HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Upper Columbia River Fall Chinook Salmon Hatchery Program - Priest Rapids Hatchery
Species or Hatchery Stock	Upper Columbia River Fall-run ESU Chinook Salmon
Agency/Operator	WDFW
Watershed and Region	Mainstem Mid-Columbia River
Date Submitted	
Date Last Updated	August 26, 2005

Section 1: General Program Description

1.1 Name of hatchery or program.

Upper Columbia River Fall Chinook Salmon Hatchery Program - Priest Rapids Hatchery Complex

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

Upper Columbia River Fall-run ESU Chinook Salmon (*Oncorhynchus tshawytscha*);

ESA Status: Not listed.

1.3 Responsible organization and individuals.

Name (and title):	Mikel Lewis
	Priest Rapids Complex Manager
Agency or Tribe:	WDFW
Address:	P.O. Box 937, Mattawa, WA 99349
Telephone:	509-932-4481
Fax:	509-932-5188
Email:	lewismrl@dfw.wa.gov or priestrapids@dfw.wa.gov

Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

Co-operators	Role
Grant County PUD	Funding, facility maintenance - mitigation for Priest Rapids and Wanapum Dams
	John Day Dam Mitigation

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

Funding Sources
Grant County PUD
John Day Dam Mitigation

Operational Information	Number
Full time equivalent staff	4
Annual operating cost (dollars)	$750,000

The fall chinook salmon run size enhancement program is funded by Grant County Public Utility District (PUD) No. 2 for the purpose of mitigation for fishery impacts caused by the Priest Rapids Project (including Priest Rapids and Wanapum dams). 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. In addition, fall chinook sub-yearlings are currently produced as partial mitigation for John Day Dam, as funded under a Federal Energy Regulatory Commission Settlement Agreement.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Priest Rapids Hatchery
Broodstock collection location (stream, RKm, subbasin)	Columbia River, 662 Rkm, Columbia Lower Middle
Adult holding location (stream, RKm, subbasin)	Columbia River, 662 Rkm, Columbia Lower Middle
Spawning location (stream, RKm, subbasin)	Columbia River, 662 Rkm, Columbia Lower Middle
Incubation location (facility name, stream, RKm, subbasin)	Priest Rapids Hatchery, Columbia River, 662 Rkm, Columbia Lower Middle
Rearing location (facility name, stream, RKm, subbasin)	Priest Rapids Hatchery, Columbia River, 662 Rkm, Columbia Lower Middle

1.6 Type of program.

Integrated Harvest

1.7 Purpose (Goal) of program.

The goal of the Priest Rapids fall chinook salmon is to mitigate for the loss of fall-run chinook salmon adults that would have been produced in the region in the absence of the Priest Rapids Project.

Additional fall chinook sub-yearlings are also produced as partial mitigation for John Day Dam, which is funded from sources other than the MCMCP. These goals can be met through the use of the artificial environment of the Priest Rapids fish rearing facilities to increase the number of adults that return to the region by increasing survival at life-history stages where competitive or environmental bottlenecks occur. Concurrently, a release strategy for artificial production is employed that will not create a new bottleneck in productivity through competition with the naturally produced component of the population and other naturally-produced stocks.

1.8 Justification for the program.

Located at the base of Priest Rapids Dam, this facility was built in 1963 as compensation for inundated spawning habitat. Funded by Grant PUD and operated by WDFW, it has a Section 10 permit for incidental take of Snake River chinook and sockeye salmon. Originally built as a 1.6 km long spawning channel for fall chinook salmon, it has been converted into six long rearing ponds. The mitigation agreement is for 100,000 lbs of fall chinook salmon production (5,000,000 fish at 50 fpp). In addition, 1,700,000 subyearlings are produced as partial mitigation for John Day Dam. This production group is independent of the Mid-Columbia Hatchery Program. Water is supplied primarily from gravity flow from the Columbia River, but 17.6 cfs of well water is used to control incubation timing. Construction activities to convert the spawning channel to rearing ponds took place in 1980 and 1981. Since that time, the Priest Rapids Hatchery has successfully met or exceeded the production goal of 100,000 pounds (approximately 5,000,000 fish) of fall chinook sub-yearlings with little trouble. In fact, the hatchery has also provided rearing capacity for an additional 1,700,000 sub-yearling fall chinook for John Day Dam mitigation. Under this arrangement, feed is provided by the USFWS, and the fish are cared for by hatchery personnel as part of their regular duties. During the period of conventional hatchery operations, the egg take has been as high as 17,007,000. Annual releases of fall chinook sub-yearlings from the Priest Rapids Hatchery to the Columbia River have ranged from 5,333,500 to 7,000,200.

Columbia River Upriver Bright (URB) stock are defined as wild and hatchery fall chinook originating upstream of McNary Dam (All-Species Review 1996). The URBs are major contributors to Pacific Fishery Management Council (PFMC) and Pacific Salmon Commission (PSC) fisheries, and are an escapement indicator stock/ model stock to the Chinook Technical Committee (CTC) of the PSC. Despite the high degree of mortality that occurs during both upstream and downstream migration through the hydropower system, Hanford Reach URBs are one of few Columbia River salmon stocks that are not currently declining; they are classified as strong by Nehlsen et al. (1991) and healthy by Huntington et al. (1996) and WDFW (1993). The Hanford Reach is a 90-km segment of the Columbia River located between the upstream end of McNary Dam reservoir (rkm 549) and Priest Rapids Dam (rkm 639). It is the only sizeable free-flowing reach of the mainstem Columbia River upstream of Bonneville Dam, and subsequently encompasses the largest tract of remaining lotic habitat. Fall chinook salmon have successfully made use of Hanford Reach spawning and rearing habitat as other production areas became inundated by reservoirs (Dauble and Watson 1997). The Hanford Reach contains the most significant area of URB fall chinook production in the mainstem Columbia River. Spawning primarily occurs in discontinuous segments between rkm 558 and 630 (Dauble 2000).

Although not designed as one, Priest Rapids could be considered a supplementation program. Extensive gene flow occurs between the hatchery and the Hanford Reach natural production. Fish are well acclimated to the area, by use of Columbia River water, and the rearing containers mimic the natural river environment in many respects. Analysis of coded-wire tag recoveries from approximately 200,000 Upriver Bright fall chinook reared at Priest Rapids Hatchery (*Oncorhynchus tshawytscha*), marked annually since 1973, indicates a significant contribution to the natural spawning on the Hanford Reach. It was found that on average 29.83% of the Priest Rapids Hatchery returns spawn on the Hanford Reach, and that hatchery-reared fish contribute up to 33.05% of adult returns to the Hanford Reach spawning grounds in any one year, averaging 8.63% over the 20 years surveyed. For the 1976 to 1989 broods, the average release to adult survival (including fishery contribution and escapement) of subyearlings released from Priest Rapids FH is 0.84%, roughly eight times higher than those subyearlings released at Wells FH. Priest Rapids FH provides eyed eggs to various facilities which rear this population. The subyearling chinook salmon program at Rocky Reach FH received 1,800,000 eggs from Priest Rapids up until 1995. They now are received from Wells FH. Efforts have recently been made to control the flow of the Priest Rapids population into the Wells FH and Eastbank FH programs, as it is considered by WDFW to be a separate Genetic Diversity Unit (Marshall et al. 1995). Adult fall chinook salmon return to the hatchery and adjacent spawning grounds from September through November and are collected as volunteers to the channel. Adults are collected from a trap at the dam ladder but these fish are usually surplus to the hatchery's on station production needs. There is usually a sufficient number of eggs taken to supply other hatcheries.

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.

Abstract:
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).

1.9 List of program "Performance Standards".

See Section 1.10 below.

1.10 List of program "Performance Standards", 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 $_{\text{Year y}}$	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.

	Ho: Δ Spawning Population = Δ Effective Spawning Population Ho: Age at Maturity $_{Hatchery}$ = Age at Maturity $_{Naturally\ produced}$ Ho: Size at Maturity $_{Hatchery}$ = Size at Maturity $_{Naturally\ produced}$	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 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 $_{Year\ x}$ > NRR $_{Year\ x}$ Ho: HRR ≥ Expected value per assumptions in BAMP	Monitor and evaluate hatchery and natural adult-to-adult replacement rate 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 $_{Hatchery\ fish}$ < 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 $_{Size}$ = Programmed $_{Size}$ Ho: Hatchery fish $_{Number}$ = + 10% of Programmed $_{Number}$	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 $_{Supplemented\ population}$ > Δ smolts/redd $_{Non\text{-}supplemented\ population.}$	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. $_{BKD}$ supplemented fish $_{Time\ x}$ = Conc. $_{BKD}$ supplemented fish $_{Time\ x}$ Ho: Conc. $_{BKD}$ supplemented stream $_{Time\ x}$ = Conc. $_{BKD}$ non-supplemented stream $_{Time\ x}$ Ho: Conc. $_{BKD}$ hatchery effluent $_{Time\ x}$ = Conc. $_{BKD}$ hatchery effluent $_{Time\ x}$ Ho: Conc. $_{BKD}$ supplemented stream $_{Upstream\ Time\ x}$ = Conc. $_{BKD}$ hatchery effluent $_{Time\ x}$ = Conc. $_{BKD}$ supplemented stream $_{Downstream\ Time\ x}$ Ho: Hatchery disease $_{Year\ x}$ = Hatchery disease $_{Year\ y}$	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 $_{\text{Year y through z}}$	

1.10.1 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 smolt-size (50 fish/lb) and released from the hatchery at a time that fosters rapid migration downstream. Adipose fin and CWT proportions have been determined sufficient 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-7013).	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 will be 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. Hatchery operations comply with all ESA permit requirements.	Section 10 annual reports are submitted in compliance with permits.	Section 10 annual reports are submitted in compliance with permits.
5. Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, 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	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

	routine basis. Multiple rearing sites or footprints for 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.	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.	Hatchery fall chinook reared to sufficient size 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). 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. 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. All listed fish will be released upstream or returned to natal streams immediately.	Fish culture and evaluation staff monitor behavior, coefficient of variation in length, and condition. Fish health specialists will certify all hatchery fish before release. Broodstock collection protocols will be developed each season and reviewed by the HCP Hatchery committees.

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

3,051 females and 3,051 males.

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

Production Below Rock Island Dam

Current production of fall chinook salmon at Priest Rapids FH is 100,000 lbs. of marked and unmarked subyearling smolts (5,000,000 fish at 50 fpp). In addition, 1,700,000 subyearlings are currently produced as partial mitigation for John Day Dam, which is funded from sources other than the MCMCP. Both these production groups will be maintained in Phase A. Under Phase A of the Mid-Columbia Hatchery Program, upriver bright fall chinook salmon releases from Priest Rapids FH would increase to 6 million subyearling smolts (120,000 lbs. at 50 fpp) plus the production for John Day mitigation. However, current or future production at Priest Rapids FH for John Day mitigation cannot preclude current or future production capabilities for the Mid-Columbia Hatchery Program. Production for the MCMCP will take priority over production for compensation programs outside the Mid-Columbia Region. The facility would be modified to meet this increased production objective. Modifications could probably include increased incubation and rearing capacities, although an analysis of program needs would be required prior to modifications.

The current, and future, expected size of the Priest Rapids Hatchery fall chinook hatchery program (fish production by facility) is indicated in the Mid Columbia Hatchery Plan@ (BAMP 1998). Current, annual production of fall chinook salmon at Priest Rapids Hatchery is 100,000 lbs. of marked and unmarked sub-yearling smolts (5,000,000 fish at 50 fpp). Releases are made from the hatchery located at RKm 662 on the Columbia River. In addition, 1,700,000 sub-yearlings are currently produced at Priest Rapids as partial mitigation for John Day Dam, which is funded through the U.S. Army Corps of Engineers, and not Grant County PUD. Both these production groups will be maintained for the near future.

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

For the 1976 to 1989 broods, the average release to adult survival (including fishery contribution and escapement) of sub-yearlings released from Priest Rapids Hatchery is 0.84% (BAMP 1998). Table 2 compares estimated, mean survival rates for WDFW summer and fall chinook sub-yearling and yearling smolt releases presented in the Mid-Columbia Hatchery Plan (BAMP 1998). The hatchery smolt to adult survival rate goal is 1.0 % (IHOT 1995).

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

Brood Year	Smolt to Adult Survival (%)
1990	0.60
1991	0.03
1992	0.23
1993	0.80
1994	0.06
1995	0.89
1996	0.39
1997	0.08
1998	0.53
1999	0.81*
2000	Na
2001	Na
2002	Na
2003	Na

*Preliminary numbers only.

Table 2. Release-to-adult survival rates of summer and fall chinook salmon reared as sub-yearlings and yearlings at selected hatcheries in the Mid-Columbia Region. Survival rates are expressed as un-weighted means of variable-sized release groups.

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

Table 2 is a compilation of the data used to estimate the contribution of PRH fish to Hanford Reach natural production and the calculation of that contribution. The proportion of Hanford Reach escapement attributable to PRH ranged from 1.33% to 33.05% with an average of 8.63%. Although the percent contribution oscillates from year to year, there is no discernible trend (Figure 1). The number of coded-wire tags recovered in each return year was highly variable, ranging from 0-856 recoveries (expanded). No coded-wire tags were recovered for return years 1992 and 1993; therefore, we were unable to calculate a PRH contribution to the spawning grounds for those years. Priest Rapids Hatchery returns to the hatchery, natural spawning, and percent of fish returns spawning in the wild are listed in Table 2. The proportion of Priest Rapids Hatchery fish returning to the Hanford natural production area ranged from 4.64% to 60.57% with an average of 29.83% (Table 3). The proportions of the hatchery returns that are recovered on the spawning grounds (expanded) are illustrated in Figure 3.

Table 3. Priest Rapids Hatchery returns to the hatchery, natural spawning, and percent of fish returns spawning in the wild (1980-2000).

Return year	Adult PRH contribution to Hanford Reach	Adult PRH returns to hatchery	Adult PRH returns to hatchery + wild	% PRH returns spawning in Hanford Reach
1980	1,813	2,192	4,005	45.27%
1981	1,045	1,594	2,639	39.59%
1982	2,362	2,613	4,975	47.48%
1983	2,052	3,014	5,066	40.51%
1984	2,681	6,387	9,068	29.56%
1985	1,395	11,956	13,351	10.45%
1986	22,831	14,865	37,696	60.57%
1987	14,203	18,171	32,374	43.87%
1988	9,105	9,966	19,071	47.74%
1989	856	6,496	7,352	11.64%
1990	1,669	3,479	5,148	32.42%
1991	1,410	2,636	4,046	34.84%
1992				
1993				
1994	2,511	13,819	16,330	15.38%
1995	2,885	10,740	13,625	21.17%
1996	2,336	14,280	16,616	14.06%
1997	3,364	10,836	14,200	23.69%
1998	734	15,074	15,808	4.64%
1999	3,349	23,101	26,450	12.66%
2000	3,280	7,235	10,515	31.19%
average	3,645	9,392	13,596	29.83%

Table 4. Components of total production in the Hanford Reach and Priest Rapids Hatchery and calculations of the contribution of Priest Rapids Hatchery to Hanford Reach natural production (1979-2001).

Brood year	Priest Rapids Hatchery # released	Priest Rapids Hatchery # CWT	Expanded # tags recov. on spawn ground	Return year	Hanford Escapement	Hanford Escapement less PRH contrib.	PRH contrib to Hanford (excl jacks)	% PRH contrib. (excl jacks)
1975	1,340,735	284,416	341	1979	22,600	22,289	311	1.38%
1976	759,146	147,338	221	1980	20,500	18,687	1,813	8.84%
1977	538,015	152,532	51	1981	13,544	12,499	1,045	7.71%
1978	1,197,297	153,156	172	1982	16,926	14,564	2,362	13.95%
1979	3,004,934	147,145	184	1983	32,681	30,629	2,052	6.28%
1980	4,817,750	236,738	120	1984	36,252	33,571	2,681	7.39%
1981	5,507,574	310,876	114	1985	59,579	58,184	1,395	2.34%
1982	10,296,700	406,529	920	1986	69,087	46,256	22,831	33.05%
1983	9,742,700	222,732	527	1987	81,046	66,843	14,203	17.52%
1984	2,954,000	202,244	67	1988	72,096	62,991	9,105	12.63%
1985	6,559,000	310,494	134	1989	64,333	63,477	856	1.33%
1986	6,048,000	201,843	42	1990	39,847	38,178	1,669	4.19%
1987	7,709,000	207,422	21	1991	31,298	29,888	1,410	4.50%
1988	5,404,550	204,470		1992	30,711	30,711		
1989	6,431,100	194,530	44	1993	32,577	32,577		
1990	6,386,000	199,469	100	1994	53,133	50,622	2,511	4.73%
1991	6,844,700	201,647	37	1995	38,074	35,189	2,885	7.58%
1992	6,386,000	194,622	28	1996	36,321	33,985	2,336	6.43%
1993	6,705,836	183,874	135	1997	35,645	32,281	3,364	9.44%
1994	6,702,000	178,496	8	1998	27,449	26,715	734	2.67%
1995	6,700,000	196,086	208	1999	27,720	24,371	3,349	12.08%
1996	6,644,100	193,203		2000	38,576	35,296	3,280	8.50%
1997	6,737,600	204,251		2001	45,999			
average	5,394,506	214,994	174	1,990	40,000		4,009	8.63%

Data is from the Columbia River Inter-Tribal Fish Commission

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

Priest Rapids Hatchery began operations as a full scale hatchery in 1981. The hatchery evolved from a spawning channel constructed downstream from Priest Rapids Dam in 1963. The facility was operated only as a spawning channel from1963-71, using summer/fall chinook adults trapped in the east ladder of Priest Rapids Dam. Artificial propagation of fall chinook at the site began in 1972, and between 1972 and 1977, part of the facility's production came from hatchery-raised chinook. Starting in 1978, all fish released from Priest Rapids have come from hatchery production (Chapman et al. 1994). As mentioned previously, production at Priest Rapids Hatchery has been self-sustaining since 1984, and no imports of fall chinook eggs or fry are needed to meet annual programmed release levels.

1.14 Expected duration of program.

The supplementation program will continue with the objective of mitigating the loss of fall-run chinook salmon productivity caused by hydroelectric dams in the Columbia River Basin.

1.15 Watersheds targeted by program.

Mainstem Mid-Columbia River Fall-run chinook salmon propagated and released through the Priest Rapids Hatchery program originated from natural and hatchery-origin summer/fall broodstock returning to the mid- and upper Columbia River region. The targeted watershed is the Columbia River mainstem below Priest Rapids Dam (WRIA 36-0001).

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

Priest Rapids Fall Chinook

1.16.1 Brief overview of issues:

Primary concern with this stock is the quality of the Priest Rapids Hatchery (PRH) itself. Facility is spread out over several miles, equipment and plumbing are outdated and extremely inefficient, well water is limited, river water is dependent on an old and unreliable pumping system, rearing densities exceed Agency guidelines, standby required housing is located 17 miles from the site, formalin discharges exceed allowable levels, etc. Currently, production of John Day Dam mitigation (1.7 million fingerlings) occupies valuable space and water, and may need to be moved. This will allow Grant County to meet new mitigation requirements under relicensing. Another concern is the probable increase in production under upcoming mitigation requirements. If the current program expands, or a new program is implemented, space and well water limits will have to be addressed. Traveling screen used at the river water intake does not meet ESA guidelines. This screen is Grant County PUD's responsibility, as it is located at the Priest Rapids Dam.

1.16.2 POTENTIAL ALTERNATIVES TO THE CURRENT PROGRAM

Priest Rapids Fall Chinook

Move John Day mitigation elsewhere (White Bluffs?), to free up space and water (CRITFC – Dompier).

1. POTENTIAL REFORMS AND INVESTMENTS

Priest Rapids Fall Chinook

Completely rebuild Priest Rapids for quality rearing of current program and any potential increases or changes covered during Grant County PUD's licensing period. WDFW and Grant County are currently in negotiations regarding rebuild, and many concerns are addressed in Grant's latest proposal.

The traveling screen used at the river water intake must be upgraded to comply with ESA guidelines. Although it is operated by hatchery staff, it is located on the Priest Rapids dam, and has historically been considered Grant PUD's responsibility (they conduct all maintenance on the screen). Grant is aware the screen is not in compliance, and have promised to address the problem.

Additional well water is desired for the current program, and absolutely necessary for any increased production or new programs.

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: Scientific Research/Enhancement- Artificial production of upper Columbia spring chinook. Expires Dec 31, 2007 but was amended on January 20, 2004 and expires January 20, 2014. 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). WDFW submits annual reports as conditioned by Section 10 permit # 1196 Section **Permit # - 1196** covering the period from January 1- December 31 each year. Broodstock retained may be used in the USFWS's Winthrop NFH Methow River Basin supplementation programs. Methow Fish Hatchery Complex activities are coordinated with the U.S. Fish and Wildlife Service (USFWS) spring chinook artificial supplementation program at the Winthrop NFH (ESA Section 10 Permit #1300).

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. The PUDs can be added as joint Section 10 permit holders (#1196) in accordance with the three HCPs such as happened in 2004.

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.

2.2.1 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

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 on March 24, 1999 under the ESA.

Upper Columbia River ESU summer steelhead trout (*Oncorhynchus mykiss).* The Upper Columbia River (UCR) Steelhead ESU was listed as Endangered on August 18, 1997. NOAA Fisheries is currently reviewing this listing in light of the decision to include hatchery produced UCR steelhead in the ESU. The final determination for this and nine other *O. mykiss* ESUs is expected in December of 2005.

Bull Trout populations (*Salvelinus confluentus*). 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.

As Priest Rapids Hatchery is below Priest Rapids Dam, listed fish are not directly affected by the program but bypass the hatchery to continue to the Upper Columbia ESU. Text below is only general to the Upper Columbia status of listed steelhead and spring chinook upstream of the hatchery. Counts of listed fish are made at Priest Rapids Dam. For further status review of individual population in the upper Columbia, see also Upper Columbia HGMPs.

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).

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 subbasin 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 spwning 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.

Trapping Operations: The only portion of the Priest Rapids Hatchery operation that may lead to the direct take of listed species is the broodstock trapping program. The hatchery channel trap, which is used to collect all fall chinook as volunteers in recent years, may collect straying listed fish, but the likelihood for such take is low. Upstream migrating wild steelhead native to the upper Columbia River drainages, and possibly, Snake River system wild steelhead, may be incidentally encountered as strays during fall chinook broodstock operations occurring between early September and mid-November at Priest Rapids Hatchery. A maximum total of 10 adult steelhead are encountered each year at the trap during chinook broodstock collection (1986-95 base year estimate from Paul Pederson, WDFW, pers.comm. June 1997). The incidence of wild steelhead straying to this facility is low. The hatchery trap does not incorporate a fish weir to guide fish into the hatchery outlet channel or into the trap. All fish returning to Priest Rapids Hatchery are of hatchery-origin, recruiting to the trap as volunteers. The trapping program is therefore not a "run of the river" operation, and captures of other species besides fall chinook salmon produced at the hatchery are minimal.

As a run-of-the-river operation, the Priest Rapids Dam east ladder trap, when used for the collection of fall chinook broodstock, may lead to the direct take of listed stocks, including Upper Columbia River ESU steelhead and (potentially) bull trout. The operation of this trap during the fall chinook return period is presently authorized for steelhead stock assessment purposes under Section 10 direct take permit # 1094 and for bull trout takes under a Section 6 cooperative agreement with USFWS.

Authorized activities at Priest Rapids Dam include the handling of from 246 to 735 Upper Columbia ESU-origin steelhead each year (1986-96 average range). These ranges represent 8-10 % of the passing steelhead population. Because the sample is collected through operation of the trap in one ladder at the dam 1.5 days per week, most of the steelhead return is allowed to pass unimpeded, and no additional taking of Upper Columbia steelhead is anticipated through this sampling program. In nine years of operation, WDFW personnel have not experienced any mortalities of adult steelhead collected for this program at Priest Rapids Dam (L. Brown, WDFW, pers. comm. August 1997). Trapping and sampling at Priest Rapids in future years is not likely to lead to the immediate mortality of listed steelhead. Stress, descaling and possible injury of captured fish is possible, possibly leading to delayed mortality or a decreased potential for successful spawning. Bull trout are occasionally observed in fish counting windows on the Columbia mainstem dams, and this species may be encountered during operation of the Priest Rapids Dam steelhead trapping program (L. Brown, WDFW, pers. comm., May 1998). However, Mongillo (1992) identified the reach of the Columbia River mainstem where the dam is located as not presently harboring a bull trout population. No bull trout are expected to be encountered as volunteers at the Priest Rapids Hatchery trap.

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). Run timing separates the migration of upper Columbia River spring chinook stocks from fall chinook stocks.

Disease interactions The Columbia River watershed is a single "Fish Health Management Zone" under the "Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State" (NWIFC and WDFW 1998), and transfers of salmon within the same zone are allowed from a fish disease management perspective. Regulated pathogens include bacterial kidney disease (BKD), which occurs routinely at virtually all of the facilities that rear chinook salmon, and the pathogen is ubiquitous in Columbia River basin chinook salmon populations, and infectious hematopoietic necrosis virus (IHNV), which has also been identified in adult chinook salmon returning to hatchery facilities in the UCR basin. North American

viral hemorrhagic septicemia virus (VHSV) is also regulated, as is *Myxobolus cerebralis* (the protozoan causing whirling disease) which has not been found in the UCR basin. The proposed artificial propagation program will be operated to comply with these guidelines. In addition, fish health protocols will be followed in accordance with Pacific Northwest FishHealth Protection Committee (PNFHPC 1989) and Integrated Hatchery Operations Team (IHOT 1995) guidelines for all programs. To reduce the likelihood for the amplification of fish disease, the incidence of viral pathogens in all salmon broodstocks is determined by sampling fish at
spawning in accordance with procedures set forth in the above documents. Fish health and condition would be monitored routinely during rearing by fish health professionals for each proposed program. Additionally, juvenile fish undergo fish health sampling prior to transfers between facilities and prior to release into the natural environment. NMFS finds that implementation of these guidelines is sufficient to minimize the risk of fish disease amplification through hatchery spawning practices, and disease transmission to listed adult fish outside of the hatcheries.

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 Columbia mainstem 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.

Predation, cannibalism, and residualism:
Predation by hatchery fish on natural-origin smolts is less likely to occur than predation on fry. The USFWS (1994) presented information indicating salmonid predators are generally thought to prey on fish approximately 1/3 or less their own length (see also Witty *et al.* (1995) citing Parkinson *et al.* (1989)). Consequently, predation by hatchery fish on listed salmon smolts in the migration corridor is believed to be low. Large numbers of artificially propagated steelhead may attract predators (birds, fish, pinnipeds) and, consequently, contribute indirectly to predation of naturally produced fish. On the other hand, a mass of hatchery fish moving through an area may confuse or distract predators and may provide a beneficial effect to naturally produced fish. Both effects may be occurring to some extent. The presence of large numbers of hatchery fish may also alter the listed species' behavioral patterns, which may influence vulnerability and prey susceptibility (USFWS 1994). Impacts from predation by hatchery-produced steelhead released below the UCR are not likely to be a substantial risk to ESA-listed naturally produced UCR steelhead because of their size at release and because they tend to migrate out of the basin quickly.

Residualism
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. WDFW will release only smolts with demonstrated readiness for seaward migration. Smolt releases can also be timed with water budget releases from upstream dams to further accelerate rapid downstream movement (WDFW 1997). Chinook salmon though do not tend to residualize (Groot and Margolis 1991).

Migration Corridor/Ocean
Hatchery and natural populations have similar ecological requirements and can potentially be competitors where critical resources are in short supply (LGMSC 1993). The artificial propagation programs will be managed to produce only juvenile steelhead ready for seaward migration. Proposed maximum production for these facilities is the same as when the Columbia basin annual production ceiling was established in 1995 (NMFS 1995; WDFW 1997). The Columbia basin annual production ceiling was based on the information on the effects of hatchery fish on listed fish in the migration corridor and ocean. Reviews of

the potential effects of hatchery fish in the migration corridor and ocean are provided by Hard (1994), NMFS (1995) and CBFWA (1996). Currently, the only way to address potential ecological interactions between hatchery and natural fish in the Columbia River basin is through the production ceiling (NMFS 1995), which limits the number of hatchery fish released into the basin. A total of about 72 million anadromous salmonid smolts are released from artificial propagation programs annually. The effects of the releases from Priest Rapids cannot be separated from all other smolt releases, nor can the effects of the entire release be determined at this time. NMFS concludes that the production ceiling protects ESA listed species and finds that based on the best available information of adverse impacts in the migration corridor and ocean that the proposed programs have only minor transitory effects.

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).

Take Description and Levels are covered under Incidental Take Permit 1347 (artificial propagation of unlisted salmon). Incidental takes of ESA-listed species associated with broodstock collection activities, hatchery operations, and juvenile fish releases from the program are authorized 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 Rapids hatchery-origin fall chinook salmon.
- The holding and artificial spawning of collected adults at Wells, Eastbank, and PriestRapids Hatcheries, and Lake Wenatchee Net Pens.
- The incubation and propagation from the fertilized egg through the fingerling, pre-smoltor 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-smoltsfrom the hatcheries for rearing at facilities in the Wenatchee, Methow, and OkanoganRivers' watersheds, and to net-pens in Lake Wenatchee.
- The release of summer chinook salmon, fall chinook salmon, and sockeye salmon smoltsinto the Wenatchee, Methow, and Okanogan Rivers' basins, and into the mainstemColumbia 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 ascalled 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.

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 that deviates from permit conditions or take levels would be communicated to NOAA Fisheries per permit conditions (#1395 and #1196).

Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.
Annual Progress Reports as a condition of Section 10 permit compliance are provided from WDFW to NOAA Fisheries for past takes associated with the Section 10 permit (#1395 and # 1196).

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 artificial propagation activities of this program are included within the MCMCP, a conservation planning initiative in the mid-Columbia River Basin designed to bolster the productivity of salmonid populations in a manner that is compatible with self-sustaining populations. The MCMCP includes approaches for hatchery production that will contribute to the rebuilding and recovery of naturally spawning stocks throughout the Mid-Columbia region to the point that those stocks can be self-sustaining, supporting harvest, while maintaining genetic and ecologic integrity (MCMCP 1998). A Biological Assessment and Management Plan (BAMP) has been assembled as a part of the MCMCP that describes approaches to be applied within the region under a Mid-Columbia River Hatchery Program. This program is a consensus plan by fish co-managers for development, operation, and evaluation of anadromous salmonid hatcheries in the Columbia River upstream of the Yakima River confluence (BAMP 1998). The co-managers include National Marine Fisheries Service (NMFS), U. S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, Yakama Indian Nation, Colville Confederated Tribes, the Confederated Umatilla Tribes, and Chelan, Douglas, and Grant Public Utility Districts (PUDs).

The hatchery program is part of an application for the 50-year multi-species MCMCP and relicensing agreement for the PUDs. The 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 the 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. The first objective (recover populations that are at risk of extinction) takes precedence, and will guide the strategies used in the initial years of the hatchery program. Once it appears that populations have recovered, and if it can be done in a manner that will not jeopardize them, hatchery production of these populations will increase to meet the second objective (compensation for hydropower-related mortalities).

The program described in this HGMP is consistent with the following general agreements and plans:

- The Columbia River Fish Management Plan (CRFMP)
- *U.S. vs. Oregon* court decision
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations Team (IHOT) Operation Plan 1995 Volume III.
- Pacific Northwest Fish Health Protection Committee (PNFHPC)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Sub Basin Plans
- Washington Department of Fish and Wildlife (WDFW) Wild Salmonid Policy

WDFW's Yearly Future Brood Document (FBD)

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

Artificial production in the Columbia Cascade Province has been primarily driven by mitigation agreements with Douglas County, Chelan County, and Grant County Public Utility Districts, and the Grand Coulee Mitigation Agreement of the U.S. Bureau of Reclamation. The Columbia River Fish Management Plan arising from the US v. Oregon process includes hatchery programs, but this plan has expired and is no longer in force.

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).

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

- Upper Columbia River Steelhead Management Plan. Fishery management objectives within the UCRSMP and HGMP are consistent.
- The Upper Columbia Salmon Recovery Board (UCSRB and the Regional Technical Committee (RTT): The UCSRB is a partnership among Chelan, Douglas, and Okanogan counties, the Yakama Nation, and the Confederated Tribes of the Colville Indian Reservation in cooperation with local, state, and federal partners. The mission of the UCSRB is *to restore viable and sustainable populations of salmon, steelhead, and other at-risk species through the collaborative efforts, combined resources, and wise resource management of the Upper Columbia Region.* To better meet its mission, the UCSRB wishes to ensure that actions taken to protect and restore salmonid habitat in the region are based on sound scientific principles.
- Northwest Power Planning Council 2000 Fish and Wildlife Program. The proposed hatchery program is consistent with the Vision, Goals, Objectives, and Strategies of the 2000 Fish and Wildlife Program as well as the Okanogan Subbasin Summary created under the Fish and Wildlife Program.
- National Marine Fisheries Service Biological Opinion for Operation of the Federal Columbia River Power System. The work to be conducted under this HGMP is consistent with several Reasonable and Prudent Alternatives as described in the BiOp for the FCRPS (109, 169, 171).
- Mid-Columbia River Habitat Conservation Plan. The HCP indicates that the preferred strategy for the Okanogan River steelhead program is to develop a local population for broodstock to promote local adaptation. The proposed work intends to accomplish this program reform.

3.3 Relationship to harvest objectives.

The Priest Rapids fall 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 fall 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 fall chinook releases, including predation, competition, and disease transfer, are expected to be minimal.

Fisheries for summer/fall chinook in the Columbia River are managed under provisions of the Columbia River Fish Management Plan, adopted by U.S. District Court in 1988. URB fall chinook produced at Priest Rapids are harvested in directed fisheries in the mid- and lower Columbia River. In-river fisheries significantly supported by Priest Rapids production include sport fisheries in the Hanford Reach area, Buoy 10, and Zone 1; tribal fisheries from Bonneville Dam upstream; and non-Indian drift gillnet fisheries from the mouth of the Columbia River to Bonneville Dam. In-river harvest of fall-run chinook of up-river origin averaged 131,000 adults from 1987-192 (Chapman et al. 1994). Priest Rapids fall chinook are also harvested in marine area fisheries in Oregon, Washington, British Columbia, and Alaska.

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

Priest Rapids Fall Chinook

The URBs are major contributors to Pacific Fishery Management Council (PFMC) and Pacific Salmon Commission (PSC) fisheries, and are an escapement indicator stock/ model stock to the Chinook Technical Committee(CTC) of the PSC.

The 1982-89 brood year average ocean fisheries exploitation rate for mid-Columbia River summer/fall chinook is 39 %, with a total exploitation rate of 68 % estimated for the same years (Myers et al. 1998). Chapman et al. (1994) estimated that the 1975-87 brood year mean exploitation rate for fish released from Priest Rapids Hatchery was 64 % (with adult-equivalents accounted for).

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

Priest Rapids Fall Chinook Fingerling Fisheries Contributions.

Brood Year	Program Release #	# of Fish Program Contributed to fisheries	Proportion(%) of Total Catch								
			AK & Can. Commercial fisheries	OR, WA, WA Treaty Troll	AK and Can. Ocean Sport	WA Ocean Sport*	OR Ocean Sport	Fresh-water Sport**	Treaty C&S	Col. R. Gillnet	Misc. Fishery Contribution (<1%)
1990	5,041,492	15,587	56.6	0.0	5.6	1.3	0.0	8.6	0.0	26.6	1.4
1991	6,297,258	337	40.4	0.0	0.0	0.0	0.0	0.0	5.4	54.2	0.0
1992	4,964,844	5,413	25.8	1.3	6.0	1.2	0.0	10.0	0.0	50.0	5.6
1993	6,520,153	2,311	27.6	2.0	7.0	2.1	0.0	16.1	0.0	42.3	2.9
1994	4,826,120	1,806	27.8	0.0	8.3	0.0	0.0	29.4	0.0	34.5	0.0
1995	4,803,811	21,417	40.8	1.0	10.2	2.2	0.0	11.4	0.0	32.7	1.8
1996	4,751,485	9,271	24.0	0.0	11.0	2.2	0.0	16.2	0.0	42.7	3.8
1997	4,832,821	2,515	24.2	2.0	8.0	2.0	0.0	5.0	0.0	59.0	-0.1
1998	4,648,140	11,584	29.5	2.5	3.3	3.2	0.0	12.2	0.0	46.9	2.4
1999	4,951,657	25,308	32.4	1.4	4.1	1.7	1.1	8.9	0.0	49.0	1.5
Average	**5,163,778**	**9,555**	**32.9**	**1.0**	**6.3**	**1.6**	**0.1**	**11.8**	**0.5**	**43.8**	**1.9**

*** Contains WA Buoy 10 fisheries. ** Combined WA and OR Columbia River and Col. R. tributaries.**

Source: WDFW and RMIS

Given fishery protection measures implemented in pre-terminal area, mainstem Columbia River and upper river tributaries to protect ESA-listed and depressed salmonid populations, future harvest rates on fish propagated by the program and on natural populations in the target area are expected to be lower than the mean level estimated for the 1975-87 period.

3.4 Relationship to habitat protection and recovery strategies.

The Hanford Reach, as mentioned earlier, is the only free-flowing section of the Columbia River above Bonneville Dam in the United States. It runs approximately 50 miles from the head of Lake Wallula upstream to Priest Rapids Dam. In the Hanford Reach, the river maintains its historical profile and riverine character, although flows are locally modified at Priest Rapids Dam for optimum power generation and fish benefits. Regulation of flows has resulted in significantly different annual and diurnal shoreline shifts that affect the river's pre-development character.

Habitat protection efforts, including improvements in dam passage survival rates, combined with sub-yearling fall chinook production from the Priest Rapids program, are expected to benefit natural fall 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 fall chinook programs will be used to boost the upper river adult population to a level approaching 9,000 fish at Priest Rapids Dam (1974 - 1983 average level identified for initial compensation from BAMP 1998). Fall chinook sub-yearlings are produced at Priest Rapids to mitigate for natural adult chinook salmon production to fisheries lost as the result of the construction and operation of the Priest Rapids, Wanapum, and John Day hydroelectric projects. 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 fall chinook release program is based will therefore work in concert with the regional habitat restoration program.

The main fresh-water habitat problem presently facing this ESU is hydropower dams in the mainstem Columbia River, which have probably reduced returns of summer/fall chinook salmon (Chapman et al. 1994). Measures taken by the Mid-Columbia PUDs to improve natural production of anadromous fish in the region are designed to compensate for mortality in project and reservoir passage. Two strategies will be applied: (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).

WDFW is a cooperating agency involved in regional fish and wildlife planning and technical assistance effort through the Upper Columbia Salmon Recovery Board (UCSRB). The mission of the UCSRB is to restore viable and sustainable populations of salmon, steelhead, and other at-risk species through the collaborative, economically sensitive efforts, combined resources, and wise resource management of the Upper Columbia Region. Along with Chelan, Douglas, and Okanogan counties, the Yakama Nation, and Colville Confederated Tribe, local, state, and federal partners, agency staff will be working closely in partnership with existing planning efforts in the region including Wenatchee Watershed Planning, Entiat Watershed Planning, Lead Entities, Regional Fisheries Enhancement Group, and Salmon Recovery Planning.

Six fish and wildlife plans (also known as "subbasin plans") have been be developed for the following "subbasins" (commonly known as watersheds): Wenatchee, Entiat, Lake Chelan, Methow, Okanogan, and the mainstem Columbia River from Rock Island dam to the Canadian border. Subbasin plans have been submitted to the Northwest Power Planning Council in May 2004. These subbasin plans will identify and provide the basis for prioritizing project proposals to be submitted to the Northwest Power Planning Council in future funding cycles and will be used, potentially, for salmon recovery planning in North Central Washington.

WDFW helps ensures that actions taken to protect and restore salmonid habitat in the region are based on sound scientific principles thru technical assistance of Regional staff. In addition to habitat, WDFW is involved with the Yakama Nation and Colville Confederated Tribes in helping develop recovery goals, and providing coordination and representation for all 4 H's (Harvest, Hydro, Hatcheries and Habitat). At the watershed scale, technical tools such as Limiting Factors Analysis (LFA), Ecosystem Diagnosis and Treatment (EDT) and SSHIAP (Salmon and Steelhead Inventory and Assessment Program) will used to identify factors that currently impact salmon and the priority actions needed in the watershed.

Production of Wenatchee sockeye salmon is primarily limited by oligotrophic conditions in Lake Wenatchee (sole rearing lake)(BAMP 1998). Lake Wenatchee is reported to be the least productive sockeye rearing lakes in North America (Allen and Meekin 1980), yet the habitat and migration conditions are generally considered good in this basin (Mullen 1986, BAMP 1998). NMFs expressed concerns about effects of hydropower development in the Columbia River on the health of Lake Wenatchee sockeye (Gustafson et al. 1997). The main freshwater habitat problem currently facing this ESU is hydropower dams in the mainstem Columbia River, which probably reduce returns of sockeye salmon (Chapman et al. 1995). Measure 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 Columbia River and in the four major tributaries, including the Wenatchee River.

Bugert et al. (1997) maintain that the spawning habitat for the Wenatchee population is highly susceptible to degradation or loss. This may greatly affect the viability of naturally produced sockeye salmon. In the Wenatchee Watershed, most sockeye spawn in the lower 15 km of the White River, which is vulnerable to housing development. Bugert et al. (1997) identified this as the single most important habitat to protect the Wenatchee Watershed.

The supplementation program for the Wenatchee sockeye salmon is based on the premise that current stock productivity has a major limiting factor because of low spring zooplankton production in Lake Wenatchee (BAMP 1998). Mullan (1996) hypothesized that low zooplankton densities limited growth and survival of sockeye fry in Lake Wenatchee from fry emergence through early summer, particularly in years with high snow accumulations and resultant nutrient flushing from the lake. The existing population and proposed additional production is designed to circumvent this bottleneck by providing rearing in net pens until fall or late summer, when zooplankton densities are much higher. This strategy is based on the concept that release of juveniles in the late summer to fall will not reduce survival of naturally produced sockeye rearing in the lake because food is abundant in late summer and winter survival is probably not density dependent.

Habitat protection efforts, combined with production from the sockeye supplementation program, are expected to benefit natural sockeye production over the short-term and long-term. Improvements in dam passage survival rates, and circumvention of the bottlenecks to productivity afforded by the sockeye supplementation program will be used to boost the populations to a level approaching or exceeding 32,000 adults.

3.5 Ecological interactions.

Salmonid and non-salmonid fishes or other species that could:
(1) negatively impact program;
Fall chinook are released as sub-yearling smolts in the late spring. Competition for food may play a role in the mortality of liberated fall 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 pikeminnow poses a high risk of significant negative impact on productivity of enhanced chinook (SIWG 1984). The degree of predation risk 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).

(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 of unknown degree 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 other salmonid species that escape to spawn in upper Columbia River tributaries may contribute nutrients to the system upon dying that would benefit fall chinook productivity in the Hanford Reach, and for emigrating Priest Rapids fish in the lower Columbia River.

(4) be positively impacted by program.
Priest Rapids Hatchery fall chinook juveniles released through the WDFW programs may benefit co-occurring salmonid populations. A mass of emigrating hatchery fish may overwhelm established predator populations, providing a beneficial, protective effect to co-occurring wild fish. Increased numbers of hatchery-origin fall 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.

The main supply draws river water via a 54" diameter siphon intake located on Priest Rapids Dam (Chapman et al. 1994). This line can supply the hatchery with up to 120 cfs of water from the Columbia River, which is the "home" water source for the propagated population. Temperature from winter to late summer ranges from 0.3 – 20.0 (ºC). Six wells drilled on the hatchery site can provide a combined sustainable yield of approximately 16 – 18 cfs. Temperature from winter to late summer ranges from 1.3 – 16.0 (ºC). Both river water and well water may be used for adult holding, incubation and rearing (IHOT 1995).

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.

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.

Programs are operated and monitored 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.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

In recent years, all of the fall chinook broodstock used for the Priest Rapids Hatchery program have been obtained as volunteers to the hatchery trap in the outlet channel. Adult fall chinook salmon return to the hatchery and adjacent spawning grounds from September through November and are collected as volunteers to the channel. Adults have in the past been collected from the east ladder trap in Priest Rapids Dam, but these fish were usually surplus to the hatchery's on station production needs. There is usually a sufficient number of eggs taken to supply other hatcheries. Adults are collected throughout the entire run to ensure that the run timing for these populations is maintained.

Trapping procedures at the head of the outfall channel at Priest Rapids Hatchery include capture of fall chinook volunteering to the trap, transfer to the hatchery adult holding pond, and holding in the pond through maturity. An approximate mixed well water/river -origin water discharge of 100 cfs attracts returning fall chinook to the hatchery outlet channel. Fish entering the outlet channel must swim approximately ½ mile up the channel before encountering the hatchery trap. Upon traveling up the channel, the fall chinook jump a finger weir, which is the trap entrance. The weir prevents the fish from backing downstream, and fish are held briefly in trap for transport by tank truck one mile to the adult holding pond. The holding pond is supplied with 100% well water to maintain the pond temperature at a low level for fish health purposes.

Although no longer used for fall chinook broodstock collection, stock assessment trapping procedures at Priest Rapids Dam include collection of migrants, and holding, anesthetizing, and handling prior to passage upstream. The trap in Priest Rapids Dam is located at the top of the right bank ladder. In order to capture fish, a gate is closed in the fish-way, and upstream-migrating fish are entrained into a *Denil* ladder, where they are either shunted to the dam forebay or into a temporary brail for sampling. The temporary brail measures 6' wide x 4.5' long x (up to) 12' deep. The trap is actively operated and fish are transferred immediately from the temporary brail to sampling tanks. Because the trap is actively operated, captured steelhead and fall chinook salmon are held for a minimal amount of time in the trap holding area. Fish are anesthetized using MS-222 in accordance with WDFW guidelines. Scales are collected from captured fish for age analysis. Fish are identified as of wild or hatchery-origin through examination for fin-clips and any observations regarding gill net or predator marks are also noted. Data collected are used to extrapolate the total up-river adult run size, hatchery and wild fish contribution to the total, and age class contribution. All fish sampled through the program are revived and passed immediately upstream.

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

A 1,000 gallon tanker truck equipped with oxygen is used to haul trapped adults a short distance to the holding ponds. Fish are released from the hatchery and do not require transportation.

5.3 Broodstock holding and spawning facilities.

Fall chinook spawners at Priest Rapids Hatchery are maintained in a 206,000 ft3 holding pond through maturity. Only well water is used to supply the pond, but back-up is available in the event of a loss of power through gravity feed from Priest Rapids Dam. The maximum temperature of groundwater used at Priest is 16.0 degrees Celsius (range 1.6 - 16.0 degrees from BAMP 1998).

5.4 Incubation facilities.

The hatchery has 80 stacks of vertical incubators housed in a 4,000 ft2 hatchery/incubation building. The incubation facility is supplied with well water, but gravity feed water from Priest Rapids Dam is available as a back-up in the event of a power loss.

Incubator Type	Units (number)	Flow (gpm)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
Vertical stack trays	1,280	3.5	10,000	6500
Deep trough	2	10	70,000	Not hatched

5.5 Rearing facilities.

Fall chinook fry are reared to sub-yearling smolt size at Priest Rapids in 80- x 8 x 3 ft above ground vinyl raceways or in 250 x 36 x 4 ft deep channel ponds. Either gravity feed or well water may be used to supply the ponds for rearing.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index
12	vinyl	2800	100	8	3.5	200	536
5	concrete	26250	250	28	3.75	5000	

5.6 Acclimation/release facilities.

Fingerlings are acclimated, reared to smolt size, and released at Priest Rapids Hatchery in either the vinyl raceways or channel ponds described above. Rearing on parent river water or acclimation for several weeks to parent river water is done to ensure strong homing to the facility.

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

The channel rearing ponds do not drain completely that can result in end of the pond loss especially if the fish have not chosen to exit the kettle drain system. This structural problem should be addressed in future re-licensing agreements. Also, channel ponds have bird twine running perpendicular over the ponds but fish are still vulnerable to significant avian predation.

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.

Listed fish are not propagated at Priest Rapids Hatchery. For protecting on-station programs, The risk of catastrophic loss is minimized through the availability of two separate water supply sources for the hatchery. The availability of gravity feed water from the Columbia River reduces the concern for water loss that may occur with power outages. High water temperatures in the reservoirs during late summer and early fall that periodically causes stress-related mortality if returning adults can be attenuated through increased infusion of well water.

Section 6. Broodstock Origin and Identity

6.1 Source.

Broodstock used in the program are collected from the run at large volunteering to the hatchery trap. Fall chinook volunteering to the trap are almost entirely hatchery-origin fish, although some wild fish also recruit, as gene flow between the hatchery and the Hanford Reach natural production is thought to be significant (BAMP 1998). Fall chinook propagated through the program originated predominately from adults returning to the volunteer trap or to the east bank fish ladder at Priest Rapids Dam. During the 1970s and early 1980s, however, some eggs were transferred into the facility from outside sources in an attempt to build production (Chapman et al. 1994). These sources included eggs from the Bonneville and Kalama Falls hatcheries and the Ringold Rearing Ponds. The hatchery became self-sustaining in 1984, and the practice of importing eggs into the facility ended that year.

6.2.1 History.

The original stock used in the Priest Rapids spawning channel came from late-run chinook trapped at Priest Rapids Dam. Most of these fish were destined for areas in the Mid-Columbia River drainage upstream from Priest Rapids, although some of the fish trapped may have originated from Hanford Reach or other Columbia Basin areas. Before 1987, the hatchery depended heavily on fish trapped in the east bank ladder to provide broodstock. From 1972 through 1986 about 37 % of the adults held at the hatchery came from fish that attempted to pass Priest Rapids Dam. Egg transfers into the hatchery from Bonneville, Kalama Falls, and Ringold hatcheries in the late 1970s and early 1980s may also have influenced the genetics of the broodstock. When these transferred stocks returned as adults to the hatchery, their genetic material was incorporated into the hatchery stock. As mentioned previously, Priest Rapids Hatchery has been self-sustaining since 1984. In addition, since 1989, all of the adults used in the program have come from fall chinook volunteering to the hatchery trap. These broodstock collection changes have led to a decreased gene flow into the hatchery stock from upstream-bound fish, but Wells Hatchery lineage fish are still captured as volunteers to the hatchery trap. Stray hatchery and wild-origin from other Basin areas, including Hanford Reach, also volunteer to the hatchery trap each year and are incorporated into the broodstock.

Ocean-type chinook salmon in the ESU including Priest Rapids Hatchery fish have been mixed considerably over the past five decades, not only among stock groupings, but among individual runs comprising the stock groupings as well (Myers et al. 1998). This mixing was due to the variety of methods employed to collect broodstock at dams, hatcheries, or other areas and as a result of juvenile introductions into various areas. Waknitz et al. (1995) reported that, partly as a result of hatchery practices, there were no significant genetic differences between summer- and fall-run chinook salmon in the ESU. Priest Rapids Hatchery fish are therefore not genetically distinguishable from summer-run adults returning to Wells Hatchery, the Wells Dam trap, or the Similkameen River (Waknitz et al. 1995).

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 considered in whole (Chapman et al. 1994; Myers et al. 1998). Of the 105 million fall-run chinook released from the Priest Rapids Hatchery since 1960, two percent (2.62 million) originated from outside of the Upper Columbia summer/fall chinook salmon ESU. Priest Rapids Hatchery-origin and lineage fish comprised 71.4 % of the total number of released over this period (1960-93 release data from Myers et al. 1998).

6.2.2 Annual size.

The spawning protocol mandates the use of a spawning population of at least 500 adults. The current annual broodstock collection goal for the Priest Rapids program is 6,102, equally divided by sex (IHOT 1995). Future production alternatives specified in the Mid-Columbia Hatchery Plan (BAMP 1998) will necessitate the annual collection of an additional 1,060 adults (1:1 sex ratio) to meet increased Priest Rapids Project fall chinook smolt production objectives (6.0 million sub-yearlings).

The current collection goal of 6,102 fall chinook for use as broodstock is not expected to adversely affect the population status of the natural population relative to critical and viable thresholds. The program relies on predominately hatchery-origin adults that volunteer to the hatchery trap, and the number of natural fish removed, and the impact on the viability of the naturally spawning populations, are minimal. As cited in Chapman et al. (1994), Norman (1992) estimated optimum escapements for adult fall-run chinook passing McNary Dam of either 21,905 or 41,094. The Columbia River Fish Management Plan of 1993 specified an escapement goal of 45,000 up-river bright fall chinook past McNary Dam.

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

From 1972 through 1986 about 37 % of the adults held at the hatchery came from fish that attempted to pass Priest Rapids Dam. Beginning in 1989, fish were no longer secured from the Priest Rapids Dam east bank ladder, significantly decreasing the number of natural fish incorporated into the hatchery broodstock. Broodstock used in the program are now secured only from hatchery and natural fall chinook adults volunteering to the Priest Rapids Hatchery trap. Chapman et al (1994) reported that wild-origin (mainly Hanford Reach) fish still recruit to the volunteer trap, at unknown levels relative to the total number collected. Fall chinook from other natural production areas in the Columbia Basin also recruit to the volunteer trap (CWT recovery data from Chapman et al. 1994). Extensive gene flow occurs between the hatchery and the Hanford Reach natural production.

6.2.4 Genetic or ecological differences.

There are no known genotypic, phenotypic, or behavioral differences between the hatchery fall chinook stock and natural fall chinook stocks within the Upper Columbia summer/fall chinook ESU.

6.2.5 Reasons for choosing.

Fall chinook salmon propagated through the program represent the indigenous Hanford Reach and mid- and upper Columbia River Basin up-river bright fall chinook populations, which are the target of the mitigation program.

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.

Adult fall chinook salmon have, in the past, been collected from the east ladder trap in Priest Rapids Dam, but these fish were usually surplus to the hatchery's on station production needs. Although fall chinook adults have not been collected from the east ladder trap since 1989, the WDFW has proposed to collect run at large UBR fall chinook broodstock at the east ladder trap from September through November in years when collections at Priest Rapids Hatchery are below desired levels. The weekly effort of trap operation within this period is dependent on the abundance of chinook salmon migrating through the ladder, and the number of adult fish required to augment broodstock collections at the Priest Rapids Hatchery trap. Natural and hatchery-origin URB chinook salmon,

and stray fall-run chinook salmon from other Columbia River regions may be taken in the east ladder trap. Migrating listed UCR steelhead may also be trapped incidentally when the east ladder trap is operated.

In addition, the Pacific Salmon Treaty's Chinook Technical Committee (CTC) has mandated marking a survival index group of 200,000 natural-origin Hanford Reach chinook salmon juveniles annually. The natural fish marking project is a cooperative effort with the Yakama Nation.

Section 7. Broodstock Collection

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

Adults volunteering to the Priest Rapids trapping facilities.

7.2 Collection or sampling design

Adults are collected throughout the entire run to ensure that the run timing for these populations is maintained. The spawning protocol mandates the use of a spawning population of at least 500 adults. When spawning fewer than 1 million eggs in a day, the male to female ratio will be 1:1 for all populations. When spawning more than 1 million eggs in a day, the ratio will not be less than 1 male to 3 females. A portion of each day's egg take is used for on-site hatchery production. The intent of the broodstock collection procedure applied at the hatchery is to collect enough adults to maintain the hatchery production program. The hatchery goal for annual adult collections is 6,102. Surplus eggs are supplied to other hatcheries when available (IHOT 1995). Adults are collected throughout the entire run to ensure that the run timing of the population under propagation is maintained.

The number of natural-origin fall chinook trapped at the hatchery each year is unknown (J. Sneva, B. Foster, WDFW, pers. comm.), but is thought to be low due to the location of the trap high in the outlet channel, and the use of well water to supply the channel to attract hatchery-produced adult fish. Broodstock collection is proposed with the following sideboards:

- Retain salmon broodstock across the entire run to ensure that the run timing for the population is maintained;
- When stray salmon from a program outside the mid-Columbia exceeds 5 percent, then remove those stray salmon from hatchery broodstock;
- Operate the Priest Rapids Hatchery trap three days a week during the September through November;

Adult fall chinook salmon have, in the past, been collected from the east ladder trap in Priest Rapids Dam, but these fish were usually surplus to the hatchery's on station production needs. Although fall chinook adults have not been collected from the east ladder trap since 1989, WDFW has proposed to collect run at large UBR fall chinook broodstock at the east ladder trap from September through November in years when collections at Priest Rapids Hatchery are below desired levels. The weekly effort of trap operation within this period is dependent on the abundance of chinook salmon migrating through the ladder, and the number of adult fish required to augment broodstock collections at the Priest Rapids Hatchery trap. Natural and hatchery-origin URB chinook salmon, and stray fall-run chinook salmon from other Columbia River regions may be taken in the east ladder trap. Approximately four percent of the fall chinook salmon produced through the program are marked with an adipose fin-clip/CWT combination. In addition, the Pacific Salmon Treaty's Chinook Technical Committee (CTC) has mandated marking a survival index group of 200,000 natural-origin Hanford Reach chinook salmon juveniles annually. The natural fish marking project is a cooperative effort with the Yakama Nation.

Although Priest Rapids Hatchery has been self-sustaining in terms of adult fall chinook returns since 1984, egg or fish importations from other facilities may still be allowed to achieve production goals while maintaining regional genetic integrity in times of inadequate hatchery returns (IHOT 1995). Eggs from Priest Rapids Hatchery-origin adults are always given priority for station use. The other fall chinook stock grouping approved for release, but viewed as less well suited than the Priest Rapids Hatchery stock, are mainstem Columbia River up-river brights.

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.

7.3 Identity.

Columbia River Upriver Bright (URB) stock are defined as wild and hatchery fall chinook originating upstream of McNary Dam (All-Species Review 1996). The target population is the Priest Rapids hatchery fall chinook stock. The population is included as part of the Upper Columbia Summer/Fall Chinook ESU (Myers et al. 1998). The hatchery-origin fish are genetically indistinguishable from other URB fall chinook populations present in the project area during the September-November broodstock collection period (Waknitz et al. 1995; Myers et al. 1998). Broodstock are collected from the run at large volunteering to the Priest Rapids Hatchery trap. A proportion of the fall chinook released through the program have an adipose clip/coded wire tag marking combination, enabling evaluation of the contribution of Priest Rapids hatchery fish to the annual broodstock collection

7.4 Proposed number to be collected:

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

3,051 females and 3,051 males

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.

Year	Adults		
	Females	Males	Jacks
1990	2,276	1,203	451
1991	1,533	1,103	1,088
1992	2,615	3,482	1,161
1993	3,732	5,231	277
1994	7,801	6,018	752
1995	4,664	6,076	982
1996	5,044	9,236	131
1997	6,168	4,668	1,625
1998	4,216	10,858	1,101
1999	11,386	11,715	258
2000*	3,299	1,825	87
2001*	3,226	1,597	61
2002*	3,565	1,834	na
2003*	3,176	1,640	26

2004*	3,074	1,667	27
2005			

Since 2000, numbers represent fish used for broodstock only.

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

Surplus adults are sold to fish buyers under contract with WDFW for receiving hatchery carcasses. Most fish have been inoculated with aquamycin including pond mortality.

7.6 Fish transportation and holding methods.

Fall chinook collected in the Priest Rapids Hatchery trap are transported by tank truck one mile to the adult holding pond on the main hatchery grounds where they are held for spawning. The holding pond is supplied with 100 % well water to maintain adult fish in cooler water than available from the river. The adult pre-spawning survival objective for the program is 90 %. No takes of ESA-listed fish occur through the broodstock holding operation.

Equipment Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Tank Truck	1,000	Y	N	10	none	NA

Adult Holding Pond:

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
2	concrete	24500	250	28	3.5	2000

7.7 Describe fish health maintenance and sanitation procedures applied.

The Columbia River watershed is a single "Fish Health Management Zone" under the "Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State" (NWIFC and WDFW 1998), and transfers of salmon within the same zone are allowed from a fish disease management perspective. Regulated pathogens include bacterial kidney disease (BKD), which occurs routinely at virtually all of the facilities that rear chinook salmon, and the pathogen is ubiquitous in Columbia River basin chinook salmon populations, and infectious hematopoietic necrosis virus (IHNV), which has also been identified in adult chinook salmon returning to hatchery facilities in the UCR basin. North American viral hemorrhagic septicemia virus (VHSV) is also regulated, as is *Myxobolus cerebralis* (the protozoan causing whirling disease) which has not been found in the UCR basin. The proposed artificial propagation program will be operated to comply with these guidelines. In addition, fish health protocols will be followed in accordance with Pacific Northwest Fish Health Protection Committee (PNFHPC 1989) and Integrated Hatchery Operations Team (IHOT 1995) guidelines for all programs.

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. Necropsy based condition assessments (based on organosomatic indices) will be used to assess condition of hatchery reared 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.

Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC), WDFW's Fish Health Manual November 1966, updated March 30, 1998 or Co-manager guidelines are followed. Fish health procedures used for disease prevention includes biological sampling of spawners, and (in 1992) prophylactic treatment of spawners with an approved therapeutant. 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).

Therapeutic and Prophylactic Treatments:

- Adult fall chinook are injected with antibiotics for the control of bacterial diseases.
- At spawning, eggs will be water-hardened in iodophor as a disinfectant.
- Juvenile fish will be administered antibiotics orally for the control of bacterial infections.
- Formalin (37% formaldehyde) is dispensed into water for control of parasites on fungus on eggs, juveniles and adult salmon. Treatment dosage and time of exposure varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration will be used for treatments.

7.8 Disposition of carcasses.

Carcasses of fall chinook spawned through the Priest Rapids programs are either utilized for nutrient enhancement projects or buried on-site at the hatchery**.**

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.

Fall chinook are not listed but listed fish can volunteer to the trap facility. In trapping operations directed at the collection of broodstock, WDFW will apply measures that minimize the risk of harm to listed salmon and steelhead. Migrating listed UCR steelhead may be trapped incidentally when the east ladder trap is operated. 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. 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. 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.

Adverse effects on listed fish that may be encountered incidentally during trapping are minimized through the following measures:

- The Priest Rapids Hatchery trap will be continuously monitored and operated 3 days per week during the hatchery fall chinook migration (September 1 through November).
- The hatchery trap is located in the hatchery outlet channel 2 mile upstream from its confluence with the Columbia River. A fish weir is not used to guide fish into the hatchery outlet. All fish returning to Priest Rapids 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 fall chinook salmon that were produced at the hatchery are minimal.
- Other salmonids incidentally trapped will be returned into the outlet channel to continue their migration.
- The WDFW may collect fall chinook broodstock at Priest Rapids Dam ladder trap as a secondary broodstock collection site. The incidental take of UCR steelhead shall not exceed 10 steelhead. Steelhead encountered during otherwise authorized activities, such as UCR steelhead run monitoring, authorized under permit 1395 shall not count toward this take limit.

Section 8. Mating

8.1 Selection method.

The spawning protocol mandates the use of a spawning population of at least 500 adults. Spawners are selected and mated randomly from the population maintained in the hatchery holding pond. Fish are spawned throughout the entire run to help ensure that the run timing for the stock is maintained. A portion of each day's egg-take is used for on-site hatchery production to help ensure that return timing of the seasonal run is represented and that the hatchery broodstock remains genetically similar to, and representative of, the naturally spawning up-river bright fall chinook populations.

8.2 Males.

When spawning fewer than 1 million eggs in a day, the male to female ratio will be 1:1. When spawning more than 1 million eggs in a day, the ratio will not be less than 1 male to 3 females. The five year (1983-87 brood) average male to female sex ratio applied at Priest Rapids is 0.5 : 1.0 (range 0.4:1.0 - 0.7-1.0) (IHOT 1995).

8.3 Fertilization.

For daily egg takes under 1.0 million, eggs from two females are spawned into a bucket, and two males are then spawned into the combined eggs. For daily egg takes greater than one million, the fertilization procedure is adjusted. Eggs from two females are spawned into one bucket, and milt from one male is introduced. These eggs are then combined with eggs spawned from two other females and also fertilized with one male, so that a single bucket contains eggs from four females. This procedure equates to a 1 male to 2 female ratio, but provides for back-up fertilization for the combined eggs if milt used from one of the males in the pooled buckets proves to be non-viable.

8.4 Cryopreserved gametes.

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.

Fish are not listed but follow program protocols to preserve the existing timing and represent a random selection of fish in the mating scheme. Jacks can be incorporated at a rate of up to 2%.

Section 9. Incubation and Rearing.

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

The green egg survival objective to ponding is 90.0 %. Fecundity for the past five years has averaged 4,404 (Table 10). Number of egg taken from 1990 to the present is represented in Table 11.

Table 10. Five year fecundity average for Priest Rapids Fall Chinook

YEAR	1999	2000	2001	2002	2003	Total
Sum of Females Spawned	3,659	3,204	3103	3,431	3,042	16,439
Sum of Actual Egg Take	16,088,100	15,359,500	13,389,000	13,732,550	13,834,500	72,403,650
Sum of Fecundity	4,397	4,794	4,315	4,002	4,548	4,404

Table 11.

Year	Total Egg Take	Eggs retained for program	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Fry-fingerling Survival (%)
1990	9,936,000	7,551,114	86.9	99.6	98.4
1991	6,089,000	5,677,068	94.8	99.3	99.8
1992	10,580,000	7,747,630	94.5	99.11	96.47
1993	14,643,000	6,983,648	95.4	98.41	97.4
1994	15,819,600	7,620,176	93.54	98.46	95.55
1995	16,794,000	7,753,756	91.4	98.1	96.4
1996	15,079,000	7,706,833	92.4	96.4	97.6
1997	17,007,000	7,540,898	91.5	99.63	96.65
1998	13,981,300	7,609,977	91.4	99.76	97.1
1999	16,088,100	7,304,223	89.7	99.64	99.64

2000	15,359,500	7,719,581	89.8	99.0	99.9
2001*	13,389,000	7,970,971	88.5	99.47	97.8
2002*	13,732,550	7,946,433	88.0	99.53	97.4
2003*	13,834,500	7,944,608	88.2	98.9	97.8
2004*	12,753,500	8,029,718	88.1	97.5	98.8
2005*	-				

* Total includes all egg takes. Approximately 5.0 million are transferred to other programs.

9.1.2 Cause for, and disposition of surplus egg takes.

The summer/fall Chinook programs may take up to 10% surplus eggs to ensure program release goals are met. The number of surplus eggs will be based on program performance and the greater need of ensuring adequate escapement to the spawning grounds. WDFW is not authorized to destroy excess gametes or fish. This rule applies to the early-arriving summer/fall Chinook reared at Priest Rapids Hatchery. The take of surplus eggs will be minimized when program survival levels are determined and stabilized.

9.1.3 Loading densities applied during incubation.

Heath stack incubators are used to incubate the fall chinook eggs at the hatchery. Incubation conditions are consistent with on loading densities recommended by Piper et al. (1982). Water is supplied primarily from gravity flow from the Columbia River, but 17.6 cfs of well water is used to control incubation timing (BAMP 1998).

Pond management strategies are used to help optimize the quality of the rearing environment and to minimize fish stress. The "Density Index" (Piper et al. 1982) is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. The "Flow Index" (Piper et al. 1982) is used to estimate the rearing unit's carrying capacity based on water flows (IHOT 1995).

9.1.4 Incubation conditions.

Influent and effluent gas concentrations, including dissolved oxygen concentrations, are within parameters optimal for chinook salmon egg and juvenile survival.

9.1.5 Ponding.

Fall chinook fry are transferred from Heath trays for ponding upon button-up and swim-up. Ponding generally occurs after the accumulation of 1,650-1,750 temperature units. Unfed fry are transferred to the rearing ponds in January and February. The mean weight for fry ponded at Priest Rapids Hatchery for brood years 1996-97 was 0.54 gms. The estimated fork length for fall chinook fry weighing 0.54 gms is 39 mm (WDFW Hatcheries Program length/weight conversion data for fall chinook, April, 1997).

9.1.6 Fish health maintenance and monitoring.

Eggs - Fish health procedures used for disease prevention include water hardening of eggs in an iodophor at spawning and 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).

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.

Listed fish are not incubated at this facility. To protect existing programs, low flow alarms monitor water flow, temperature is monitored and formalin drips are used to control fungal infections.

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 Section 9.1.1.

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

The pond loading densities maintained at the hatchery are consistent with those recommended by Piper et al. (1982; 6 lb/gpm and 0.75 lb/ft^3) and Banks (1994; 0.125 lb/ft^3/in) (BAMP 1998). Fry are transferred from the Heath incubation trays to vinyl raceways for start feeding and continued rearing. The raceways have flow through water circulation.

9.2.3 Fish rearing conditions.

After two weeks of initial feeding in vinyl containers, fish are moved to five channel raceways for rearing. D.O., flows, and water temperatures are monitored regularly. Channel ponds have bird twine running perpendicular over the ponds but fish are vulnerable to significant avian predation.

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.

See below.

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

Rearing Period	Length (mm)	Weight (fpp)	Growth Rate
Feb	36.9	1100	683 fpp
Mar	50.8	417	200 fpp
Apr	63.28	217	117 fpp
May	79.5	110	57 fpp
June	100.9	53	4 fpp

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
Feb-June	BioMoist	8-1/day	1.4-4.0	0.1	0.81-1

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

Fish health and disease condition are continuously monitored, and disease reporting and disease control of selected pathogens are conducted in accordance with the Co-managers Fish Disease Control Policy (WDFW and WWTIT 1998). Fish health and condition is monitored on-site by fish health professionals at the hatchery throughout the rearing period. Specific fish health monitoring and disease control activities applied at Priest Rapids Hatchery include the following (detailed in IHOT 1995):

- On at least a monthly basis, both healthy and clinically diseased fish from each lot at the hatchery are given a health exam. The sample includes a minimum of ten fish per lot. Findings are reported on WDFW Form FH01;
- Prior to release, fish are given a health exam. This exam may be conducted in conjunction with the routine monthly visit;
- Whenever abnormal behavior or mortality is observed, the fish health specialist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures;
- Juvenile fish are administered antibiotics orally when needed for the control of bacterial infections; and
- Only therapeutants approved by the U.S. Food and Drug Administration are used for treatments.
- Vaccines are NOT used, whenever possible, to minimize the use of antimicrobial compounds.

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

Priest Rapids Hatchery fall chinook are released in June as sub-yearling smolts. Fish size, appearance, and release time are used to indicate the readiness of the population for emigration. No smolt development indices are assessed.

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

Although not designed as one, Priest Rapids Hatchery could be considered as a program that employs “natural” rearing methods. Fish are well acclimated to the area, by use of Columbia River water during rearing, which is the water source for the natural population. Channel raceways used as rearing containers mimic the natural river environment in many respects.

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.

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 mainstem at the upper extent of Hanford Reach, an area of significant natural production, impose deleterious ecological and genetic effects on natural fish are of concern.

A carefully developed hatchery operation and evaluation program, such as the one developed for the “Mid-Columbia Hatchery Plan”, is needed to identify hazards potentially posed by the Priest Rapids program to the propagated and adjacent natural summer/fall chinook populations, and to listed fish in the mid- and upper Columbia River region.

Section 10. Release

10.1 Proposed fish release levels.

Current production of fall chinook salmon at Priest Rapids FH is 100,000 lbs. of marked and unmarked subyearling smolts (5,000,000 fish at 50 fpp). In addition, 1,700,000 subyearlings are currently produced as partial mitigation for John Day Dam, which is funded from sources other than the MCMCP.

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

Priest Rapids Hatchery located at RKm 662 on the Mainstem Columbia River.

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

	Fingerling Release		
Release Year	No.	Date (MM/DD)	Avg Size (fpp)
1991	5,333,500	6/14-6/26	46.1
1992	7,000,200	6/12-6/24	56.8
1993	6,386,000	6/15-6/27	55
1994	6,705,836	6/12-6/20	50.4
1995	6,702,000	6/13-6/23	48.9
1996	6,700,000	6/14-6/22	47
1997	6,644,100	6/18-6/24	61
1998	6,737,600	6/12-6/24	46.8
1999	6,504,800	6/14-6/22	47.7
2000	6,856,000	6/14-6/26	51.3
2001	6,862,550	6/13-6/19	46.3
2002	6,779,035	6/11-6/19	46.6
2003	6,777,605	6/12-6/20	45.3-49.5
2004	6,814,560	6 14 –22	48.4
2005	6,599,838*	6/ 9 – 17	48.2

*Preliminary numbers for 2005.

10.5 Fish transportation procedures, if applicable.

None needed for releases.

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

Fall chinook are acclimated to the release site through rearing on Columbia River water supplied by gravity feed from Priest Rapids Dam. Rearing on parent river water, or acclimation for several

weeks to parent river water, is done to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Homing by returning hatchery-origin adults to the Priest Rapids Hatchery trap is optimized by releasing a mix of Columbia River water, and (cooler) well water into the hatchery outlet channel as attraction water.

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

A proportion of each year's release of fall chinook from Priest Rapids receives an adipose clip-coded wire tag marking combination. Approximately four percent of the fall chinook salmon produced through the program are marked with an adipose fin-clip/CWT combination. The chinook are marked with an adipose clip/coded wire tag combination to allow for assessment of brood year fishery contribution and survival rates for fish released from Priest Rapids Hatchery. In addition, the Pacific Salmon Treaty's Chinook Technical Committee (CTC) has mandated marking a survival index group of 200,000 natural-origin Hanford Reach chinook salmon juveniles annually. The natural fish marking project is a cooperative effort with the Yakama Nation.

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

The program has remained constant and based on past history, does not have surplus fish beyond the goals of the program.

10.9 Fish health certification procedures applied pre-release.

The disease management program will follow the requirements of the "Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State" (Co-managers 1998), requirements of the Section 10 ESA permits issued and guidelines of IHOT (1995). A qualified fish health specialist will conduct monitoring assessments. This monitoring will be conducted at least monthly and more often when necessary. These inspections must adhere to the disease prevention and control guidelines established by the Pacific Northwest Fish Health Protection Committee;

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

In the event of a water system failure, a back-up water siphon system can be used to supply water from the dam. Screens would be pulled to allow fish to exit the ponds or in some cases they can be transferred into other rearing vessels to prevent an emergency release.If the survival of the program is in jeopardy, stop logs and screens could be pulled and the fish forced to leave. WDFW also has emergency response procedures for providing back-up pumps, transport trucks, etc. in cases of emergency. In cases of severe flooding the screens are not pulled because flood waters rise to the point where they breach the ponds. Every effort will be made to avoid pre-programmed releases including transfer to alternate facilities. Emergency releases, if necessary and authorized, would be managed by removal of outlet screens and pull sumps of the rearing units. If possible, staff would set up portable pumps to use river water to flush the fish.

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 fall chinook salmon juveniles that are released as sub-yearlings are ready to actively migrate to the ocean with minimal delay. 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, the program is released once fish reach 50ffp.

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."

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 chinook on parent river water in the 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 spring chinook or 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.

At least a representative portion of the artificially propagated chinook juveniles 200,000 (3.0%) can be internally tagged (e.g., CWT) prior to release to allow monitoring and evaluation of fish performance and contribution rates, including straying levels to natural spawning areas and to other hatcheries. Another 1,700,000 are adipose fin clipped. The appropriate level of tagging shall be based in the investigational or management objectives and shall be reviewed by a trained statistician or biometrician.

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

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.

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.

Grant County PUD provides funding for some of the M&E/Performance Monitoring activities for this program. WDFW provides some of the personnel and equipment for conducting these activities. Funding for both five and ten year monitoring and evaluation plans will be decided by the HCP Hatchery Committees and the PUDs. Complementary components to monitor and evaluate adult-based supplementation and captive-rearing of fish will be funded and implemented by the parties to the MCMCP.

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 31st 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. A summary documenting the monitoring and evaluation activities associated with endangered UCR spring chinook hatchery supplementation program is included in annual progress reports submitted to NOAA Fisheries. 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, and ecological and genetic effects of the program on the natural population.

12.2 Cooperating and funding agencies.

Grant County Public Utility District No. 2 provides some funding for the research/Monitoring-Evaluation Program. Staffing and funding are committed through the Priest Rapids Hatchery operations and maintenance contract and budget.Additional funding and staff may be necessary to carry out some of the M&E objectives subsequently identified in the MCMCP or as identified and prioritized through continued evaluation work.

12.3 Principle investigator or project supervisor and staff.

See Section 10 Permit 1347 annual reports also.

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

Salmonid Stocks Affected
Lake Wenatchee Sockeye (Little Wenatchee and White rivers)
Wenatchee Summer Chinook
Wenatchee Spring Chinook
Bull Trout
Resident trout (rainbow, cutthroat, eastern brook)
Whitefish

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

See Section 10 Permit 1347 annual reports also.

12.6 Dates or time periods in which research activity occurs.

See Section 10 Permit 1347 annual reports also.

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

See Section 10 Permit 1347 annual reports also.

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

Amount or Extent of Take Anticipated: There is the potential for the incidental take of listed adult Upper Columbia River spring chinook and bull trout during the operation of the Priest Rapids fish trap.

Effects of the Take: The incidental take of other listed salmonids is more difficult to define because of the inherent biological attributes of aquatic species such as salmon, steelhead and bull trout, the dimensions and variability of the Columbia and Snake River system and tributaries, and the operational complexities of hatchery actions, determining precise (or even quantifiable) incidental take levels of ESA-listed species attributable to artificial propagation activities described in this Biological Opinion is not possible at present. In the absence of quantifiable estimates of incidental take, NMFS will require monitoring of broodstock collection activities, release numbers, and release locations to assure that the incidental takes, and the potential effects to ESA-listed species associated with such takes are minimized.

The monitoring of incidental take associated with the release of hatchery-produced smolts from the supplementation program is a part of the programs monitoring and evaluation that is covered under scientific research permit to WDFW.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

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 Section 10 Permit 1347 annual reports also.

12.10 Alternative methods to achieve project objects.

See Section 10 Permit 1347 annual reports also.

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

Salmonid Stocks Affected
Lake Wenatchee Sockeye (Little Wenatchee and White rivers)
Wenatchee Summer Chinook
Resident trout (rainbow, cutthroat, eastern brook)
Whitefish

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.

Handled and release, according to NMFS methods and procedures all listed and unlisted fishes that are incidentally trapped during the collection of adult summer steelhead for broodstock at the Dryden and Tumwater Dam trapping facilities after enumeration and collection of biological information.

Handled and release (according to NMFS methods and procedures) all listed and unlisted fishes that are capture during the monitoring and evaluation for the program.

Section 13. Attachments and Citations

13.1 Attachments and Citations

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Washington Department of Fisheries (WDF) and Washington Department of Wildlife (WDW). 1993. 1992 Washington State salmon and steelhead stock inventory - Appendix three Columbia River stocks. Washington Dept. Fish and Wildlife, 600 Capitol Way N, Olympia, WA. 98501-1091. 580 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	Priest Rapids Fall Chinook Programs
Location of hatchery activity	Priest Rapids Dam Trapping of unlisted fall chinook.
Dates of activity	Early September – 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)			Up to 10 fish yearly[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] Fish volunteer to the Priest Rapids trap and are released back to stream.

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.

Spring Chinook

ESU/Population	Upper Columbia Spring Chinook
Activity	Priest Rapids Fall Chinook Programs
Location of hatchery activity	Priest Rapids Dam Trapping of unlisted fall chinook.
Dates of activity	Early September – 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 fall chinook trapping time.

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.