines set forth in the MCMCP's "Mid-Columbia Hatchery Plan" (BAMP 1998). The plan presents hatchery programs that have been jointly developed and, in most cases, agreed to by the parties to the MCMCP, which includes WDFW, NMFS, USFWS, Chelan and Douglas PUDs, and the Tribes.

The summer chinook artificial propagation program is a component of the Mid-Columbia Hatchery Program, a part of an application for a 50-year multi-species Habitat Conservation Plan (HCP) and re-licensing agreement for the PUDs. This plan has two objectives: (1) to help recover natural populations throughout the Mid-Columbia Region so that they can be self-sustaining and harvestable, while maintaining their genetic and ecologic integrity; and (2) to compensate for a 7% mortality rate at each of the five PUD-owned mid-Columbia River mainstem dams (Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids) in a manner that is consistent with the first objective. Through the regional hatchery plan, the summer chinook artificial production program has been integrated with harvest management objectives to provide run size enhancement and fishery benefits. Biological risks to listed species in the Columbia Basin posed by hatchery chinook releases, including predation, competition, and disease transfer, are expected to be minimal.

3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

In 1988, under the authority of U.S. v. Oregon, the states of Washington, Oregon and Idaho, federal fishery agencies, and the treaty tribes agreed to the Columbia River Fish Management Plan (CRFMP), which was a detailed harvest and fish production process. There are no financial encumbrances tied to the process. Rather, the fish production section reflects current production levels for harvest management and recovery purposes, since up to 90% of the Columbia River harvest occurs on artificially produced fish. This Plan expired in 1998, and has had subsequent annual rollover of portions in which agreement has been reached. However, a newly negotiated CRFMP is forthcoming. Hatchery production programs in the upper Columbia sub-basins are included in the management plans created by the fishery co-managers identified in the treaty fishing rights case *United States v Oregon*. The parties to *U.S. v Oregon* include the four Columbia River Treaty Tribes – Yakama Nation, Warm Springs, Umatilla, and Nez Perce tribes, NOAA-Fisheries, U.S. Fish and Wildlife Service, and the states of Oregon, Washington, and Idaho. The Shoshone-Bannock Tribe is admitted as a party for purposes of production and harvest in the upper Snake River only. These parties jointly develop harvest sharing and hatchery management plans that are entered as orders of the court that are binding on the parties. The "relevant co-managers" described in the *U.S. v Orego*n management plans are, for the mid-Columbia sub-basins, the federal parties, Yakama Nation, and Washington Department of Fish and Wildlife.

In April 2002, negotiations on three Habitat Conservation Plans (HCPs) were concluded pursuant to section 10(a)(1)(B) of the ESA; *Anadromous Fish Agreement and Habitat Conservation Plan Wells Hydroelectric Project FERC1 License No. 2149* with Douglas PUD for the operation of Wells Dam (DPUD 2002), and *Anadromous Fish Agreement and Habitat Conservation Plan Rocky Reach Hydroelectric Project FERC License No. 2145* (CPUD 2002a) with Chelan PUD for the operation of Rocky Reach Dam, and *Anadromous Fish Agreement and Habitat Conservation Plan Rock*

Island Hydroelectric Project FERC License No. 943 with Chelan PUD for the operation of Rock Island Dam (CPUD 2002b). Biological Opinions with incidental take statements (ITSs) on the operation of each of the above hydroprojects have been issued consistent with the HCPs (NMFS 2003a, 2003b, 2003c). These HCPs are long term agreements between NMFS, the PUDs, the WDFW, the USFWS, the Colville Tribes, and other stakeholders. They provide the PUDs with some degree of certainty for the long-term operation of these projects and require the PUDs to provide mitigation in the form of a tributary fund for habitat improvement projects, and artificial propagation programs to mitigate for unavoidable loss of natural fish production due to habitat inundation and passage mortality at the projects. The HCPs were developed to protect five species of anadromous salmonids, including endangered UCR steelhead and UCR spring chinook salmon. The HCP agreements restrict the PUDs and NMFS from changing the artificial propagation production level during the period of this permit. The HCPs provide for HCP Hatchery Committees that may adjust the operation or implementation strategy of the programs based on new scientific data, changes in NMFS hatchery policy, or recommendations of the HCP Hatchery Committees.

The supplementation program, and the HGMP describing it, are consistent with the following agreements or plans:

- The Mid-Columbia Mainstem Conservation Plan - Hatchery Plan (BAMP 1998).
- The Rock Island Settlement Agreement (RISA 1989) between Chelan Public Utilities District, their power purchasers, and the joint fishery parties represented by Washington Department of fish and Wildlife and other state and federal fishery agencies and tribes.
- The Wells Settlement Agreement between Douglas PUD, their power purchasers, and the joint fishery parties represented by Washington Department of fish and Wildlife and other state and federal fishery agencies and tribes.
- The Rocky Reach Mitigation Agreement between the joint fishery parties and Chelan PUD, as modified in the late-1980s.

3.3 Relationship to harvest objectives.

In 1988, a provisional plan was established to rebuild and enhance upper Columbia River fish for treaty Indian and non-Indian fisheries. Parties to the agreement include the Confederated Tribes of the Warm Springs Indian Nation; the Confederated Tribes and Bands of the Yakama Indian Nation, the Nez Perce Tribe; the Confederated Tribes of the Umatilla Indian Nation; the Shoshone-Bannock Tribes; the federal government, acting by and through the Secretary of Commerce and his agents, and the Secretary of Interior and his agents; and the states of Oregon, Idaho, and Washington. This agreement was established pursuant to a settlement in the *U.S. vs. Oregon* litigation (CRFMP 1987). As part of the settlement agreement, the parties jointly developed, and the federal court adopted, the Columbia River Fish Management Plan (CRFMP) to guide harvest and production management. Among other things, the plan specified harvest guidelines, escapement goals, and production actions for populations of salmon that are produced above Bonneville Dam, including those that enter the Mid-Columbia Region. The CRFMP provided for management goals of 115,000 spring chinook salmon at Bonneville Dam, 65,000 sockeye salmon at Priest Rapids Dam, and 40,000 fall chinook salmon at McNary Dam. The parties subsequently have agreed on a provisional management goal of 80,000 summer chinook salmon at Bonneville Dam. In addition, the parties agreed to restrict fishery impacts on wild steelhead when Bonneville run sizes are less than 75,500 wild adults. The agreement also established a Production Advisory Committee (PAC) to oversee implementation of the production actions called for in the CRFMP and to coordinate annual production planning for state and federal Columbia River hatcheries. The parties to the CRFMP also agreed to impose voluntary restrictions on harvests in the mainstem Columbia River when upriver runs are less than the Bonneville management goals. Harvest impacts on under escaped runs seldom exceed 5 - 7% to provide for minimal ceremonial and subsistence needs by the tribes and for minor incidental catches in non-treaty fisheries. Commercial fisheries for all salmonid species except fall chinook salmon have been curtailed in recent years; the last commercial harvest of upriver spring chinook salmon occurred in 1977, and the last commercial summer chinook salmon fishery occurred in 1964. Commercial harvest of sockeye salmon have occurred in only six of the past 20 years. Voluntary restriction on harvest impacts to wild steelhead in tribal commercial fall chinook salmon fisheries limit the catch to 15% of the A wild run and 32% of the B wild run, which has resulted in early closures of those fisheries in some years. These fishery restrictions were intended to complement other measures by the parties to increase the production of salmonids in upriver tributaries. Clearly however, some upriver runs have not recovered despite sharp reductions in fishing mortality. Under the CRFMP, specific goals for artificial propagation were established for the Mid-Columbia Region--these goals may then be adjusted annually by agreement of the *U.S. v Oregon* parties. At this time, Priest Rapids FH, Rocky Reach FH, Wells FH, and the GCFMP Complex (Leavenworth FH, Entiat FH, and Winthrop FH) produce salmon and steelhead to assist in meeting these escapement objectives (although all production in the region is incorporated into the escapement calculations). The presence of additional hatchery fish in the aggregate run of salmon passing through ocean and inriver fisheries downstream of McNary Dam could lead to increased harvest rates on species listed under the ESA. Harvest management implications of additional hatchery production, whether for recovery purposes or for mitigation, are evaluated by the parties to *U.S. v. Oregon* to ensure that harvest management decisions are consistent with rebuilding listed and other Columbia Basin populations.

Through the regional hatchery plan, the summer chinook artificial production program has been integrated with harvest management objectives to provide run size enhancement and fishery benefits. Biological risks to listed species in the Columbia Basin posed by hatchery chinook releases, including predation, competition, and disease transfer, are expected to be minimal.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

The fisheries benefiting from this program will include:
1) Ocean recreational and commercial fisheries from the mouth of the Columbia River north to S.E. Alaska
2) Columbia River Zone 1-5 commercial fishery
3) Columbia River Zone 1-6 recreational fishery
4) Columbia River Zone 6 tribal C&S and commercial fisheries
5) Mid-Columbia River recreational fisheries
6) Upper Columbia and Okanogan rivers Colville Tribal C&S fisheries
7) Upper Columbia and Okanogan rivers recreational fisheries

Early-arriving summer/fall Chinook from the mid-Columbia region have been heavily exploited in ocean fisheries, but only incidentally harvested in the lower Columbia River. The Colville Tribes have targeted summer/fall Chinook in their Chief Joseph Dam tailrace fishery, harvesting an average of 650 adults annually (1980-2003). The 1982-89 brood year average ocean fisheries exploitation rate was 39%, with the total exploitation rate of 68% estimated for the same years (Brown 2001). Future in-river harvest rates for the summer/fall Chinook arising from this program are likely to be based on management guidelines developed through the U.S. v Oregon management process. For those summer/fall Chinook migrating through the lower river in the early to mid summer months, their harvest will be subject to the April 2001 agreement, "Interim Management Agreement for Upriver Spring Chinook, Summer Chinook and Sockeye" which provides that non-Indian Columbia River harvest is not to exceed 1% of the run as estimated at the mouth of the Columbia River. For the four treaty tribes, harvest impacts are not to exceed 5% of the run. For those summer/fall Chinook migrating through the lower river in late summer and fall, their harvest will be subject to the August 2001 agreement, "2001 Management Agreement for Upper Columbia

River Fall Chinook, Steelhead, and Coho" which provides that the harvest rate of upper Columbia River fall Chinook is not to exceed 31.29%, with 8.25% of the harvest rate allocated to state managed fisheries and 23.04% allocated to the 4 Columbia River Treaty Tribes. These fisheries are managed for a 43,500 escapement of both hatchery origin and natural-origin fish at McNary Dam. Escapement into mid-Columbia River tributaries "…is not a management constraint for 2001 fisheries."

Wells Fingerling Summer CK Fisheries Contributions												
			Proportion (%) of Total Catch									
Brood Year	**Program Release #**	**# of Fish Program Contributed to Fisheries**	**AK and Can. Commercial**	**OR, WA, WA treaty Troll**	**Col. R. Gillnet**	**NMFS Ground-Fish**	**AK and Can. Ocean Sport**	**WA Ocean Sport***	**Freshwater Sport****	**Treaty C &S**	**Misc. Fishery Contribution (<1%)**	
1994	491,735	14	47.9	0.0	0.0	0.0	0.0	0.0	0.0	52.1	0.0	
1995	500,000	99	56.6	25.3	6.1	0.0	10.4	0.0	1.7	0.0	0.0	
1996	575,411	412	74.4	4.9	0.0	1.5	13.9	1.5	2.4	1.0	0.4	
1997	541,923	166	56.3	15.6	5.2	0.0	5.7	0.0	17.2	0.0	0.0	
1998	370,617	301	69.4	9.1	2.3	0.0	8.7	1.1	7.9	1.4	0.1	
1999	363,600	390	57.3	19.7	7.7	0.0	4.8	3.5	5.3	0.0	1.8	
Average	473,881	230	60.3	12.4	3.6	0.3	7.3	1.0	5.8	9.1	0.4	
*** Contains WA Buoy 10 fisheries. ** Combined WA and OR Columbia River and Col. R. Tributaries.**												

Source: WDFW and RMIS

Wells Yearling Summer CK Fisheries Contributions												
			Proportion (%) of Total Catch									
Brood Year	**Program Release #**	**# Of Fish Program Contributed to Fisheries**	**AK and Can. Commercial**	**OR, WA, WA treaty Troll**	**Col. R. Gillnet**	**NMFS Ground-Fish**	**AK and Can. Ocean Sport**	**WA Ocean Sport***	**OR Ocean Sport**	**Fresh-water Sport****	**Treaty C&S**	**Misc. Fishery Contribution (<1%)**
1993	388,248	786	76.9	5.9	1.8	0.0	6.8	0.0	0.0	2.3	6.4	0.0
1994	365,000	47	66.2	0.0	0.0	0.0	13.2	0.0	0.0	0.0	20.6	0.0
1995	290,000	544	47.5	14.1	4.2	2.4	21.8	0.0	0.0	8.2	0.9	0.9
1996	348,559	820	62.0	10.2	0.0	1.0	19.9	1.4	0.0	3.9	0.0	1.6
1997	381,687	8,074	61.2	19.2	2.0	0.0	9.0	3.2	1.4	4.0	0.0	0.1
1998	457,770	8,969	68.5	10.8	2.7	0.0	8.7	3.1	1.1	3.9	0.0	1.3
1999	312,098	1,148	52.0	19.3	7.9	0.0	8.0	2.3	1.0	7.7	0.0	1.8
Average	363,337	2,913	62.0	11.4	2.7	0.5	12.5	1.4	0.5	4.3	4.0	0.7
*** Contains WA Buoy 10 fisheries. ** Combined WA and OR Columbia River and Col. R. Tributaries.**												

Source: WDFW and RMIS

3.4 Relationship to habitat protection and recovery strategies.

Summer chinook salmon in the mid-Columbia Region are among the most electrophoretically homogenous populations in the state (BAMP 1998). The diversity of habitat they use however, is quite high. One goal of the summer chinook hatchery programs is to develop local adaptation to streams in the Mid-Columbia Region. Production methods are implemented that encourage local adaptation to the various habitats within the region while minimizing negative effects on natural fish populations. One goal of the Mid-Columbia Habitat Program is to protect and restore critical habitats for salmon and steelhead within the Mid-Columbia Region (Bugert et al. 1997). The Mid-Columbia Hatchery Program? (BAMP 1998) on which the summer chinook release programs are based will therefore work in concert with that program. The main fresh-water habitat problem presently facing this ESU is presence of hydropower dams in the mainstem Columbia River, which have probably reduced returns of chinook salmon (Chapman et al. 1994). Measures taken by the Mid-Columbia PUDs to improve natural production of anadromous fish in the region will compensate for mortality in project and reservoir passage. Two strategies will be used: (1) habitat protection and restoration, and (2) hatchery production of affected species in the mainstem mid-Columbia River and in the four major tributaries (BAMP 1998).

Habitat protection efforts, combined with production from the summer chinook hatchery programs, are expected to benefit natural summer chinook production over the short-term and long- term. Improvements in dam passage survival rates, and improvements in smolt to adult survival rates afforded by the summer chinook programs will be used to boost the upper river adult population to a level approaching 18,000 fish at Priest Rapids Dam and approaching 8,000 at Rocky Reach Dam (BAMP 1998).

3.5 Ecological interactions.

Salmonid and non-salmonid fishes or other species that could:

(1) negatively impact program;
Summer chinook smolts are released in the spring as either yearlings or sub-yearlings. Competition for food may play a role in the mortality of liberated summer chinook. SIWG (1984) indicated that there is a high risk that competition between hatchery-origin chinook, and coho, steelhead and other chinook stocks, will have a negative impact on the productivity of the hatchery fish. Predation in freshwater areas also may limit the productivity of the summer chinook releases. In particular, predation by northern pike minnow poses a high risk of significant negative impact on productivity of enhanced chinook (SIWG 1984). Predation risks to hatchery chinook juveniles posed by coho, steelhead, and other chinook stocks are unknown (SIWG 1984). Hatchery-reared salmon and steelhead released into spawning and rearing areas of natural species may fail to emigrate (residualize), and may negatively interact with natural fish. Steelhead residualism has been found to vary greatly, but is thought to average between 5% and 10% of the number of fish released (USFWS 1994). Because of their larger size, the predation risk posed by the above species is lower to yearling smolts released from the hatcheries (Rieman et al. 1991).

(2) be negatively impacted by program;
SIWG (1984) reported that there is a high risk that enhanced chinook salmon populations would negatively affect the productivity of wild chum and sockeye in freshwater and during early marine residence through predation. The risk of negative effects to wild fish posed by hatchery chinook through competition is low or unknown in freshwater and marine areas (SIWG 1984). Large concentrations of migrating hatchery fish may attract predators (birds, fish, and seals) and consequently contribute indirectly to predation of listed wild fish (Steward and Bjornn 1990). The presence of large numbers of hatchery fish may also alter wild salmonid behavioral patterns, potentially influencing their vulnerability and susceptibility to predation.

(3) positively impact program;
Increased numbers of chinook and other salmonid species that escape to spawn in upper Columbia River tributaries may contribute nutrients to the system upon dying that would benefit summer chinook productivity.

(4) be positively impacted by program.
Summer chinook juveniles released through the WDFW programs may benefit co-occurring salmonid populations. A mass of hatchery fish migrating through an area may overwhelm established predator populations, providing a beneficial, protective effect to co-occurring wild fish. Increased numbers of hatchery-origin summer chinook that are allowed to spawn naturally may contribute nutrients to the system upon dying that would benefit the productivity of other salmonid species.

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.

15 groundwater wells provide incubation and rearing of the program through the summer months. The wells deliver approximately 500- 1000 gpm each of water at approximately 50ºF. The sub-yearling program is reared entirely on well water with fish being released by early summer. The remaining production needs to remain on well water as warming Columbia River waters can lead to disease problems. Yearlings can be switched from well water in mid-November to river water when the Columbia River cools to the low-50ºF range before the switch is made.

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.

Adverse impacts on listed fish due to the operation of hatchery facilities for the propagation of unlisted species may occur because of river water intake placement, or design, or operation including blocked migration, de-watering river reaches or reduced stream flow, and entrainment from unscreened or improperly screened intakes. Effluent from hatchery facilities may decrease quality through changes in water temperature, pH, suspended solids, ammonia, organic nitrogen, total phosphorus, and chemical oxygen demand in the receiving streams mixing zone (Kendra 1991). Water withdrawal for use in hatcheries is monitored through the Washington State Department of Ecology and the Washington State chapter 90.03 Revised Code of Washington (RCW) water code. None of the hatchery facilities employed to carry out the proposed artificial propagation programs de-water river reaches used by listed fish for migration, spawning, or rearing.

In the mainstem Columbia River, Eastbank Hatchery does not use any surface water, so no intake structures are associated with these operations, and no intake screening that may lead to listed juvenile fish injury through entrainment exists. Juvenile fish screening for the water intake systems at Wells Hatchery and Priest Rapids Hatchery are not in compliance with NMFS screening criteria (NMFS 1996). The facilities were built prior to the establishment of NMFS criteria. Douglas PUD is committed to be in compliance by November 2005 (Shane Bickford, pers. com., October 1, 2003). Routine intake screen inspections and upgrading to current screening criteria when existing screens fail are conditions which will be included in permit 1347. Without these conditions, water intakes for the hatchery may adversely affect listed spring chinook and steelhead juveniles through entrainment. Application of the conditions to the operation of these hatcheries through this Opinion will help ensure that the effects of the hatchery intakes on listed fish are adequately minimized.

The applicants propose to operate and monitor their programs in compliance with applicable NPDES permit effluent discharge limitations. Each permit contains limits concerning discharge, monitoring and reporting requirements, and other provisions to ensure that the discharge does not hurt water quality or people's health. In essence, the permit translates general requirements of the Clean Water Act into specific provisions tailored to the specific hatchery facility operations and the discharge of pollutants. Although the actual level of impact of hatchery effluent discharge on listed fish survival is unknown, it is presumed to be small and localized at outfall areas, as effluent is diluted downstream. This facility operates under the “Upland Fin-Fish Hatching and Rearing” National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE). WAG 13-5011. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE.

Discharges from the cleaning treatment system are monitored as follows: *Total Suspended Solids (TSS)*C1 to 2 times per month on composite effluent, maximum effluent and influent samples.

*Settleable Solids (SS)*C1 to 2 times per week on effluent and influent samples. *In-hatchery Water Temperature* - daily maximum and minimum readings.

*Appendix G2 lists design criteria for existing acclimation ponds on terminal area streams in the Mid-Columbia Region. These standards will be used for development of new sites for the Mid-Columbia Hatchery Program. Screening of hatchery intakes is critical to ensure that fish are not permanently removed from the stream. During Phase A all new hatchery intakes in the Mid-Columbia Hatchery Program will meet or exceed screening criteria established by WDFW. All facilities in the proposed Mid-Columbia Hatchery Program discharge hatchery effluent directly into the Columbia River or its tributaries. The existing facilities meet or exceed NPDES requirements, and dilution factors downstream of discharge points will have no affect on habitat quality affecting natural species. Total discharge for the facilities are: Wells FH - 83 cfs; Eastbank FH- 53 cfs; Rocky Reach- 35 cfs; Priest Rapids- 117 cfs. The targeted Columbia River discharge at Priest Rapids Dam during juvenile outmigration is 140 kcfs.

Potential adverse impacts from the physical operation of hatchery facilities include impacts from water withdrawal and release of hatchery effluent. Water withdrawal for hatcheries located within the spawning and/or rearing areas can diminish stream flow from points of intake to outflow and, if great enough, can impede migration and affect spawning behavior. Appendix G2 lists design criteria for existing acclimation ponds on terminal area streams in the Mid-Columbia Region. These standards will be used for development of new sites for the Mid-Columbia Hatchery Program. Screening of hatchery intakes is critical to ensure that fish are not permanently removed from the stream. During Phase A all new hatchery intakes in the Mid-Columbia Hatchery Program will meet or exceed screening criteria established by WDFW. All facilities in the proposed Mid-Columbia Hatchery Program discharge hatchery effluent directly into the Columbia River or its tributaries. The existing facilities meet or exceed NPDES requirements, and dilution factors downstream of discharge points will have no affect on habitat quality affecting natural species. Total discharge for the facilities are: Wells FH - 83 cfs; Eastbank FH- 53 cfs; Rocky Reach- 35 cfs; Priest Rapids- 117 cfs. The targeted Columbia River discharge at Priest Rapids Dam during juvenile outmigration is 140 kcfs. At McNary Dam the targeted discharge is 200 kcfs during the outmigration period (NMFS 1994). Hatchery effluent is greatly diluted and will have little if any affect on outmigrating natural species. Appendix H lists methods for monitoring and controlling discharge from Mid-Columbia hatcheries.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Channel Pond- Lower 15 at Wells Hatchery	12232	139	19	4	1850
1	Channel Pond- Upper 15 at Wells Hatchery	16500	200	19	3.9	1850

Fish trapped the west side ladder ascend a 12ft Denil fish ladder into a 12ft x 12ft x 8ft deep holding tank. Captured fish can then be directed from the holding tank over a false weir leading to a V shaped chute, which funnels the fish into an underground pipe leading to the Lower 15 Channel Pond.

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

No transportation equipment required for fish hauling since all program activities (broodstock acquisition and smolt release) occur on-station. A 1300 gallon tanker truck is available for other programs and on station movements of various stocks.

5.3 Broodstock holding and spawning facilities.

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Channel Pond- Lower 15 at Wells Hatchery	12,232	139	19	4	1,850
1	Channel Pond- Upper 15 at Wells Hatchery	16,500	200	19	3.9	1,850

Fish trapped for this program enter Wells hatchery via a ladder separate from the Wells Dam west side and east side ladder systems. Captured fish can then be sorted by species and numbers either back to the river or to the Lower 15 Channel Pond. After all the adults are collected, they are moved to Upper 15 Channel Pond, where broodstock are held for spawning.

5.4 Incubation facilities.

Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
Heath Stacked Tray (75 half stack units with 8 trays per 1/2 Stack	75	3.5	-	6000	8000

A loading of 1 female eggs per Heath Tray during green to eyed stage. After pathology discrimination, females lots are combined at ~1.5 females per tray from eyed to hatch stage.

5.5 Rearing facilities.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
10	Raceways	2338	89.2	9.8	2.7	450	0.79	0.15
1	Earthen Pond	176000	440	100	4.0	2500	1.8	0.04
3	Channel Pond	22000	250	19	4.0	2500	1.2	0.08

5.6 Acclimation/release facilities.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
1	Earthen Pond	176000	440	100	4.0	2500	1.8	0.04
3	Channel Pond	22000	250	19	4.0	2500	1.2	0.08

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

In November 2002, ~50 percent of the BY 2001 summer chinook were loss due to ichthyophthirius outbreak.

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.

Potential adverse impacts identified with the physical operation of hatchery facilities include impacts from water withdrawal, release of hatchery effluent and facilities failure (NMFS 1999a). Hatchery effluent may transport pathogens (disease) out of the hatchery and infect natural-origin fish. Aside from the potential impacts on water flow and quality, operational failures due to power/water loss, flooding, freezing, vandalism, predation and disease may result in catastrophic losses to rearing adults and juveniles.

Flow reductions, flooding and poor fish culture practices may all cause hatchery facility failure or the catastrophic loss of listed fish under propagation. To protect fish, all efforts should be made to ensure that the survival of fish held for broodstock at the hatchery facility be maximized. The applicants propose a variety of measures to address risks associated with operational failures, including:

- Protection of fish from vandalism and predation is provided by fencing, locks, and security lights at all hatchery facilities;
- Rapid response in the event of power and water loss or freezing is provided by a combination of staffing and automated alarm paging systems; (Douglas PUD provides 24/7 security of the Wells Hatchery).
- Equipping hatchery facilities to ensure reliable power to provide water to rearing fish during power outages. Wells Hatchery has redundant-independent water supplies (pumped well water, gravity surface water, re-used water) that is available. If well water supply/pumps go down, gravity river water would be available.

Section 6. Broodstock Origin and Identity

6.1 Source.

Wells Hatchery - 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 (Chapman et al. 1994). With the exception of undetected strays from other areas that may have contributed to the Wells broodstock collections, and the potential incorporation in some years (1967-86) of fall-run chinook, all broodstock for the Wells Hatchery program came from local Columbia River summer chinook stock (Chapman et al. 1994). Since founding the Wells summer chinook program from trapped Methow/Okanogan natural fish, there has been a transition to the use of mixed natural and hatchery-origin volunteer broodstocks at Wells Hatchery for the Wells and Rocky Reach mitigation programs.

Methow and Okanogan basin origin summer chinook were the major populations intercepted at Wells Dam, and supplying broodstock for the program. This section provides guidelines for collection of summer chinook broodstock from the east fishway at Wells Dam and for volunteers to Wells FH. Guidelines are based upon natural escapement goals for the Methow and Okanogan/Similkameen drainages, and broodstock requirements of summer chinook for the Wells, Eastbank, and Rocky Reach fish hatcheries. An action plan has been developed to adjust collection of broodstock from the trap to account for shifts in run timing or the potential for low escapement of natural spawners.

Chinook salmon broodstock for Wells FH has routinely been collected primarily from volunteers to the hatchery, and secondarily from the fishways at Wells Dam. Trap operation on the west fishway posed some difficulties however, for maintenance of stock integrity for the hatchery. Most (80%) of the summer chinook adults passing Wells Dam enter the east fishway, making broodstock collection on the west fishway time consuming. Trap operations often had to continue well into late September to collect adequate broodstock. This caused problems with potential collection and spawning of fall chinook salmon (notably Priest Rapids stock) in the Wells FH production. The presence of Priest Rapids hatchery fish in the Wells FH broodstock was verified through coded-wire tag recoveries. In 1991, a trap was built on the east fishway at Wells Dam. Summer chinook salmon are collected for broodstock at this site (primarily for the Similkameen and Carlton acclimation ponds operated by Eastbank FH, and secondarily for Wells FH). Broodstock collection has become more expedient as a result. Trap operations terminate on 28 August, which virtually eliminated all known fall chinook salmon from the Wells broodstock, as determined by subsequent coded-wire tag analyses (LaVoy 1992, 1993). In 1991 and 1992, fish were trapped on the east and west fishways; since then, only the east fishway trap was used. Prior to 1991, fish were collected on the west fishway only. Sufficient escapement past Wells Dam is required for the Methow, Similkameen, and Okanogan Rivers. These streams are managed on a natural stock basis (NPPC 1991). The long-term escapement goals of the Integrated System Plan is to achieve Maximum Sustainable Yield; desired escapement past Wells Dam is 1,503 summer chinook for the Methow Sub-basin, and 6,043 summer chinook for the Okanogan/ Similkameen Sub-basin. Broodstock collection at Wells Dam is managed to balance the needs of hatcheries and natural escapement goals.

Since inception of Wells FH in 1967, less than 25% of the summer chinook salmon run (adults and jacks) to Wells Dam were collected for broodstock, both as volunteers and on the west fishway. In some years however, collections included egg-take needs for Entiat and Winthrop National Fish Hatcheries. Most fish used for production are from voluntary returns to the hatchery. From 1985 to 1993, 77% of the summer chinook used at Wells FH were volunteers, although egg-take goals were not met in 1987, 1992, and 1993. LaVoy (1993) estimated that 9% of the adult summer chinook migrating through Wells Dam in 1992 were intercepted for broodstock. The production objectives for Wells FH are to release 484,000 sub-yearlings in June at 20 fish per pound (fpp), and 320,000 yearlings in April at 10 fpp. To meet these goals, an egg-take of 1 million is required. The production objectives for Eastbank FH include 400,000 yearlings for release from Carlton in April and May at 10 fpp, and 576,000 yearlings for release from Similkameen in April at 10 fpp. To meet these objectives, an eggtake of 1.2 million is required. These values are based upon 85% sub-yearling and 80% yearling egg-to-smolt survival rates. The average pre-spawning mortality at Wells FH is 12%, average male:female ratio is 1:1, and average fecundity is 4,900 eggs/female. If one million eggs are needed for Wells FH production, 457 adults need to be collected from Wells Dam and Wells FH ladder combined. For Eastbank FH production, 594 adults need to be taken from Wells Dam. If 77% of the summers required for Wells FH can be obtained through volunteers, 106 adults (23% of 457) need to be trapped at Wells Dam for complete production. A total of 700 adults therefore, need to be trapped for Eastbank and Wells FH (106 plus 594). Average summer chinook run size to Wells Dam from 1983 to 1993 is 3,477 adults. Conceivably, 20% (700 out of 3,477) of the run would be required for hatchery production. The objective of maximum escapement upstream of Wells Dam must be balanced with the preponderance of volunteers relative to trapped fish. Consecutive record low numbers of summer chinook salmon passed Wells Dam in 1991 (1,776 adults and 270 jacks) and 1992 (1,333 adults and 631 jacks), despite relatively strong returns of volunteers to Wells FH. Trapping was curtailed at the dam both years to increase upstream escapement, yet collections of volunteers to the hatchery continued. The result of this action was to take progeny of Wells FH volunteers for production at Eastbank FH.

6.2.1 History.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Upper Columbia River Summer Chinook	N	1967	1970
Wells Hatchery Summer Chinook (Admixture of Natural and Hatchery)	H/N	1971	Present

Summer chinook broodstock collected for the hatchery programs are the descendants of stock manipulations during the Grand Coulee Fish Maintenance Program and mainstem dam mitigation (Myers et al. 1998). These activities tended to homogenize extant summer chinook populations, and likely resulted in incorporation of fall-run fish into summer chinook runs under propagation. The percentage of non-indigenous stocks incorporated into the hatchery programs has been low (about 3 % of the over 200 million ocean-type chinook propagated since 1941), and does not appear to have had a significant impact on the genetic integrity of the ESU (Chapman et al. 1994; Myers et al. 1998).

Propagation of summer/fall Chinook in the Columbia Cascade Province started with operation of the Wells spawning channel in 1967. Initially, the entire run was propagated. Then in 1987, broodstock collection was terminated after August 28th to avoid including stray fall Chinook from downriver programs. All broodstock came from local Columbia River summer/fall Chinook stock with few exceptions. Broodstock was diverted from ladders at Wells Dam or from volunteers that entered the trap at the hatchery discharge. Only low numbers, about 3%, of non-indigenous stocks have been incorporated into the broodstock over the years. Methow and Okanogan sub-basins were the major populations intercepted at Wells Dam and supplied the broodstock for the programs (Brown 1999). Since 1987, early-arriving summer/fall Chinook broodstock for the Rocky Reach/Turtle Rock program and the Similkameen program have also been obtained from the trap at Wells Dam and consequently have a similar history (Brown 1999). Prior to 1987, summer/fall chinook were trapped from the west fish ladder at Wells Dam and were diverted into Wells Hatchery. Trapping took place from mid-July through early November (S. Bickford, pers comm. 2003).

6.2.2 Annual size.

Annual escapement of summer chinook salmon to Rock Island Dam averaged 15,640 adults and jacks (1983-92 data from Chapman 1994). See also HGMP Section 1.12. Hatchery-origin adults are estimated to have contributed part of the escapement levels to the region, averaging about 6 % of the total escapement for the years 1967-87 (Chapman et al. 1995). An escapement objective to basin tributaries above Wells Dam is 3,500; a level carried forth in the Mid-Columbia Hatchery Plan as a natural escapement goal (BAMP). A baseline adult production objective for the summer chinook salmon population reaching Rocky Reach Dam is 30,293 (BAMP 1998). The current annual program broodstock collection goals for the Eastbank hatchery programs including Wenatchee and Methow/Okanogan summer chinook supplementation programs are 492 and 556, respectively, equally divided by sex. Wells and Turtle Rock programs require another 980 broodstock.

6.2.3 Past and proposed level of natural fish in the broodstock.

Broodstock used in the summer chinook supplementation programs are secured from the run-at large encountered through trapping in the Wenatchee River (at Tumwater and Dryden dams) and the mainstem Columbia River (Wells Dam and Wells Hatchery volunteers). There is currently no protocol in place to select either for or against any particular trait or parental origin in any of the summer chinook broodstock programs except that only Wells volunteers, which are a mix of hatchery and natural fish, are used for the Wells and Rocky Reach/Turtle Rock mitigation programs.

6.2.4 Genetic or ecological differences.

A mainstem stock will be maintained for Wells and Turtle Rock production yet gene flow from this stock to others will be acceptable. Efforts will be made to manage these populations separately, yet it is acknowledged that straying among all populations will occur. These populations will be given strong protection against strays from outside the mid-Columbia Region, but efforts to eliminate strays from within the mid-Columbia will not be a priority. Separation and management of these populations would follow three guidelines.

1. The primary consideration is to achieve a minimum natural escapement of 2,000 adults and jacks past Wells Dam, with an emphasis on meeting the 3,500 escapement level. This goal, by far, takes precedence. The broodstock protocol (to be reviewed yearly), would provide the required direction on means to set, and meet, the yearly goal. If the run size is low in a given year, the hatchery programs will be reduced or eliminated to increase escapement. The order of elimination in hatchery programs is: (1) Wells sub-yearlings, (2) Wells yearlings, (3) the Carlton and Similkameen programs. The trap operations at the east ladder of Wells Dam may be curtailed if needed, to assist in increasing escapement.

2. The next consideration is to ensure that those salmon intercepted from upstream migration contribute solely to upstream production. For example, volunteers at Wells Hatchery may be used for Methow and Okanogan production, but using salmon trapped at the east ladder for Wells or Rocky Reach should be discouraged, as this places upstream-bound adults significantly down-river. This principle is consistent with the first one; in low escapement years, a preponderance of volunteers can supplement the Eastbank Hatchery broodstock, allowing increased natural escapement.

3. Marked stray salmon from programs outside the mid-Columbia would be removed from the hatchery broodstocks, when it appears that the percentage of strays from a given program exceeds 5%. This provisional standard is based upon the NMFS Biological Opinion of system wide hatchery operations in the Columbia River (NMFS 1999), and will be revised when results

from ongoing region-wide analyses of genetic introgression from straying provides more definitive direction.

6.2.5 Reasons for choosing.

Summer chinook salmon propagated through the program represent the indigenous Wenatchee Basin and Methow/Okanogan populations, which are the target of the mitigation programs.

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.

Methow/Okanogan, Wells Hatchery, and Turtle Rock Programs (Broodstock Collection at Wells Dam and Wells Hatchery). Summer chinook salmon broodstock are collected each year from the run at large reaching Wells Dam, located at Rkm 861.0 on the Columbia River during the months of July and August. Broodstock for the Similkameen and Carlton programs are currently trapped in the fish ladders circumventing Wells Dam.

Fish volunteering into Wells FH are used primarily for the Wells and Turtle Rock programs. To prevent inclusion of fall chinook population into the summer chinook gene pool, broodstock collection at both capture sites is curtailed on August 28. Ladder-trapped fish are transported to Eastbank FH where they are held until maturity and spawned. Gametes from fish with CWTs are held separately until the origin of the fish is determined. Only summer chinook salmon are used in these programs.

Measures to reduce sources of bias that could lead to a non-representative sample of the desired Methow/Okanogan basin brood stock sources include trapping all fish randomly from the run at large and throughout the duration of passage to ensure proportional representation of the age and size structure of the returning population. Additional measures employed to reduce the risk of adverse genetic effects to the population is a collection date beginning no earlier than June 28 and ending no later than August 28 to exclude spring-run and fall-run chinook from collections. Hatchery summer chinook volunteering to the hatchery trap can be separated by origin through CWT analysis. This process will allow differentiation between Carlton, Similkameen, and Wells hatchery-origin fish (as well as out-of-basin strays) prior to spawning and maintenance of separate local broodstocks for each production area as necessary.

Adverse effects on the natural summer chinook population, and on listed fish that may be encountered incidentally during trapping, are minimized through the following measures:

- The east ladder (and west ladder) trap(s) will be continuously monitored and operated 3 days per week during the summer chinook migration (June 28 through August 28). The east ladder trap is actively manned during trapping and the west ladder trap is passively operated and checked at least daily, ensuring minimal holding times for fish captured.
- The Wells Hatchery trap does not incorporate a fish weir to guide fish into the hatchery fish ladder. All fish returning to Wells Hatchery recruit to the trap as volunteers. The trapping program is therefore not a run of the river operation, and captures of other species besides summer chinook salmon that were produced at the hatchery are minimal.
- To minimize migration delays to fish other than the targeted species, the fish sorting flume in the west ladder trap will be staffed at all times while the fishway is barricaded for the purpose of guiding fish into the trap.
- Attraction flows from the false weir will be maintained to encourage fish to use the sorting flume.
- The traps will be operated in a manner to reduce retention time in the holding pools above the Denil fishways accessing the trap.
- Fish not required for broodstock will be returned into the fishway as they move through the sorting flumes to continue their upstream migration.

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

Adult summer chinook salmon are to be collected at Wells Dam for use as broodstock. The broodstock collection objective is to remove equal numbers of males and females.

7.2 Collection or sampling design

Wells Hatchery Goals: The annual Wells Hatchery on-station release goals are 320,000 summer chinook salmon yearlings released in April at an average size of 10 fpp and 484,000 accelerated sub-yearlings released in June at an average size of 20 fpp. Summer chinook salmon yearlings and sub-yearlings produced at Wells Hatchery are reared entirely at the hatchery and released directly into the mainstem Columbia River. WDFW proposes to determine annual broodstock collection goals and protocols prior to the arrival of the adults each year to allow for consideration of run size, run composition in terms of sex, age and natural to hatchery components. Broodstock collection protocols are generally as follows:

- Retain summer chinook salmon that volunteer to the Wells Hatchery trap from about July 10 through August 31, or until the summer chinook salmon broodstock collection objective is met, which ever is earliest;
- Retain approximately equal numbers of male and female salmon;
- Adult broodstock collection objectives may vary, but is generally about 1,210 salmon, contingent on HCP Hatchery Committee recommendations for survival studies throughout the middle and upper Columbia River region.

Draft adult broodstock collection protocols such as those outlined below (2003-04) are keyed on target numbers at various collection sites operated by WDFW that provide broodstock for Mid-Columbia PUD mitigation program facilities. Adult broodstock collection protocols are to be considered an interim and dynamic hatchery broodstock collection plan, which may be altered following joint fishery party (JFP) discussions. As such, there may be significant in-season changes in broodstock numbers, locations, or collection times, brought about through continuing co-manager consultation and in-season monitoring of the anadromous fish runs to the Columbia River above Priest Rapids Dam.

Wells Hatchery summer chinook programs and assumptions:

Wells program	320,000 yearling smolts
	484,000 sub yearlings
Lake Chelan program	100,000 green eggs
Rocky Reach program	200,000 yearling smolts
	450,000 accelerated sub-yearling
	628,000 normal sub-yearling
Propagation survival	81% fertilization to 0+ release
	78% fertilization to 1+ release
Fecundity	5,000 eggs per female
Female to male ratio	1 to 1
Pre-spawn survival	90%
Broodstock required	1,348

7.3 Identity.

Summer chinook adults recruiting to the Wells Hatchery trap are a mixture of natural and hatchery-origin fish, and identified by CWT-adipose clip combinations. Gametes secured from these spawners are only used in the Wells Hatchery and Turtle Rock Hatchery release programs, and smolts are not released in areas above Wells Dam.

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults): Current protocols for the summer chinook programs allow for the annual collection of up to 1,210 (Wells FH volunteers), equally divided among sexes that are used for the Wells and Turtle Rock Hatchery Programs. Approximately 980 are used for broodstock.

Year	Adults		
	Females	Males	Jacks
Planned	605	605	-
1994	654	371	-
1995	1101	966	134
1996	642	742	9
1997	631	605	**
1998	648	585	**
1999	500	504	**
2000	591	706	**
2001	562	816	**
2002	570	525	**
2003	570	449	**
2004	497	501	**
2005	-	-	-

** Jacks have been included in male counts.

7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.

In the event excess fish are collected, they will be returned to the Columbia River below Wells Dam.

7.6 Fish transportation and holding methods.

Equipment Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Tanker Truck**	1300	Y	N	150	Salt	U
Marking Trailer	NA	NA	NA	15	MS 222	U
Fish Pump	NA	NA	NA	5	NA	NA

Fish do not need to be transported. A tanker truck can be used for PUD experiments.

7.7 Describe fish health maintenance and sanitation procedures applied.

For all production programs under the Mid and Upper Columbia Hatchery Programs, standard fish health monitoring will be conducted (monthly checks of salmon and steelhead) by fish health specialist, with intensified efforts to monitor presence of specific pathogens that are known to occur in the donor populations (specific reactive and proactive strategies for disease control and prevention are outlined in Appendix I). Significant fish mortality to unknown cause(s) will be sampled for histopathological study. Fish health maintenance strategies are described in IHOT (1995). Incidence of viral pathogens in salmon and steelhead broodstock will be determined by sampling fish at spawning in accordance with the Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State. Populations of particular concern may be sampled at the 100% level and may require segregation of eggs/progeny in early incubation or rearing. Incidence of *Renibacterium salmoninarum* (Rs, causative agent of bacterial kidney disease) in salmon broodstock will also be determined by sampling fish at spawning. Where appropriate, collected broodstock will be sampled for enzyme-linked immunosorbent assay (ELISA). If required, hatchery staff will segregate eggs/progeny based on levels of Rs antigen, protecting "low/negative" progeny from the potential horizontal transmission of Rs bacteria from "high" progeny. Progeny of any segregation study will also be tested by ELISA; at a minimum each segregation group would be sampled at release. Necropsybased condition assessments (based on organosomatic indices) will be used to assess condition of hatcheryreared salmon and steelhead smolts at release, and wild salmon and steelhead during out-migration. If needed, condition assessments will be done at other key times during hatchery rearing.

7.8 Disposition of carcasses.

Carcasses of summer chinook spawned through the programs are buried on-site at Eastbank Hatchery or Wells Hatchery or returned to the Wenatchee, Methow, or Columbia River near the tail-race of Wells Dam for nutrient enrichment and productivity enhancement purposes.

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.

In trapping operations directed at the collection of broodstock, the Permit Holders shall apply measures that minimize the risk of harm to listed salmon and steelhead. These measures include, but are not limited to: limitations on the duration (hourly, daily, weekly) of trapping in mainstem river areas to minimize capture and handling effects on listed fish; limits on trap holding duration of listed fish prior to release; application of procedures to allow safe holding, and careful handling and release of listed fish; and allowance for free passage of listed fish migrating through trapping sites in mainstem and tributary river locations when those sites are not being operated. 12. All traps that have the potential to incidentally capture listed UCR spring chinook salmon or UCR steelhead when they are operated must be checked and have all trapped fish removed at least daily. 13. If water temperature at adult trapping sites exceeds 21°C (69.8°F), the trap operation shall cease, pending further consultation with NMFS to determine if continued trap operation poses substantial risk to ESA-listed species that may be incidentally encountered. The Permit Holders shall monitor the incidence of, and minimize capture, holding, and handling effects on, listed salmon and steelhead encountered during trapping. The WDFW shall carefully handle and immediately release upstream incidentally captured listed UCR spring chinook salmon and steelhead adults that are not intended for use as broodstock in concurrently operated and otherwise authorized listed stock recovery programs. 15. The Permit Holders shall limit operation of Wells Dam east and west ladder traps to no more than three days per week from July through November. If both traps are operated, they shall be operated concurrently, operating on the same three days each week. When operating, active trapping may occur up to 16 hours per day. The ladder shall be open to passage at night for listed steelhead.16.

Methow/Okanogan Program (Wells Dam and Wells Hatchery) -
Following are collection and sampling designs for the two trapping programs directed at summer chinook at Wells Dam and Wells Hatchery. The 1985 - 1996 average proportion of the total up-river return collected as broodstock through these programs is 25.1 %. Summer chinook salmon broodstock are collected each year from the run at large reaching Wells Dam, located at Rkm 861.0 on the Columbia River during the months of July and August. Broodstock for the Similkameen and Carlton programs are currently trapped in the fish ladders circumventing Wells Dam. Fish volunteering into Wells FH are used primarily for the Wells and Turtle Rock programs. To prevent inclusion of fall chinook population into the summer chinook gene pool, broodstock collection at both capture sites is curtailed on August 28. Ladder trapped fish are transported to Eastbank FH where they are held until maturity and spawned. Gametes from fish with CWTs are held separately until the origin of the fish is determined. Only summer chinook salmon are used in these programs.

Fish traps at Wells Dam are located in the ladders on both the east and west sides of the dam. The ladder traps are operated from early May through November to collect spring chinook, summer chinook, and fall chinook, and steelhead broodstock for use in stock recovery and fisheries enhancement programs. Active trapping occurs 16 hours per day on a consistent schedule, and fish are removed from the traps at least daily when the traps are operational. Summer chinook broodstock are trapped each year in the east side trap, and the west side trap is only used when difficulties are encountered in securing fish from the east side trap. Fish trapped the west side ladder ascend a 12' *Denil* fish ladder into a 12' x 12' x 8' deep holding tank. Captured fish can then be directed from the holding tank over a false weir leading to a "V" shaped chute, which funnels the fish into an underground pipe leading to a 12' x 100' pond, where broodstock are held for spawning. Movement of fish in this manner is automatic, and no handling with nets which could damage the fish is involved. At the Wells east ladder trap, the fish ladder closes above a large holding area from which fish ascending a *denil* fishway and false weir are diverted via a chute directly into a truck-mounted anesthetic tank. There is no netting or other handling of fish trapped at the east ladder prior to being anesthetized, after which they can be tagged, recovered, and/or placed in transport trucks. The risk of injury to fish is minimized through application of these measures. Measures to reduce sources of bias that could lead to a non-representative sample of the desired Methow/Okanogan basin brood stock sources include trapping all fish randomly from the run at large and throughout the duration of passage to ensure proportional representation of the age and size structure of the returning population. Additional measures employed to reduce the risk of adverse genetic effects to the population is a collection date beginning no earlier than June 28 and ending no later than August 28 to exclude spring-run and fall-run chinook from collections. Hatchery summer chinook volunteering to the hatchery trap can be separated by origin through CWT analysis. This process will allow differentiation between Carlton, Similkameen, and Wells hatchery-origin fish (as well as out-of-basin strays) prior to spawning and maintenance of separate local broodstocks for each production area as necessary. Adverse effects on the natural summer chinook population, and on listed fish that may be encountered incidentally during trapping, are minimized through the following measures:

1. The east ladder (and west ladder) trap(s) will be continuously monitored and operated 3 days per week during the summer chinook migration (June 28 through August 28). The east ladder trap is actively manned during trapping and the west ladder trap is passively operated and checked at least daily, ensuring minimal holding times for fish captured.
2. The Wells Hatchery trap does not incorporate a fish weir to guide fish into the hatchery fish ladder. All fish returning to Wells Hatchery recruit to the trap as volunteers. The trapping program is therefore not a "run of the river" operation, and captures of other species besides summer chinook salmon that were produced at the hatchery are minimal.
3. To minimize migration delays to fish other than the targeted species, the fish sorting flume in the west ladder trap will be staffed at all times while the fishway is barricaded for the purpose of guiding fish into the trap.
4. Attraction flows from the false weir will be maintained to encourage fish to use the sorting flume.
5. The traps will be operated in a manner to reduce retention time in the holding pools above the *Denil* fishways accessing the trap.
6. Fish not required for broodstock will be returned into the fishway as they move through the sorting flumes to continue their upstream migration.

Section 8. Mating

8.1 Selection method.

Spawners are collected randomly from the run at large arriving at the trapping locations during the July - August summer chinook salmon migration period. Beginning (late June or early July) and ending (late August) dates set for trapping help ensure that only summer chinook salmon are used in these programs. Adult collection at Wells Dam is managed throughout the season in response to fish counts at Rocky Reach Dam to ensure adequate escapement above Wells Dam. A portion of each day's egg-take is used for on-site production at Wells Hatchery to help ensure that the hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations. A portion of each days egg-take is used for on site production to help ensure that the hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations. A 1:1 mating scheme is employed.

8.2 Males.

Males may be live-spawned on the first spawning day as necessary to make up for a low naturally-occurring male to female ratio. However, inclusion of jack chinook in the run-at-large broodstock collections helps to alleviate occasional low adult male occurrence.

Collecting jacks in similar proportion to the run-at-large. Inclusion of jack chinook in the run-at-large broodstock collections helps to alleviate occasional low adult male occurrence. The hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations.

8.3 Fertilization.

Spawning protocols reflect the need to maintain genetic diversity of the separate summer chinook populations. Summer chinook collected from the Wenatchee River and at Wells Dam are maintained at Eastbank Hatchery as separate populations and spawned at a 1 male to 1 female ratio. Gametes of the least numerous sex are split into subsets and these are crossed with gametes from a different individual of the more numerous sex. At Wells Hatchery, gametes from fish with CWTs that volunteer to the hatchery trap are held separately until the origin of the fish is determined.

8.4 Cryopreserved gametes.

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.

- A portion of each days egg-take is used for on site production to help ensure that the hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations. A 1:1 mating scheme is employed.
- Males may be live-spawned on the first spawning day as necessary to make up for a low naturally-occurring male to female ratio. However, inclusion of jack chinook in the run-at-large broodstock collections helps to alleviate occasional low adult male occurrence.
- Collect jacks in similar proportion to the run-at-large. Inclusion of jack chinook in the run-at-large broodstock collections helps to alleviate occasional low adult male occurrence. The hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations.
- Fish health procedures used for disease prevention include biological sampling of spawners. Generally, sixty ovarian fluid and kidney/spleen samples are collected from female spawners to test for the presence of viral pathogens. The enzyme-linked immunosorbent

assay (ELISA) is conducted on kidney samples from 100 females. This assay detects the antigen for *Renibacterium salmonarium*, the causative agent of bacterial kidney disease (BKD).

Section 9. Incubation and Rearing.

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

Current protocols for the summer chinook programs allow for the annual collection of 1,210 (Wells FH volunteers), equally divided among sexes including jacks that are used for the Wells and Turtle Rock Hatchery Programs. Egg take goal combined for both programs and for 100,000 eyed eggs for the Lake Chelan RSI's (triploid), and regional educational cooperatives is 3,000,000 eggs (FBD 2005-06). 1,331,000 eyed eggs and 256,000 green eggs are transferred to Turtle Rock Hatchery. Mitigation is for 56,200 pounds of total production. Production is for 484,000 sub-yearlings and 320,000 yearlings released from Wells into the Columbia River.

The program survival standard from fertilization to ponding is 90.0 %. The survival objective from fertilization to release is 65.0 %. The egg survival objective: green egg to the eyed stage is 92.0 %; the eyed egg stage to ponding is 98.0 %; 30 days post ponding is 97.0; 100 days post ponding is 93.0; and ponding to smolt is 72%.

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Perfor-mance Std.
1995	4,155,000	92.54	~99.0	98.0
1996	2,580,000	94.18	~99.0	98.0
1997	2,717,014	93.40	~99.0	98.0
1998	2,719,086	91.65	~99.0	98.0
1999	2,111,582	93.70	~99.0	98.0
2000	2,201,000	93.09	~99.0	98.0
2001	2,620,000	93.77	~99.0	98.0
2002	2,850,000	Na	~99.0	98.0
2003	2,850,000	Na	~99.0	98.0
2004	2,485,000	Na	~99.0	98.0
2005				

Table 10. Fecundity for Summer Chinook in the Upper Columbia (WDFW Database 2005).

Stock	Field	1999	2000	2001	2002	2003	5 YR Avg.
MEOK	Females Spawned	254	210	152	233	237	1086
	Estimated Egg Take	1,246,450	1,038,800	750,000	1,147,500	1,175,000	5,357,750
	Fecundity	4,907	4,947	4,934	4,925	4,958	4,933
Wells	Females Spawned	503	564	525	577	575	2744
	Estimated Egg Take	2,475,000	2,780,000	2,620,000	2,850,000	2,850,000	13,575,000
	Fecundity	4,920	4,929	4,990	4,939	4,957	4,947
Wenat-chee	Females Spawned	247	211	152	204	171	985
	Estimated Egg Take	1,220,050	1,040,000	745,200	972,500	847,500	4,825,250
	Fecundity	4,939	4,929	4,903	4,767	4,956	4,899

9.1.2 Cause for, and disposition of surplus egg takes.

Broodstock collection plan sets forth adult collection target that minimizes surpluses of eggs and juvenile fish. In the case where surplus eggs/fish, eggs and fish would be incubated and reared to full term, and acclimated and released as smolts from the Wells Hatchery acclimation ponds into the Columbia River.

9.1.3 Loading densities applied during incubation.

Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations were followed for water quality , flows , temperature , substrate and incubator capacities. Heath stack incubators are used to incubate the summer chinook eggs at Wells Hatchery. Incubation conditions at the two hatcheries are designed on loading densities recommended by Piper et al. (1982).

9.1.4 Incubation conditions.

Eggs are incubated full-term(Green egg-Emergence) at Wells Hatchery. Eggs of subyearling production component are incubated on ambient temperature well water that results in fry emergence around mid-January. Whereas eggs of yearling production component are incubated on chilled temperature well water that results in fry emergence around latter part of April.

Influent and effluent gas concentrations at the hatcheries and within the acclimation ponds, including dissolved oxygen concentrations, are within parameters optimal for juvenile salmonid production and survival.

9.1.5 Ponding.

Summer chinook fry are transferred from Heath trays for ponding upon button-up and swim-up. Ponding generally occurs after the accumulation of 1,650 to 1,750 temperature units. Unfed fry are transferred to the rearing ponds from early May through early June. The normal weight for fry initially ponded at Eastbank Hatchery for brood years 1989-95 was 0.45 grams (1000 fish per pound). The fry fork length recorded for the same brood years was 36 to 40 mm.

9.1.6 Fish health maintenance and monitoring.

No fish disease outbreaks have been experienced during the incubation to ponding period in the summer chinook programs in recent years and mortality levels have remained within program standards. Fish health is continuously monitored in compliance with Co-manager Fish Health Policy standards (WDFW and WWTIT 1998). Rearing space at Eastbank was designed to maintain maximum loading densities below the criteria of Piper et al. (1982), as modified by Wood (Chelan PUD and CH2MHILL 1988).

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.

No listed fish are reared in this program.

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 (1990-2001), or for years dependable data are available.

See HGMP Section 9.1.1.

9.2.2 Density and loading criteria (goals and actual levels).

The rearing conditions at Wells and Eastbank hatcheries (as well as its acclimation ponds) are designed on loading densities recommended by Piper et al. (1982; 6 lb/gpm and 0.75 lb/ft3) and Banks (1994; 0.125 lb/ft3/in) (BAMP 1998). Fry are transferred from the Heath incubation trays to fiberglass rearing tanks for start feeding, and then to raceways for continued rearing. The tanks have flow through water circulation. Fingerlings are transferred to the acclimation ponds in the tributaries in October (Carlton Ponds) and February (Dryden and Similkameen).

9.2.3 Fish rearing conditions.

Sub-yearling Production Component of Program- emergent fry are ponded in concrete standard raceways (2250 cf) during mid-January. After marking, fish are transferred into adult holding pond for final rearing. Sub-yearlings are volitionally released from adult holding pond in mid-June at ~20 fpp.

Yearling Production Component of Program- emergent fry are ponded in concrete standard raceways (2250 cf) during mid-late April. After marking (~100 fpp), fish are transferred into large lined earthen pond for rearing through the following April, when fish are volitionally released during mid-April at ~10 fpp.

Temperature, dissolved oxygen and pond turn over rate are monitored. IHOT standards are followed for: water quality, alarm systems, predator control measures (netting) to provide the necessary security for the cultured stock, loading and density. Settleable solids, unused feed and feces are removed regularly to ensure proper cleanliness of rearing containers. All ponds are broom cleaned as needed and vacuumed monthly for the yearling pond. Ponds are pressure washed between broods. Temperature and dissolved oxygen are monitored and recorded daily during fish rearing. Temperatures during the rearing cycle range from a high of 60 degrees F to a low of 33 degrees F.

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.

The normal weight for fry initially ponded at Eastbank Hatchery for brood years 1989-95 was 0.45 grams (1000 fish per pound). The fry fork length recorded for the same brood years was 36 to 40 mm. Comparable data for summer chinook programs were examined in the mid-1990's (Table 11 and 12).

Table 11 . Length, weight, and condition factor data for 1995 brood summer chinook reared through the Wenatchee supplementation program (Eastbank over-winter to Dryden Pond) (from Petersen et al. 1999b).

Date	Fork Length mm	SD	CV %	Weight (gms)	Condition Factor (Kfl)
June 29	44.2	2.13	4.8	0.9	1.0
Aug. 1	59.4	4.24	7.1	2.3	1.1
Sept. 1	72.1	4.30	6.0	4.1	1.1
Sept. 27	77.6	7.55	9.7	5.9	1.3
Oct. 24	93.7	8.23	8.8	9.1	1.1
Oct. 31	96.5	10.50	10.9	10.2	1.1
Nov. 30	103.5	13.54	13.1	12.9	1.2
Jan. 1	114.0	16.74	14.7	19.1	1.3
Feb. 1	123.9	24.798	20.0	25.4	1.3
Feb. 26	126.7	20.43	16.1	23.1	1.1
Feb. 28	123.3	23.59	19.1	24.4	1.3
Apr. 4	133.8	17.44	13.0	27.7	1.2
May 6	149.4	22.68	15.2	42.4	1.3

Table 12. Length, weight, and condition factor data for 1995 brood summer chinook reared through the Methow/Okanogan supplementation program (from Petersen et al. 1999b).

Date	Fork Length mm	Fork Length SD	Fork Length CV %	Weight (gms)	Condition Factor (Kfl)
Carlton Pond					
June 29	41.0	2.13	5.2	0.6	0.91
July 31	55.0	3.34	6.1	1.8	1.07
Aug. 30	65.5	4.31	6.6	3.2	1.13
Sept. 27	76.0	5.92	7.8	5.2	1.19
Oct. 31	91.6	7.19	7.9	7.9	1.03
Nov. 30	111.9	8.90	8.0	15.2	1.08
Jan. 1	112.2	13.61	12.1	16.8	1.07
Jan. 31	143.4	11.68	8.2	33.6	1.14
Mar 3	142.5	23.81	16.7	34.9	1.21
Mar. 18	148.5	25.09	16.9	39.9	1.22
Apr. 22	160.3	22.96	14.3	50.5	1.23
Similkameen Pond					
May 31	40.2	1.64	4.1	0.6	0.9
June 29	50.5	2.89	5.7	1.3	1.01
Aug. 1	66.8	6.18	9.3	3.6	1.2
Sept. 2	86.0	7.25	8.4	7.9	1.3
Sept. 27	105.1	8.4	8.0	15.2	1.3
Sept. 30	106.5	8.17	7.7	12.9	1.1
Oct. 31	128.5	8.61	6.7	25.4	1.2
Nov. 5	128.7	8.41	6.5	25.5	1.2
Dec. 3	133.8	9.25	6.9	27.5	1.2
Jan. 3	135.3	10.31	7.6	27.1	1.1
Feb. 4	134.6	10.07	7.5	25.2	1.0
Mar. 31	136.7	13.87	10.2	32.8	1.3

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

Results of organosomatic index (OSI) sampling were conducted on 1995 brood juvenile Wenatchee and Methow/Okanogan summer chinook salmon (from Petersen et al. 1999b

Table 13. Results of organosomatic index (OSI) sampling conducted on 1995 brood juvenile Wenatchee and Methow/Okanogan summer chinook salmon (from Petersen et al. 1999b).

Date	Specific Indices (%) mesenteric fat	Combined Indices (%) normality	feeding	Blood Constituents Hematocrit % volume (SD)	Leucocrit (SD)	Plasma Protein g/100 ml
Wenatchee						
Feb. 26	68.8	85.5	28.3	50.70 (6.14)	0.10 (0.00)	6.28 (0.57)
Mar. 4	42.5	100.0	58.3	50.60 (5.72)	0.10 (0.00)	5.72 (0.47)
May 6	30.0	9725	75.0	47.20 (5.55)	0.33 (0.27)	4.50 (1.78)
Carlton						
Oct. 22	42.5	100.0	38.3	49.8 (5.9)	0.3 (0.2)	6.5 (1.2)
Mar. 18	65.0	92.5	33.3	45.4 (5.0)	0.1 (0.1)	5.2 (0.6)
Apr. 8	35.0	92.5	40.0	50.2 (4.1)	1.0 (0.0)	4.9 (0.8)
Apr. 22	56.3	96.0	21.7	49.8 (4.5)	0.5 (0.3)	5.4 (0.8)
Similkamee n						
Sept. 27	63.8	98.5	80.7	47.8 (4.6)	0.2 (0.2)	6.7 (0.9)
Mar. 31	31.3	95.5	86.7	52.4 (7.4)	0.7 (0.2)	6.0 (0.7)

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*).

Commercial-grade moist or semi-moist fish feed is used in the operation, and applied at sizes appropriate for the size of the fish being fed. The daily amount fed is determined by the number of fish in the population and individual fish weight. Feed is therefore applied at a daily rate ranging from 3.0 % of the total population weight per day (fry and small fingerlings) to 1.5 % of the total population weight per day for larger fingerlings. The expected feed conversion efficiency rate is 1.2.

Rearing Period	Food Type	Application Schedule (#feedings/day)	Feeding Rate Range (%B.W./day)	Lbs. Fed Per gpm of Inflow	Food Conversion During Period
Ponding to 150 fpp	Moore Clark Nutra Plus	6-8	2.5	0.06	0.5:1.0
Ponding to 150 fpp	BioDiet Grower	6-8	2.5-3.0	0.06	0.75-0.85:1.0
150-75 fpp	BioDiet Grower	U	2.0-2.3	0.08	0.8-1.0:1.0
75-20 fpp	Moore Clark Fry	U	2.0-2.3	0.24	0.9-1.0:1.0

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

For all production programs under the Mid-Columbia Hatchery Program, standard fish health monitoring will be conducted (monthly checks of salmon and steelhead) by fish health specialist, with intensified efforts to monitor presence of specific pathogens that are known to occur in the donor populations (specific reactive and proactive strategies for disease control and prevention are outlined in Appendix I). Significant fish mortality to unknown cause(s) will be sampled for histopathological study. Fish health maintenance strategies are described in IHOT (1995). Incidence of viral pathogens in salmon and steelhead broodstock will be determined by sampling fish at spawning in accordance with the Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State. Populations of particular concern may be sampled at the 100% level and may require segregation of eggs/progeny in early incubation or rearing. Incidence of *Renibacterium salmoninarum* (Rs, causative agent of bacterial kidney disease) in salmon broodstock will also be determined by sampling fish at spawning. Where appropriate, collected broodstock will be sampled for enzyme-linked immunosorbent assay (ELISA). If required, hatchery staff will segregate eggs/progeny based on levels of Rs antigen, protecting low/negative" progeny from the potential horizontal transmission of Rs bacteria from "high" progeny. Progeny of any segregation study will also be tested by ELISA; at a minimum each segregation group would be sampled at release. Necropsybased condition assessments (based on organosomatic indices) will be used to assess condition of hatcheryreared salmon and steelhead smolts at release, and wild salmon and steelhead during outmigration. If needed, condition assessments will be done at other key times during hatchery rearing.

Fish health and disease condition are continuously monitored in compliance with Co-manager Fish Health Policy standards (WDFW and WWTIT 1998). Fish health and condition is onitored on-site by fish health professionals at the summer chinook rearing locations ten to fifteen times during the freshwater rearing period. In particular, summer chinook are screened prior to transfer and again at release for the incidence of bacterial kidney disease (BKD) through the ELISA process. Results of ELISA testing of `95 brood summer chinook indicate that the prevalence of BKD in the Wenatchee population was very low. The prevalence of BKD in the `95 brood Carlton Pond population was higher than the Similkameen Pond population. The `95 brood Carlton Program failed to meet the numerical release objective because of a BKD outbreak at Methow Hatchery, from which the smolts were transferred. The results of fish health monitoring for the summer chinook programs are presented each year in WDFW Rock Island Fish Hatchery Complex annual reports.

The general policy of the WDFW, the USFWS, and the Yakama Nation is to bury juvenile fish mortalities, and dead eggs to minimize the risk of disease transmission to natural fish. The action agencies may place at least some of the adult salmon carcasses in regional streams for nutrient enrichment purposes, consistent with permitting and disease certification protocols. If adult carcasses are not used for nutrient enhancement they will be buried or disposed of at a local waste disposal site. The distributing of spawned, dead carcasses into the natural environment should benefit natural fish productivity through nutrient enrichment. NMFS finds that risk to the listed populations is minimal if disease certification protocols are followed.

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

Degree of smoltification is monitored through monthly collection of data indicating average condition factor (Kfl) of the populations (see Tables 7 and 8). Gill ATPase levels have been monitored in the past to attempt to indicate degree of smoltification. However, this index has not been found to be a useful tool for determining when to begin releases, due to the delay in obtaining results from sampling, and the finding that ATPase levels do not actually increase until the smolts are actively migrating in the Columbia River (Petersen et al. 1999b)

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

Natural rearing methods are approached through the transfer of most summer chinook smolts to acclimation ponds at release locations. The trapizoidal, hypalon-lined ponds provide a lower density rearing location for the fish on their home water. The ponds therefore provide a more natural setting for the populations than if the fish were retained in concrete raceways, and released at central locations or scatter-planted to the upper river tributaries.

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.

Listed fish are not under propagation but all fish are handled, transported, and propagated in accordance with the WDFW Fish Health Manual and Pacific Northwest Fish Health Protection Committee disease prevention and control standards to minimize disease transfer to wild fish.

Monitoring and evaluation measures are proposed to address data gaps that lead to uncertainty in the incubation and rearing protocols. These uncertainties include whether the release of ocean-type chinook salmon into the tributaries, areas of significant natural production, impose deleterious ecological effects upon natural fish are of concern. Natural summer chinook in the region are ocean-type populations, and the release of yearling fish through the hatchery programs, an out-migration strategy that differs from the natural population, is of concern. Whether the increasing incidence of “reservoir-reared” juveniles (Petersen and Murdoch 1998) in the natural population is related to the effects of hatchery practices or simply due to hydroelectric impoundments delaying sub-yearling migrations is presently unknown. Unknowns of this yearling release strategy include: the demographic aspects of returning hatchery adults originating from yearling releases; the potential for genetic changes from the natural population from differing selective processes on yearlings versus sub-yearlings; and, the effects of hatchery yearling releases upon natural juveniles. Carefully developed hatchery operation and evaluation programs, such as those developed for the Rock Island Hatchery Complex (RIHC), will be a component of the Mid-Columbia Hatchery Program (BAMP 1998) to identify the hazard of each hatchery program to the listed species, and the means to quantify this risk.

Section 10. Release

10.1 Proposed fish release levels.

The current production goals for Wells FH are to release 484,000 sub-yearlings at 20 fpp, and 320,000 yearlings at 10 fpp. In the Columbia River, ocean-type chinook salmon released as yearlings have consistently survived better than those released as sub-yearlings In the Columbia River, the benefits of rearing juveniles through a yearling stage include (1) improved passage through hydroelectric dams, through coincidental timing of releases with increased flows and spill (Raymond 1988); (2) better fish guidance efficiency of yearlings at the dams because of behavioral and buoyancy changes (Giorgi et al. 1988); (3) decreased susceptibility to predators (Poe et al. 1991); and (4) improved swimming performance of larger smolts (Park 1969). Based upon smolt production numbers to necessary to achieve hatchery compensation objectives, the difference in production required between yearling and sub-yearling ocean-type chinook salmon is on the order of 0.24. In other words, for every 1,000 sub-yearling summer chinook smolts to be produced for compensation, 240 yearling smolts could be produced in lieu of the sub-yearlings. This ratio was derived from observed differences in survival between yearling and sub-yearling releases from Wells FH. The appropriate mix of yearling and sub-yearling smolts has been evaluated through the "Mid Columbia Hatchery Plan" to minimize the risk of this increased hatchery production on the existing natural production. At this time, hatcheries release ocean-type chinook salmon at both ages. Fish from the two rearing strategies encounter different selective processes (such as downstream migration conditions and ocean distribution), yet the demographic characteristics of those salmon released as yearlings have not meaningfully deviated from that of naturally produced fish, particularly in light of recent findings of "reservoir-reared" natural smolts. However, the demographic characteristics of the fish reared as yearlings will continue to be monitored, to ensure adaptability of hatchery fish to natural conditions. Demographic characteristics to be monitored will include, but not be limited to release to adult survival, age at return, length at age, sex ratio, and fecundity/length relation.

10.2 Specific location(s) of proposed release(s).

Wells Hatchery/Columbia River/RKm 829.0/Mid-Upper Columbia

10.3 Actual numbers and sizes of fish released by age class through the program.

	Fingerling Release			Yearling Release		
Release Year	No.	Date (MM/DD)	Avg Size (fpp)	No.	Date (MM/DD)	Avg Size (fpp)
1991	765,693	June 8 and 24	22.9			
1992	858,000	January 21-June 22	35.7	371,369	April 27	8.0
1993				392,330	April 16	15.0
1994	187,382	June 28	27.0	331,353	April 27	12.0
1995	491,735	June 15-26	32.2	388,248	April 15-30	8.3
1996	500,000	June 13-15 and August 7	20.3	365,000	April 1-9	9.5

1997	575,411	June 18-25 and August 7	19.2	290,000	April 1-19	8.6
1998	541,923	June 4-15	33.0	348,559	April 15-24	7.5
1999	370,617	June 18-21	24.8	381,687	April 15-30 May 1-31	6.0
2000	363,600	June 19	18.5	457,770	April 18-30 –May 1-12	7.0
2001	498,500	June 20-21	27	312,098	April 16-May 7	10.0
2002	376,027	June 17 & 18	20.0	343,423	April 15-30	9.6
2003	473,100	June 16-19	30.0	185,000	April 21-30	10
2004	425,271	May 11 and June 14 & 15	24.0 and 40.0	306,810	April 19-30	10
2005						

10.4 Actual dates of release and description of release protocols.

Wells Hatchery yearlings are volitionally released in April and sub-yearlings are volitionally released in June. Program releases occur during the out-migration window of natural summer chinook.

10.5 Fish transportation procedures, if applicable.

No transportation equipment required for fish hauling since all program activities (broodstock acquisition and smolt release) occur on-station.

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

Fish have been term reared at the facility on river water. All fish are acclimated and volitionally released from Wells Hatchery into the Columbia River. Yearling smolts are released in mid-April, and sub-yearling smolts are released in mid-June.

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

All summer chinook produced through the WDFW programs in the region are marked with an adipose clip/coded wire tag combination to allow for visual identification of hatchery origin fish upon adult return, differentiation of hatchery fish from wild fish and from hatchery fish from the various release locations, and assessment of brood year fishery contribution and survival rates by release site. For 2005-06, both Wells sub-yearling and yearling releases will be 100% CWT and adipose fin clipped.

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

Situation would be discussed with regional managers (WDFW, PUD, Tribes, etc.), and fish would be released from Wells or Turtle Rock.

10.9 Fish health certification procedures applied pre-release.

All fish are examined for the presence of "reportable pathogens" as defined in the PNFHPC disease control guidelines, within 3 weeks prior to release.

Fish transfers into the sub-basin 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.

Screens and stoplogs at outlets of raceways would be lifted, and fish would be released into the Columbia River. These type measures have not been necessary in recent years.

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.

Measures have been applied to ensure that artificially propagated summer chinook salmon juveniles that are released are ready to actively migrate to the ocean with minimal delay. To meet this condition, fish must be released at a uniform size and state of smoltification that ensures that the fish will migrate seaward without delay. Variance from this smolts-only release requirement shall only be allowed in the event of an emergency, such as flooding, water loss to raceways, or vandalism, that necessitates early release of ESA-listed steelhead to prevent catastrophic mortality. Any emergency releases made by the action agencies shall be reported immediately to the NMFS Salmon Recovery Division. The rearing and release strategies are designed to limit ecological interactions between hatchery and naturally produced fish. Fish are reared until smoltification has occurred within nearly the entire population, which reduces residence time in streams following release (Bugert et al. 1991). To indicate when fish should be allowed to volitionally migrate, physiological measures of the degree of smoltification within the hatchery population, including allowable fork length coefficient of variation maximums (CV less than 10%) and average condition factor at release targets (0.9 - 1.0) will be used for yearlings while size at time of release (50ffp) will be used for sub-yearling releases.

Through these practices, smolts will migrate seaward without delay, minimizing interactions with listed wild spring chinook and steelhead juveniles and smolts that rear in and/or migrate through freshwater and estuarine areas. In addition, smolt releases will continue to be timed with water budget releases from upstream dams, to further accelerate seaward migration of released hatchery fish and reduce the duration of any interactions with wild fish. On-station rearing of spring chinook on parent river water in the upper Columbia region will also contribute to the smoltification process leading to reduced hatchery fish residence time in the rivers and mainstem migration corridors.

Variance from this smolts-only release requirement shall only be allowed in the event of an emergency, such as flooding, water loss to raceways, or vandalism, that necessitates early release of ESA-listed steelhead to prevent catastrophic mortality. Any emergency steelhead releases made by the action agencies shall be reported immediately to the NMFS Salmon Recovery Division in Portland.

All propagated summer chinook juveniles shall be externally and internally marked (i.e., CWT and adipose fin clipped) prior to release.

Fish have been monitored daily by staff during rearing for signs of disease, through observations of feeding behavior and monitoring of daily mortality trends. A fish health specialist has been monitoring fish health as least monthly. More frequent care will be provided as needed if disease is noted. Prior to release, population health and condition is established by the Area Fish Health Specialist. Adherence to WDFW, Pacific Northwest Fish Health Protection Committee, and IHOT (1995) fish disease control policies will reduce the incidence of diseases in hatchery fish produced and released. Fish health management programs affecting all stocks, and fish health activities specific for each complex, are detailed in Appendix II, under "Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread, or amplification of fish pathogens."

Section 11. Monitoring and Evaluation of Performance Indicators

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

Monitoring and evaluation plans, and research projects will be developed by the HCP Hatchery Committees as described in Section 2.3.1 (Chelan and Douglas PUD Activities). Additional details of the monitoring and evaluation plan development time lines and responsibilities are provided in the three HCP agreements. Tasks proposed for consideration at this time, which, in all likelihood, will be included in the plans developed by the HCP Hatchery Committees, include monitoring within the hatchery facilities and monitoring of artificially propagated salmon in the natural environment.

WDFW submits annual reports as conditioned by Section 10 Permit # - 1347 covering the period from January 1- December 31 and due to NOAA Fisheries by January 31st of the year following release per permit Reporting and Annual Authorization Requirements; Section C.1-C.9. Specifically, the annual reports include detailed activities as per requirements including monitoring of performance indicators identified for the program.

Adult return information shall include the most recent annual estimates of the number and proportion of artificially propagated fish on the spawning grounds, and the number and location of artificially propagated adults that were recovered outside the release areas. Adult return information and results from monitoring and evaluation activities outside the hatchery environment should be included in the annual report or a separate report. If a separate report on monitoring and evaluation activities conducted outside the hatchery environment is prepared, it shall be submitted by August 31, of the year following the monitoring and evaluation activities (i.e., surveys conducted in 2003, report due August 31, 2004) to NMFS.

Within Hatchery Environment Monitoring Reporting includes: numbers, pounds, dates, tag/mark information and locations of fish releases; Standard survival benchmarks within the hatchery environment as defined by the HCP Hatchery Committees; Monitoring and evaluation activities that occur within the hatchery environment; Coefficient of variation around the average (target) release size immediately prior to their liberation from the acclimation sites as an indicator of population size uniformity and smoltification status;

Natural Environment Monitoring Reporting includes: Annual adult return information shall include estimates of the number and proportion of artificially propagated fish on the spawning grounds; The number and location of artificially propagated adults that were recovered outside the release areas (e.g., in fisheries or strays to other rivers); Total and index redd counts by tributary basin; Carcass recovery summary which includes sex, origin, tributary location, age, and stock data. Broodstock monitoring and collection summary by location, including summary of all species encountered. Summary of all activities monitoring juvenile UCR spring chinook salmon in the natural environment including trap locations, tributary or sub basin population estimates; Biological sampling conducted on artificially propagated and natural origin juveniles in the natural environment; injuries or mortalities of listed species that result from monitoring activities; and any other information deemed necessary for assessing the program defined by the HCP Hatchery Committees.

The Chelan PUD and Douglas PUD, in coordination with the HCP Hatchery Committees, shall develop five-year monitoring and evaluation plans for the hatchery that are updated every five years. The first monitoring and evaluation plans are due to be completed with in one year of the issuance of the FERC order incorporating the HCP into the hydro project operation licenses. Existing monitoring and evaluation programs shall continue until replaced by the HCP Hatchery Committees newly developed five-year monitoring and evaluation plans. The Chelan PUD and Douglas PUD, shall assume the lead, and work in coordination with the HCP Hatchery Committees, in developing the ten year hatchery program reviews and directing the development of annual summary reports. The program reviews will determine if egg-to-fry and smolt –to-adult survival rates, and other appropriate hatchery program goals and objectives of the HCPs and the ESA section 10 permits have been met or sufficient process is being made towards their achievement. This review shall include a determination of whether artificially propagated production objectives are being achieved.

WDFW shall develop annual broodstock collection and spawning protocols for the sockeye salmon and chinook salmon artificial propagation programs. Protocols should be coordinated with the co-managers and HCP Hatchery Committees and must be submitted to NMFS by April 15 of the collection year.

The Permit Holders must report the take of any ESA-listed species not included in this permit or authorized under a separate ESA permit, when it is killed, injured, or collected during the course of enhancement/research activities. Notification should be made as soon as possible, but no later than two days after the unauthorized take. The Permit Holders must then submit a detailed written report of the non-permitted take. Pending review of these circumstances, NMFS may suspend enhancement/research activities.

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

Staffing, and other support logistics for the upper Columbia River summer chinook production programs are provided by WDFW. Funding for the programs is provided by PUD No. 1 of Chelan County and PUD No.1 of Douglas County for the purpose of mitigation for lost fish production associated with hydroelectric power system development in the region. Staffing and funding are available and committed to allow at least partial implementation of data collection, and monitoring and evaluation, described in this section. Presently there is no formally funded monitoring and evaluation program for the Rocky Reach/Turtle Rock program (Chelan PUD), and only recent agreement with Douglas PUD to begin monitoring and evaluation of the Wells summer chinook program. Plan, tasks, and methods monitoring and evaluating objectives relative to summer chinook program performances.

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.

WDFW submits annual reports as conditioned by Section 10 Permit # - 1347 covering the period from January 1- December 31 and due to NOAA Fisheries by January 31^{st} of the year folloeing release per permit Reporting and Annual Authorization Requirements; Section C.1-C.9. Specifically, the annual reports include detailed activities as per requirements including monitoring of performance indicators identified for the program. Monitoring activities have already been approved by the permit. Any additional harm to listed fish beyond the permit allowances would be communicated immediately to NOAA Fisheries by the WDFW ESA response lead in the area for review or needed changes.

Section 12. Research

12.1 Objective or purpose.

Research is directed at determination of supplementation program contribution rates, the ecological and genetic effects of the program on the natural population.

12.2 Cooperating and funding agencies.

Chelan PUD (Funding)
Douglas PUD (Funding)
WDFW
Yakama Tribe
Colville Tribe
NFMS

12.3 Principle investigator or project supervisor and staff.

See also permit 1347 or 1482 (pending) annual reports.

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

Upper Columbia River ESU spring chinook salmon (Oncorhynchus tshawytscha.
Upper Columbia River ESU summer steelhead trout (Oncorhynchus mykiss).
Upper Columbia River ESU Sockeye Salmon
Bull Trout populations (Columbia River Distinct Population Segment)

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

See also permit 1347 or 1482 (pending) annual reports.

12.6 Dates or time periods in which research activity occurs.

See also permit 1347 or 1482 (pending) annual reports.

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

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

See also permit 1347 or 1482 (pending) annual reports.

12.9 Level of take of listed fish: number of range or 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 also permit 1347 or 1482 (pending) annual reports.

12.10 Alternative methods to achieve project objects.

See also permit 1347 or 1482 (pending) annual reports.

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

See also permit 1347 or 1482 (pending) annual reports.

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.

See also permit 1347 or 1482 (pending) annual reports.

Section 13. Attachments and Citations

13.1 Attachments and Citations

Biological Assessment and Management Plan (BAMP). 1998. Mid-Columbia River hatchery program. National Marine Fisheries Service, U. S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, Confederated Tribes of the Yakama Indian Nation,

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Petersen, K., A. Murdoch, M. Tonseth, T. Miller, and C. Snow. 1999a. 1994 brood sockeye and chinook salmon reared and released at Rock Island fish hatchery complex facilities. Report # SS99-02. Fish Program, Salmon and Steelhead Division. Wash. Dept. Fish and Wildlife, Olympia. 91 pp.

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Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 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:______________

Take Table 1. Estimated listed salmonid take levels by hatchery activity.

Steelhead

ESU/Population	Upper Columbia Steelhead
Activity	Wells Hatchery Summer Chinook Program
Location of hatchery activity	Wells dam left and right bank ladder traps.
Dates of activity	Early May – mid-November
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)				
Collect for transport (b)				
Capture, handle, and release (c)			30 – 40 [1]	
Capture, handle, tag/mark/tissue sample, and release (d)				
Removal (e.g., broodstock (e)				
Intentional lethal take (f)				
Unintentional lethal take (g)				
Other take (specify) (h)				

[1] Yearly estimation of steelhead encountered during salmon broodstock collection (K. Peterson, WDFW, pers. comm. June 1997).

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.

Take Table 2. Estimated listed salmonid take levels by hatchery activity. See also Permit #1196 Annual Reports. Numbers submitted here are those allowed in the permit.

Steelhead

ESU/Population	Upper Columbia Spring Chinook
Activity	Wells Hatchery Summer Chinook Program
Location of hatchery activity	Wells dam left and right bank ladder traps.
Dates of activity	Early May – mid-November
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)				
Collect for transport (b)				
Capture, handle, and release (c)			0[1]	
Capture, handle, tag/mark/tissue sample, and release (d)				
Removal (e.g., broodstock (e)				
Intentional lethal take (f)				
Unintentional lethal take (g)				
Other take (specify) (h)				

[1] Run timing separates the migration of listed upper Columbia spring chinook from summer chinook trapping time from June 28 – August 28. .

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.