Snake River Stock Fall Chinook
Nez Perce Tribal Hatchery

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Nez Perce Tribal Hatchery (NPTH)
Species or Hatchery Stock:	Fall Chinook salmon – Snake River Stock *Oncorhynchus tshawytscha*
Agency/Operator:	Nez Perce Tribe
Watershed and Region:	Clearwater River Subbasin, Mountain Snake Province
Date Submitted:	May 11, 2011
Date Last Updated:	May 11, 2011

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Nez Perce Tribal Hatchery

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

Snake River Fall Chinook Salmon *(Oncorhynchus tshawytscha)*
ESA status: threatened

1.3) Responsible organization and individuals*:*

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Other agencies, Tribes, co-operators, or organizations involved, including

contractors, and extent of involvement in the program:

1. Bonneville Power Administration – Program funding
2. Washington Department of Fish & Wildlife (WDFW) – Co-manager and co-operator. All aspects of Snake River fall Chinook hatchery production (i.e., adult trapping, broodstock collection, spawning, rearing, marking, release) and monitoring and evaluation are coordinated with Lyons Ferry Hatchery and WDFW.
3. NOAA Fisheries (NOAA) – Co-operator operates adult trap at Lower Granite Dam which provides broodstock for NPTH.
4. Idaho Department of Fish and Game (IDFG) – Co-manager
5. Confederated Tribes of the Umatilla Indian Reservation – Co-manager
6. Oregon Department of Fish & Wildlife – Co-manager
7. U.S. Army Corps of Engineers - Operates Lower Granite Dam where fall Chinook broodstock trapping occurs.
8. *U.S. v. Oregon* Parties – Columbia Basin fish managers

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

Funding source: Bonneville Power Administration (BPA) funded the construction of Nez Perce Tribal Hatchery in 2001. All operation and maintenance as well as monitoring and evaluation costs described in this HGMP are covered by BPA.

The NPTH staff includes one Hatchery Supervisor-III, one Hatchery Supervisor-II, and two Hatchery Supervisor-I positions, three permanent maintenance technicians, and eight permanent fish culture technicians. NPTH also produces spring Chinook so not all hatchery staff is required for the fall Chinook program. Annual operation and maintenance costs for the program are estimated at $2,084,051.

Monitoring and evaluation (M&E) of the NPTH program is conducted by a staff of six permanent biologists, one permanent marking coordinator, three permanent techs, and eight seasonal technicians. These M&E positions include staff working on spring Chinook M&E so not all staff is required for the fall Chinook program. In addition, there are one permanent biologist, one half-time permanent biologist, one permanent technician, and one seasonal technician for FCAP M&E. The NPTH and FCAP M&E staff work in coordination to implement a comprehensive evaluation of NPTH and FCAP production. Annual monitoring and evaluation costs for the program are estimated at $1,996,187 for NPTH M&E (including spring Chinook work) and $322,726 for FCAP M&E.

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

See Figure 1 for map of NPTH facilities.

Nez Perce Tribal Hatchery, Central Facility includes: adult collection, adult holding, spawning, incubation, rearing, marking and release facilities.

- Clearwater River, Idaho
- GPS: N 46.3058.8509 / W 116.3928.11379
- HUC: 170603060801

North Lapwai Valley Satellite (NPTH) includes: juvenile acclimation and release units

- Lapwai Creek, Clearwater River subbasin, Idaho
- GPS: N 46.44352 / W 116.81387
- HUC: 170603063103

Sweetwater Springs Satellite (NPTH) includes : juvenile rearing units

- Sweetwater Spring/Creek, Lapwai Creek, Clearwater River subbasin, Idaho
- GIS: N 46.22963 / W116.85351
- HUC: 170603060004

Lukes Gulch Satellite (NPTH) includes: juvenile acclimation and release units

- South Fork Clearwater River, Clearwater River subbasin, Idaho
- GPS: N 46.03247 / W 115.97569
- HUC: 170603050102

Cedar Flats satellite (NPTH) includes: juvenile acclimation and release units

- Selway River, Clearwater River subbasin, Idaho
- GIS: N46.09381 / W115.53955
- HUC: 170603020101

Lower Granite Dam adult fish trap (US Army Corps of Engineers):

- Snake River, Washington
- GIS: N46® 39’ 27.65 / W117® 25’ 48.65
- HUC: 17060107

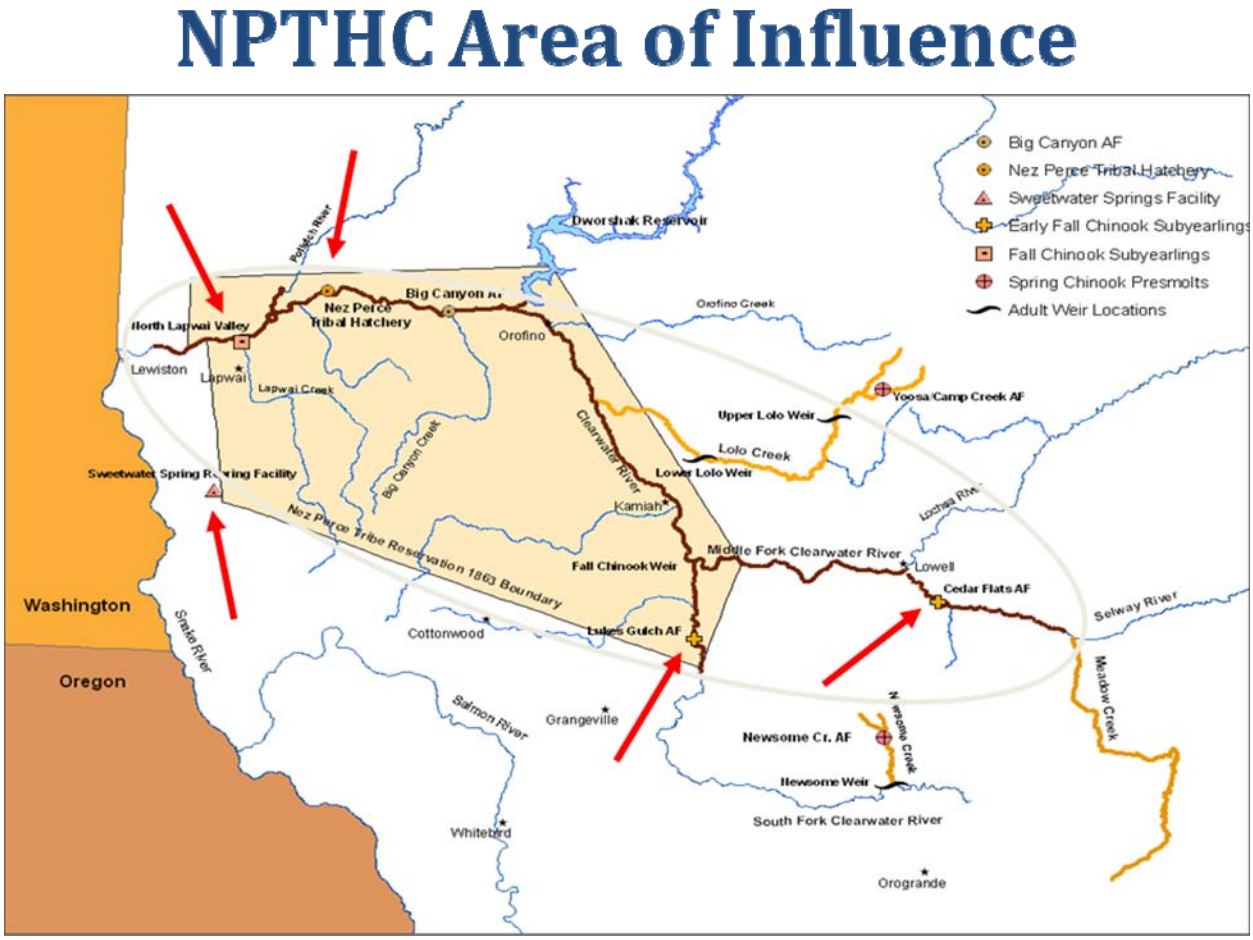


Figure 1. Map of Nez Perce Tribal Hatchery facilities in Clearwater River subbasin.

1.6) Type of program.

Integrated Recovery/Mitigation. The Snake River fall Chinook program at Nez Perce Tribal hatchery is funded by Bonneville Power Administration and managed to recover and sustain the Snake River fall Chinook population in the Clearwater River while providing tribal and non-tribal harvest opportunities.

Nez Perce Tribal Hatchery is one of four hatchery programs operated cooperatively in the Snake Basin to produce Snake River fall Chinook salmon. These four programs work together to provide mitigation for the effects of the Federal Columbia River Hydropower System. The other three programs are:

- Lyons Ferry Hatchery (funded by Lower Snake River Compensation Plan)
- Fall Chinook Acclimation Project (funded by Bonneville Power Administration and acclimating and releasing fish produced by Lyons Ferry Hatchery)
- Oxbow Hatchery/Umatilla Hatchery (funded by Idaho Power Company)

These programs are highly coordinated in their operations for all aspects of fish culture from broodstock collection at Lower Granite Dam through juvenile rearing, marking, and release. Monitoring, evaluation, and assessment of the programs are a highly coordinated effort between three states, three federal agencies, two Indian tribes, and two funding agencies.

1.7) Purpose (Goal) of program.

The Nez Perce Tribal Hatchery (NPTH) responds directly to a need to mitigate the effects of the Federal Columbia River Hydropower System on naturally-reproducing salmon in the Clearwater River subbasin. The goals of NPTH are defined as follows:

- Protect, mitigate, and enhance Columbia River subbasin anadromous fish resources;
- Develop, reintroduce, and increase natural spawning populations of salmon within the Clearwater River subbasin;
- Provide long-term harvest opportunities for Tribal and non-Tribal anglers within Nez Perce Treaty lands within four generations (20 years) following project completion;
- Sustain long-term fitness and genetic integrity of targeted fish populations;
- Keep ecological and genetic impacts to non-target populations within acceptable limits; and
- Promote Nez Perce Tribal Management of Nez Perce Tribal Hatchery Facilities and production areas within Nez Perce Treaty lands.

The overall goal is to produce and release fish that will survive to adulthood, provide harvest opportunities established under *U.S. vs. Oregon* for tribal and recreational fisheries, return to the Snake Basin and spawn in the Clearwater River subbasin, and produce viable offspring that will support future natural production and maintain genetic integrity.

Fall Chinook adult returns goals for NPTH production were identified by co-managers as part of the comprehensive Snake River fall Chinook production program in the Snake River Fall Chinook Management Plan (Zimmerman et. al 2005).

Hatchery-Origin Return Goals

- Interim total return target based on current production levels and survival is 15,484 hatchery-origin fish above Lower Monumental Dam, which is comprised of 9,988 from LSRCP, 3,206 from Nez Perce Tribal Hatchery (NPTH), and 2,290 from IPC.

- The long-term goal is for a total return 24,750 hatchery-origin fish above Lower Monumental Dam, which is comprised of 18,300 from LSRCP, 3,750 from NPTH, and 2,700 for IPC.

Natural-Origin Return Goals

- Achieve ESA delisting by attaining interim population abundance in the Snake River ESU of at least 3,000 natural-origin spawners, with no fewer than 2,500 distributed in the

mainstem Snake River (as recommended by the Interior Columbia Technical Recovery Team).

- Interim goal is to achieve a population of 7,500 natural-origin fall Chinook (adults and jacks) above Lower Monumental Dam.

- Long term goal is to achieve a population of 14,360 natural-origin fall Chinook (adults and jacks) above Lower Monumental Dam.

1.8) Justification for the program.

The Nez Perce Tribal Hatchery (NPTH) provides mitigation for the effects of the Federal Columbia River Hydropower System on naturally-reproducing salmon in the Clearwater River subbasin. The overall goal is to produce and release fish that will survive to adulthood, spawn in the Clearwater River subbasin and produce viable offspring that will support future natural production and genetic integrity.

Background

Hydroelectric and flood control dams extirpated the Clearwater River salmon runs. In 1910, construction of the Harpster Dam blocked fish passage into the South Fork Clearwater from 1911 to 1935 and from 1949 until 1963 when the dam was removed (Clearwater Subbasin Summary 2001). In 1927, Lewiston Dam was built at the mouth of the Clearwater River and prevented passage of spring, summer and fall Chinook from at least 1927 to 1940 (Fulton 1970). Passage facilities were upgraded in the 1950's, but Chinook salmon counts between 1950 and 1957 ranged from only 7 to 63 fish, indicating that the indigenous run was probably eliminated (Cramer and Neeley 1992). Harpster Dam was removed in 1963, and Lewiston Dam was removed in 1973, which made most of the Clearwater River once again a free-flowing system. But a year later, in 1974, Dworshak Dam was completed at the mouth of the North Fork Clearwater River resulting in blocked passage from that large river. As described in the Clearwater Subbasin Plan (Subbasin Plan)(Ecovista 2003), historical numbers of Chinook salmon entering the Clearwater were thought to be substantial. The impact on the people and biota caused by the loss of salmon from this 9,600 square mile watershed is a defining characteristic of the Snake River Basin.

Efforts to restore naturally, spawning, spring Chinook created small, scattered populations and fall Chinook recolonized the lower river to a limited extent by 1987. Still these runs were limited in number (Arnsberg 1992) and subject to the same overall conditions depressing all naturally spawning salmon runs in the Snake River Basin, which are primarily due to out-of-subbasin factors (e.g. dams and ocean conditions) (Ecovista 2003).

The Nez Perce Tribe has a biological, legal, historic, economic, social, and cultural need to restore salmon runs. The Nez Perce Tribe's indigenous territory consisted of north-central Idaho, southeastern Washington and northeastern Oregon. The Tribe is a federally recognized entity with sovereign status over its lands, people and resources. Its governmental rights and authorities extend to any natural resources that are reserved and protected in treaties, executive orders, and

federal statutes. The United States also has a trust obligation toward the Nez Perce Tribe to protect these rights and authorities. Salmon and other migratory fish species are an invaluable food resource and an integral part of the Nez Perce Tribe's culture. Anadromous fish have always made up the bulk of the Nez Perce tribal diet and this dependence on salmon was recognized in the treaties made with the Tribe by the United States. The historic, economic, social, and religious significance of fish to the Nez Perce Tribe continues to this day, which means that the declining fish populations in the Columbia River Basin has caused a substantial, unique, and detrimental impact on the Nez Perce way of life.

In 1980, Congress passed the Northwest Power Act. The Northwest Power Act created the Northwest Power Planning Council and directed the Council to develop the Columbia River Basin Fish and Wildlife Program. The program is designed primarily to address the impacts of the federal hydroelectric system on the fish and wildlife resources of the Columbia River Basin. BPA is the funding and implementing agency of the program. Under the Act, BPA has the responsibility to protect, mitigate impacts to, and enhance anadromous fish populations in the Columbia River Basin.

The Council recognized the opportunity to mitigate impacts to salmon runs in the Clearwater River Subbasin. In 1982, the Council authorized design and construction plans for fish production facilities on the Nez Perce Indian Reservation, and listed the facility in the Council's 1987 Fish and Wildlife Program (Action Item 703(g)(2)). The Council then established an interim goal of doubling current salmon and steelhead runs to five (5) million adult fish in the Columbia River Basin without losing biological diversity.

The Nez Perce Tribe developed the Nez Perce Tribal Hatchery Master Plan (Larson and Mobrand, 1992) which identified a central incubation and rearing facility on the Clearwater River with several satellite acclimation facilities and weirs to accomplish supplementation of spring and fall Chinook salmon. The planning and design phases of NPTH were reviewed and approved by the Council in their Three-Step Review Process. During this review process NPTH went through many different rounds of scientific panel scrutiny and many technical documents were developed that provided justification for construction and operation of the program. These include, but are not limited to:

- Genetic Risk Assessment of the Nez Perce Tribal Hatchery Master Plan (Cramer and Neeley 1992)
- Mainstem Clearwater River study: assessment for salmonid spawning, incubation, and rearing (Arnsberg et al. 1992)
- Nez Perce Tribal Hatchery Predesign Study (Montgomery Watson 1994)
- Selway Genetic Risk Assessment (Cramer 1995a)
- Nez Perce Tribal Hatchery Monitoring and Evaluation Plan (Steward 1996)
- Supplement to the Nez Perce Tribal Hatchery Master Plan (Johnson et al. 1995)
- Nez Perce Tribal Hatchery Genetic Management Plan (Kincaid 1997)
- Nez Perce Tribal Hatchery – Biological Assessment (Ruesink 1997)

- Monitoring and evaluation plan for the Nez Perce tribal hatchery: Action plan (Hesse and Cramer 2000)
- Final Environmental Impact Statement Nez Perce Tribal Hatchery Program (BPA et al. 1997)
- Supplement to the Environmental Impact Statement
- Reviews by the Independent Scientific Review Panel in 2001, 2003, 2006, and 2010.

The Nez Perce Tribal Fish Hatchery has been in the Council's program since 1982, and was the first project to be addressed in the Three-Step Review Process. The Council approved the final design and recommended that Bonneville Power Administration construct Nez Perce Tribal Hatchery in 2000. Construction was completed in 2002.

The Nez Perce Tribal Hatchery production works to accomplish specific adult return objectives for anadromous species identified in the Clearwater Management Plan includes (Refer to Table 3, Clearwater Management Plan, p. 16). These anadromous species objectives require a combined application of artificial production strategies, habitat protection and restoration strategies, and mitigation of deleterious out-of-subbasin effects. The application of artificial propagation measures are intended to realize anadromous fish restoration, recovery objectives, mitigation, and harvest goals in Table 3.

This project is consistent with and implements Biological Objective D: Utilize a mix of hatchery and natural production strategies for native, localized, and reintroduced populations to meet subbasin goals delineated in Table 3 within 25 years.

Strategy 1: Maximize hatchery effectiveness in the subbasin – continue existing and/or implement innovative hatchery production strategies in appropriate areas to support fisheries, natural production augmentation and rebuilding, reintroduction, and research (Management Plan, p. 21).

Strategy 2: Apply safety net hatchery intervention based on extinction risk analysis and benefit risk assessments (Management Plan, p. 21). Strategy 3: Implement artificial propagation measures and continue existing natural production strategies (Management Plan, p. 21). Strategy 4: Monitor and evaluate effectiveness of implementation of hatchery and natural production strategies (Management Plan, p. 21).

1.9) List of program "Performance Standards"

A Northwest Power and Conservation Council (NPCC) "Artificial Production Review" document (2001) provides categories of standards for evaluating the effectiveness of hatchery programs and the risks they pose to associated natural populations. The categories are as follows: 1) legal mandates, 2) harvest, 3) conservation of wild/naturally produced spawning populations, 4) life history characteristics, 5) genetic characteristics, 6) quality of research activities, 7) artificial production facilities operations, and 8) socio-economic effectiveness. The NPCC standards represent the common knowledge up to 2001. Utilization of more recent reviews on the standardized methods for evaluation of hatcheries and supplementation at a basin wide ESU scale

is warranted.

In a report prepared for NWPCC, the Independent Scientific Review Panel (ISRP) and the Independent Scientific Advisory Board (ISAB) reviewed the nature of the demographic, genetic and ecological risks that could be associated with supplementation, and concluded that the current information available was insufficient to provide an adequate assessment of the magnitude of these effects under alternative management scenarios (ISRP and ISAB 2005). The ISRP and ISAB recommended that an interagency working group be formed to produce a design(s) for an evaluation of hatchery supplementation applicable at a basin-wide scale. Following on this recommendation, the *Ad Hoc* Supplementation Workgroup (AHSWG) was created and produced a guiding document (Galbreath et al. 2008) that describes a framework for integrated hatchery research, monitoring, and evaluation to be evaluated at a basin-wide ESU scale.

The AHSWG framework is structured around three categories of research monitoring and evaluation: 1) implementation and compliance monitoring, 2) hatchery effectiveness monitoring, and 3) uncertainty research. The hatchery effectiveness category addresses regional questions relative to both harvest augmentation and supplementation hatchery programs and defines a set of management objectives specific to supplementation projects. The framework utilizes a common set of standardized performance measures as established by the Collaborative System wide Monitoring and Evaluation Project (CSMEP). Adoption of this suite of performance measures and definitions across multiple study designs will facilitate coordinated analysis of findings from regional monitoring and evaluation efforts. This is needed to address management questions and critical uncertainties associated with the relationships between harvest augmentation and supplementation hatchery production, and ESA listed stock status/recovery.

The NPCC (2006) has called for integration of individual hatchery evaluations into a regional plan. While the RM&E framework in AHSWG document represents our current knowledge relative to monitoring hatchery programs to assess effects that they have on population and ESU productivity, it represents only a portion of the activities needed for how hatcheries are operated throughout the region. A union of the NPCC (2001) hatchery monitoring and evaluation standards and the AHSWG framework likely represents a larger scale more comprehensive set of assessment standards, legal mandates, production and harvest management processes, hatchery operations, and socio-economic standards addressed in the 2001 NPCC document (sections 3.1, 3.2, 3.7, and 3.8 respectively). These are not addressed in the AHSWG framework and should be included in this document. NWPCC standards for conservation of wild/natural populations, life history characteristics, genetic characteristics and research activities (sections 3.3, 3.4, 3.5, and 3.6 respectively) are more thoroughly developed by the AHSWG, and the later standards should apply to this document. Table 1 represents the union of performance standards described by the NWPCC in 2001, regional questions for monitoring and evaluation for harvest and supplementation programs, and performance standards and testable assumptions as described by the AHSWG (Galbreath et al. 2008).

Table 1. Compilation of performance standards described by the Northwest Power and Conservation Council (NPCC 2001), regional questions for monitoring and evaluation for harvest and supplementation programs, and performance standards and testable assumptions as described by the Ad Hoc Supplementation Work Group (2008).

Category	Standards	Indicators
1. LEGAL MANDATES	1.1. Program contributes to fulfilling tribal trust responsibility mandates and treaty rights, as described in applicable agreements such as under U.S. v. OR and U.S. v. Washington.	1.1.1. Total number of fish harvested in Tribal fisheries targeting this program. 1.1.2. Total fisher days or proportion of harvestable returns taken in Tribal resident fisheries, by fishery. 1.1.3. Tribal acknowledgement regarding fulfillment of tribal treaty rights.
	1.2. Program contributes to mitigation requirements.	1.2.1. Number of fish released by program, returning, or caught , as applicable to given mitigation requirements.
	1.3. Program addresses ESA responsibilities.	1.3.1. Section 7, Section 10, 4d rule and annual consultation
2. IMPLEMENTATION AND COMPLIANCE	2.1. Program contributes to mitigation requirements.	2.1.1. Hatchery is operated as a segregated program. 2.1.2. Hatchery is operated as an integrated program 2.1.3. Hatchery is operated as a conservation program
	2.2. Program addresses ESA responsibilities.	2.2.1. Hatchery fish can be distinguished from natural fish in the hatchery broodstock and among spawners in supplemented or hatchery influenced population(s)
	2.3. Restore and maintain treaty-reserved tribal and non-treaty fisheries.	2.3.1. Hatchery and natural-origin adult returns can be adequately forecasted to guide harvest opportunities. 2.3.2. Hatchery adult returns are produced at a level of abundance adequate to support fisheries in most years with an acceptably limited impact to natural-spawner escapement.
	2.4. Fish for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding over-harvest of non-target species.	2.4.1. Number of fish release by location estimated and in compliance with AOPs and US vs. OR Management Agreement. 2.4.2. Number if adult returns by release group harvested 2.4.3. Number of non-target species encountered in fisheries for targeted release group.
	2.5. Hatchery incubation, rearing, and release practices are consistent with current best management practices for the program type.	2.5.1. Juvenile rearing densities and growth rates are monitored. and reported. 2.5.2. Numbers of fish per release group are known and reported. 2.5.3. Average size, weight and condition of fish per release group are known and reported. 2.5.4. Date, acclimation period, and release location of each release group are known and reported.
	2.6. Hatchery production, harvest management, and monitoring and evaluation of hatchery production are coordinated among affected co-managers.	2.6.1. Production adheres to plans documents developed by regional co-managers (e.g. US vs. OR Management agreement, AOPs etc.). 2.6.2. Harvest management harvest, harvest sharing agreements, broodstock collection schedules, and disposition of fish trapped at hatcheries in excess of broodstock needs are coordinated among co-management agencies. 2.6.3. Co-managers react adaptively by consensus to monitoring and evaluation results. 2.6.4. Monitoring and evaluation results are reported to co-managers and regionally in a timely fashion.
RING REGION AL FOR AUGME NTATIO N AND	3.1. Release groups are marked in a manner consistent with information needs and protocols for monitoring impacts to natural- and hatchery-origin fish at the targeted life stage(s)(e.g. in juvenile migration corridor, in fisheries, etc.).	3.1.1. All hatchery origin fish recognizable by mark or tag and representative known fraction of each release group marked or tagged uniquely. 3.1.2. Number of unique marks recovered per monitoring stratum sufficient to estimate number of unmarked fish from each release group with desired accuracy and precision.

Category	Standards	Indicators
	3.2. The current status and trends of natural origin populations likely to be impacted by hatchery production are monitored.	3.2.1. Abundance of fish by life stage is monitored annually. 3.2.2. Adult to adult or juvenile to adult survivals are estimated. 3.2.3. Temporal and spatial distribution of adult spawners and rearing juveniles in the freshwater spawning and rearing areas are monitored. 3.2.4. Timing of juvenile outmigration from rearing areas and adult returns to spawning areas are monitored. 3.2.5. Ne and patterns of genetic variability are frequently enough to detect changes across generations.
	3.3. Fish for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding over-harvest of non-target species.	3.3.1. Number of fish release by location estimated and in compliance with AOPs and US vs. OR Management Agreement. 3.3.2. Number if adult returns by release group harvested 3.3.3. Number of non-target species encountered in fisheries for targeted release group.
	3.4. Effects of strays from hatchery programs on non-target (unsupplemented and same species) populations remain within acceptable limits.	3.4.1. Strays from a hatchery program (alone, or aggregated with strays from other hatcheries) do not comprise more than 10% of the naturally spawning fish in non-target populations. 3.4.2. Hatchery strays in non-target populations are predominately from in-subbasin releases. 3.4.3. Hatchery strays do not exceed 10% of the abundance of any out-of-basin natural population.
	3.5. Habitat is not a limiting factor for the affected supplemented population at the targeted level of supplementation.	3.5.1. Temporal and spatial trends in habitat capacity relative to spawning and rearing for target population. 3.5.2. Spatial and temporal trends among adult spawners and rearing juvenile fish in the available habitat.
	3.6. Supplementation of natural population with hatchery origin production does not negatively impact the viability of the target population.	3.6.1. Pre- and post-supplementation trends in abundance of fish by life stage is monitored annually. 3.6.2. Pre- and post-supplementation trends in adult to adult or juvenile to adult survivals are estimated. 3.6.3. Temporal and spatial distribution of natural origin and hatchery origin adult spawners and rearing juveniles in the freshwater spawning and rearing areas are monitored. 3.6.4. Timing of juvenile outmigrations from rearing area and adult returns to spawning areas are monitored.
	3.7. Natural production of target population is maintained or enhanced by supplementation.	3.7.1. Adult progeny per parent (P:P) ratios for hatchery-produced fish significantly exceed those of natural-origin fish. 3.7.2. Natural spawning success of hatchery-origin fish must be similar to that of natural-origin fish. 3.7.3. Temporal and spatial distribution of hatchery-origin spawners in nature is similar to that of natural-origin fish. 3.7.4. Productivity of a supplemented population is similar to the natural productivity of the population had it not been supplemented (adjusted for density dependence). 3.7.5. Post-release life stage-specific survival is similar between hatchery and natural-origin population components.
	3.8. Life history characteristics and patterns of genetic diversity and variation within and among natural populations are similar and do not change significantly as a result of hatchery augmentation or supplementation programs.	3.8.1. Adult life history characteristics in supplemented or hatchery influenced populations remain similar to characteristics observed in the natural population prior to hatchery influence. 3.8.2. Juvenile life history characteristics in supplemented or hatchery influenced populations remain similar to characteristics in the natural population those prior to hatchery influence. 3.8.3. Genetic characteristics of the supplemented population remain similar (or improved) to the unsupplemented populations.
	3.9. Operate hatchery programs so that life history characteristics and genetic diversity of hatchery fish mimic natural fish.	3.9.1. Genetic characteristics of hatchery-origin fish are indistinguishable from natural-origin fish. 3.9.2. Life history characteristics of hatchery-origin adult fish are indistinguishable from natural-origin fish. 3.9.3. Juvenile emigration timing and survival differences between hatchery and natural-origin fish must be minimal.

Category	Standards	Indicators
	3.10. The distribution and incidence of diseases, parasites and pathogens in natural populations and hatchery populations are known and releases of hatchery fish are designed to minimize potential spread or amplification of diseases, parasites, or pathogens among natural populations.	3.10. Detectable changes in rate of occurrence and spatial distribution of disease, parasite or pathogen among the affected hatchery and natural populations.
4. OPERATION OF ARTIFICIAL PRODUCTION FACILITIES	4.1. Artificial production facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols such as those described by IHOT, PNFHPC, the Co-Managers of Washington Fish Health Policy, INAD, and MDFWP.	4.1.1. Annual reports indicating level of compliance with applicable standards and criteria. 4.1.2. Periodic audits indicating level of compliance with applicable standards and criteria.
	4.2. Effluent from artificial production facility will not detrimentally affect natural populations.	4.2.1. Discharge water quality compared to applicable water quality standards and guidelines, such as those described or required by NPDES, IHOT, PNFHPC, and Co-Managers of Washington Fish Health Policy tribal water quality plans, including those relating to temperature, nutrient loading, chemicals, etc.
	4.3. Water withdrawals and instream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment.	4.3.1. Water withdrawals compared to applicable passage criteria. 4.3.2. Water withdrawals compared to NMFS, USFWS, and WDFW juvenile screening criteria. 4.3.3. Number of adult fish aggregating and/or spawning immediately below water intake point. 4.3.4. Number of adult fish passing water intake point. 4.3.5. Proportion of diversion of total stream flow between intake and outfall.
	4.4. Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens.	4.4.1. Certification of juvenile fish health immediately prior to release, including pathogens present and their virulence. 4.4.2. Juvenile densities during artificial rearing. 4.4.3. Samples of natural populations for disease occurrence before and after artificial production releases.
	4.5. Any distribution of carcasses or other products for nutrient enhancement is accomplished in compliance with appropriate disease control regulations and guidelines, including state, tribal, and federal carcass distribution guidelines.	4.5.1. Number and location(s) of carcasses or other products distributed for nutrient enrichment. 4.5.2. Statement of compliance with applicable regulations and guidelines.
	4.6. Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally produced population.	4.6.1. Spatial and temporal spawning distribution of natural population above and below weir/trap, currently and compared to historic distribution.
	4.7. Weir/trap operations do not result in significant stress, injury, or mortality in natural populations.	4.7.1. Mortality rates in trap. 4.7.2. Prespawning mortality rates of trapped fish in hatchery or after release.
	4.8. Predation by artificially produced fish on naturally produced fish does not significantly reduce numbers of natural fish.	4.8.1. Size at, and time of, release of juvenile fish, compared to size and timing of natural fish present. 4.8.2. Number of fish in stomachs of sampled artificially produced fish, with estimate of natural fish composition.
5. SOCIO-ECONOMIC EFFECTIVENESS	5.1. Cost of program operation does not exceed the net economic value of fisheries in dollars per fish for all fisheries targeting this population.	5.1.1. Total cost of program operation. 5.1.2. Sum of ex-vessel value of commercial catch adjusted appropriately, appropriate monetary value of recreational effort, and other fishery related financial benefits.
	5.2. Juvenile production costs are comparable to or less than other regional programs designed for similar objectives.	5.2.1. Total cost of program operation. 5.2.2. Average total cost of activities with similar objectives.
	5.3. Non-monetary societal benefits for which the program is designed are achieved.	5.3.1. Number of adult fish available for tribal ceremonial use. 5.3.2. Recreational fishery angler days, length of seasons, and number of licenses purchased.

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

Refer to Table 1. This program is consistent with the goals stated in the Viability Criteria for Application to Interior Columbia Basin Salmonid ESUs Draft Report (ICTRT 2007), although it only represents one of the three populations that used to exist in the ESU. It was determined that the Snake River fall Chinook are currently restricted to a single extant population which cannot meet the minimum ESU biological viability criteria established by the Interior Columbia River Basin Technical Recovery Team (ICTRT) because we would need two out of three populations existing. In efforts to increase the spatial distribution of this population, fish are released into the Grande Ronde and Clearwater rivers, and Snake River up to Hells Canyon Dam. The ICTRT also stated that the probability of long-term persistence of the ESU would be greatly enhanced with additional populations. They recognize that there are significant difficulties in re-establishing fall Chinook populations above the Hells Canyon complex, and suggested that initial effort be placed on recovery for the extant population, concurrently with scoping efforts for re-introduction. Ongoing discussions are occurring in-basin regarding this recommendation.

The ICTRT also established a minimum abundance threshold for the extant fall Chinook production consistent with the general abundance/productivity objectives summarized in the July 2003 ICTRT Viability Draft Report. They adapted the recommendations summarized in NMFS Biological Opinion for Hatchery Operations (1995) to assign a minimum long term average spawning abundance threshold for the extant population. They recommend a minimum abundance threshold of 3,000 natural origin spawners for the extant Snake River fall Chinook population. No fewer than 2,500 of those natural origin spawners should be distributed in mainstem Snake River habitat.

Response to Hatchery Review Recommendations:

The Hatchery Scientific Review Group (HSRG) completed their review of Snake River fall Chinook in 2009. The full document can be viewed on line at:
http://www.hatcheryreform.us/hrp_downloads/reports/columbia_river/system-wide/4_appendix_e_population_reports/blue-lower_snake_river_fall_chinook_01-31-09.pdf
Following are verbatim excerpts from their observations, and their full list of recommendations.

- Managers have not assigned a population designation for Snake River Fall Chinook although conservation and harvest objectives have been identified. Snake and Clearwater River fall Chinook salmon are managed as one population for recovery purposes.
- The current hatchery program releases 5.8 million smolts into the Snake River at various locations. Currently, this program is not meeting the standards for a Contributing or Primary population (currently proportion of natural origin fish in broodstock (pNOB) = 5%, proportion of hatchery origin fish on spawning grounds (pHOS) = 77%). The hatchery program is providing some conservation benefit to the natural population. The HSRG was unable to develop a solution that achieved the standards of either a primary or contributing population under the existing conditions.

- Adults are collected at Lower Granite Dam, the LFH and the NPTH. Adult holding, spawning, incubation, and juvenile rearing occur at LFH and NPTH. Incubation and rearing may also occur at Oxbow, Irrigon, Umatilla and Dworshak hatcheries.
- The increase in Snake River fall Chinook returns over the last several years is the result of a number of habitat, fish passage, marine survival and hatchery actions together with harvest management. As currently operated, there is little opportunity for local adaptation and spatial structure in the ESU.

Recommendations: The HSRG looked at various hatchery scenarios that could improve productivity while meeting the standards for a Primary or Contributing population, but could not significantly increase natural-origin spawning under current habitat conditions. To promote spatial structure, local adaptation and to improve productivity, the HSRG recommends that managers pursue development of broodstock collection capabilities for releases into the Clearwater River. Due to the lack of adult capture facilities, the HSRG recommends that managers develop, test and deploy live capture selective fishing gears to collect local Clearwater broodstock to accomplish this end, provide additional harvest opportunity, and manage pHOS. Managers should avoid removing Clearwater-origin fish at Lower Granite Dam. Managers should also develop similar broodstock collection capabilities within the Snake River upstream of the confluence of the Clearwater River (e.g., CJR, PBL, and Hells Canyon Dam).

The HSRG recommends that managers implement a BKD control strategy for their spring and summer/fall Chinook hatchery programs where BKD has proved a recurring problem. Ideally, the strategy should include culling (destroying) eggs/progeny from hatchery- and natural-origin brood that are found to be infected with the BKD agent. However, because brood fish with high levels of the BKD agent are more likely to transmit the agent to their progeny than brood with lesser levels of the agent, the culling of eggs/progeny from infected brood fish, should, at the very least, be applied to those with high levels of the BKD agent (e.g., ELISA OD value of 0.4 and above when broodstock are not in short supply and ELISA OD value of 0.6 and above when broodstock are in short supply). In addition, in programs using ESA-listed natural-origin brood fish, the culling of their eggs/progeny may, at the managers' discretion, be dispensed with. However, the ESA-listed broodstock should be injected, pre-spawning, with an appropriate antibiotic (preferably, erythromycin at 40 mg/kg fish), and the resulting eggs should be surface-disinfected with an iodophor. All pre-spawning brood injections may be limited to females, ESA-listed or otherwise.

Finally, eggs and hatchlings derived from broodstock found to be heavily infected with the BKD agent should be incubated and reared in isolation from those obtained from broodstock with no or lesser levels of the BKD agent. In addition, the hatchlings should be reared at the lowest possible densities (below current standards), and, at the first signs of infection with the BKD agent, they should be treated with orally administered erythromycin (100 mg/kg fish) for 28 days. The treatment should be repeated if there is evidence that the BKD agent has persisted in the hatchlings.

Response: The co-managers have discussed the issues of broodstock collection, local adaptation, spatial structure and diversity at length. There is no current evidence that broodstock collection practices are hindering the behavior or performance of fall Chinook

released within the basin from NPTH or other programs. Moreover, since Snake River fall Chinook are considered a single population, attempts to artificially create diversity in the population seems a difficult task for questionable benefit.

A study completed several years ago (Garcia et al. 2004) showed strong fidelity of adult returns from smolts released from the FCAP facilities to spawning areas near their point of release. The fish spawning in these reaches are presumed to be contributing to the increasing number of natural fish returning annually, which is the intended goal of the program. Further, the suggestion of trapping fish at NPTH or Hells Canyon Dam (concrete to concrete) seems directly contrary to the goal of encouraging local adaptation as proposed for other salmon populations in the Columbia. Local adaptation should encourage some level of natural spawning to facilitate natural selection processes, and utilizing fish returning to a specific hatchery release would seem less beneficial than selecting broodstock at random from a mixture of releases as they pass LGR dam.

Neither Lyons Ferry Hatchery nor NPTH can effectively collect fall Chinook other than returning hatchery origin adults, therefore, collecting broodstock completely from those locations does not promote integration with the natural population. While local adaptation may occur, domestication effects from continuous cycling through the hatchery would not be consistent with the supplementation goal for the upper Snake River. Development and deployment of in-river adult collection facilities for the Clearwater seems an expensive and intrusive means to collect broodstock, when there is no indication from adult spawning behavior within the basin that there has been a significant change in spawning distribution since supplementation began. This behavior does not suggest that the systematic random collection of broodstock from LGR Dam is changing spawning behavior. Although the managers understand the HSRG's contention of a possible benefit for adaptation by separating collection between the Snake and Clearwater, they continue to view this as a single remnant population from the historical, and partitioning habitat to attempt to artificially increase spatial diversity and local adaptation is not considered a viable or defensible management scheme.

That being said, as part of the NPTH program and reintroduction of fall Chinook to the upper Clearwater River, the development of a localized broodstock early spawning fall Chinook in the upper tributaries to the Clearwater River (South Fork Clearwater and Selway River) is being targeted.

In response to the recommendations regarding BKD: NPTH has implemented a highly successful fish health program in controlling BKD for Snake River fall Chinook. It is more stringent than the protocols suggested by the HSRG. All females are tested, eggs from high ELISA females (at 0.2 to 0.25 OD or higher) are culled. Females are inoculated with erythromycin and eggs are surface rinsed with iodophore.

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

Performance indicators that we use to evaluate the performance standards listed in section 1.9 are presented in Table 2. These performance measures are taken from Beasley et al. (2008) and are consistent with NEOH M&E Plan (Hesse et al. 2006). The performance indicators are broken into the categories of abundance, survival-productivity, distribution, genetic, life history, habitat, and in-hatchery groups. Within each of these groups are the specific indicator(s) and brief description of the definition/method(s).

1.10.1) "Performance Indicators" addressing benefits.

Evaluation of the fall Chinook program utilizes the performance standards and associated performance indicators in sections 1.9 and 1.10 (respectively). Table 2 will be utilized for addressing the project benefits and risks. In addition to yearly evaluations, every five years the NPTH staff performs a comprehensive review of the program to in include adaptive management recommendations addressing the benefits and risks of the program.

1.10.2) "Performance Indicators" addressing risks.

The suite of performance measures developed by the CSMEP represents a crosswalk mechanism that is needed to quantitatively monitor and evaluate the standards and indicators listed in Table 2. The CSMEP measures have been adopted by the AHSWG (Beasley et. al. 2008), and are consistent with those presented in the Northeast Oregon Hatchery Monitoring and Evaluation Plan (NEOH M&E Plan) (Hesse et al. 2006). The adoption of this regionally-applied means of assessment will facilitate coordinated analysis of findings from basin-wide M&E efforts and will provide the scientifically-based foundation to address the management questions and critical uncertainties associated with supplementation and ESA listed stock status/recovery.

Listed below are the suite of Performance Measures (modified from the management objectives listed in Beasley et al. 2008) used by the NPTH Fall Chinook Project, and the assumptions that need to be tested for each standard.

Table 2. Standardized performance measures and definitions for status and trends and effectiveness monitoring and the associated performance indicator that it addresses. (Taken from Beasley et al. 2008, also consistent with Hesse et al. 2006).

Performance Measure		Definition	Related Indicator
Abundance	Adult Escapement to Tributary	Number of adults (including jacks) that have escaped to a certain point (i.e. - mouth of stream). Population based measure. Calculated with mark recapture methods from weir data adjusted for redds located downstream of weirs and in tributaries, and maximum net upstream approach for DIDSON and underwater video monitoring. Provides total escapement and wild only escapement. [Assumes tributary harvest is accounted for]. Uses TRT population definition where available	2.3.2, 3.1.2, 3.2.1, 3.2.2, 3.2.4, 3.6.1, 3.7.1, 3.7.4, 5.3.1
	Fish per Redd	Number of fish divided by the total number of redds. Applied by: The population estimate at a weir site, minus broodstock and mortalities and harvest, divided by the total number of redds located upstream of the weir.	3.2.1, 3.2.3, 3.2.4, 3.6.3, 3.7.3

Performance Measure		Definition	Related Indicator
	Female Spawner per Redd	Number of female spawners divided by the total number of redds above weir. Applied in 2 ways: 1) The population estimate at a weir site multiplied by the weir derived proportion of females, minus the number of female prespawn mortalities, divided by the total number of redds located upstream of the weir, and 2) DIDSON application calculated as in 1 above but with proportion females from carcass recoveries. Correct for mis-sexed fish at weir for 1 above.	3.2.1, 3.2.3, 3.2.4, 3.6.3, 3.7.3
	Index of Spawner Abundance - redd counts	Counts of redds in spawning areas in index area(s) (trend), extensive areas, and supplemental areas. Reported as redds and/or redds/km.	3.2.3, 3.2.4, 3.6.3, 3.7.3, 4.6.1
	Spawner Abundance	In-river: Estimated number of total spawners on the spawning ground. Calculated as the number of fish that return to an adult monitoring site, minus broodstock removals and weir mortalities and harvest if any, subtracts the number of female prespawning mortalities and expanded for redds located below weirs. Calculated in two ways: 1) total spawner abundance, and 2) wild spawner abundance which multiplies by the proportion of natural origin (wild) fish. Calculations include jack salmon. In-hatchery: Total number of fish actually used in hatchery production. Partitioned by gender and origin.	3.2.1, 3.2.3, 3.2.4, 3.6.3, 3.7.3
	Hatchery Fraction	Percent of fish on the spawning ground that originated from a hatchery. Applied in two ways: 1) Number of hatchery carcasses divided by the total number of known origin carcasses sampled. Uses carcasses above and below weirs, 2) Uses weir data to determine number of fish released above weir and calculate as in 1 above, and 3) Use 2 above and carcasses above and below weir.	2.2.1, 3.1.1, 3.4.1, 3.4.2, 3.4.3, 3.7.2, 3.7.4
	Ocean/Mainstem Harvest	Number of fish caught in ocean and mainstem (tribal, sport, or commercial) by hatchery and natural origin.	1.1.1, 1.1.2, 2.3.1, 2.4.2, 2.6.2, 3.3.2, 3.3.3
	Harvest Abundance in Tributary	Number of fish caught in ocean and mainstem (tribal, sport, or commercial) by hatchery and natural origin.	1.1.1, 1.1.2, 2.3.1, 2.4.2, 2.6.2, 3.3.2, 3.3.3
	Index of Juvenile Abundance (Density)	Parr abundance estimates using underwater survey methodology are made at pre-established transects. Densities (number per 100 m2) are recorded using protocol described in Thurow (1994). Hanken & Reeves estimator.	3.2.1, 3.5.1, 3.5.2
	Juvenile Emigrant Abundance	Gauss software is (Aptech Systems, Maple Valley, Washington) isused to estimate emigration estimates. Estimates are given for parr pre-smolts, smolts and the entire migration year. Calculations are completed using the Bailey Method and bootstrapping for 95% CIs. Gauss program developed by the University of Idaho (Steinhorst 2000).	3.2.1, 3.6.1, 3.7.4
	Smolts	Smolt estimates, which result from juvenile emigrant trapping and PIT tagging, are derived by estimating the proportion of the total juvenile abundance estimate at the tributary comprised of each juvenile life stage (parr, presmolt, smolt) that survive to first mainstem dam. It is calculated by multiplying the life stage specific abundance estimate (with standard error) by the life stage specific survival estimate to first mainstem dam (with standard error). The standard error around the smolt equivalent estimate is calculated using the following formula; where X = life stage specific juvenile abundance estimate and Y = life stage specific juvenile survival estimate: $Var(X \cdot Y)$ $= E(X)^2 \cdot Var(Y) + E(Y)^2 \cdot Var(X) + Var(X) \cdot Var(Y)$	3.2.1, 3.6.1, 3.7.4
	Run Prediction	This will not be in the raw or summarized performance database.	2.3.1

Performance Measure		Definition	Related Indicator
rvival – Productivity	Smolt-to-Adult Return Rate	The number of adult returns from a given brood year returning to a point (stream mouth, weir) divided by the number of smolts that left this point 1-5 years prior. Calculated for wild and hatchery origin conventional and captive brood fish separately. Adult data applied in two ways: 1) SAR estimate to stream using population estimate to stream, 2) adult PIT tag SAR estimate to escapement monitoring site (weirs, LGR), and 3) SAR estimate with harvest. Accounts for all harvest below stream. *Smolt-to-adult return rates* are generated for four performance periods; tributary to tributary, tributary to tributary, tributary to first mainstem dam, first mainstem dam to first mainstem dam, and first mainstem dam to tributary. *First mainstem dam to first mainstem dam S*AR estimates are calculated by dividing the number of PIT tagged adults returning to first mainstem dam by the estimated number of PIT tagged juveniles at first mainstem dam. Variances around the point estimates are calculated as described above. *Tributary to tributary SAR* estimates for natural and hatchery origin fish are calculated using PIT tag technology as well as direct counts of fish returning to the drainage. PIT tag SAR estimates are calculated by dividing the number of PIT tag adults returning to the tributary (by life stage and origin type) by the number of PIT tagged juvenile fish migrating from the tributary (by life stage and origin type). Overall PIT tag SAR estimates for natural fish are then calculated by averaging the individual life stage specific SARs. Direct counts are calculated by dividing the estimated number of natural and hatchery-origin adults returning to the tributary (by length break-out for natural fish) by the estimated number of natural-origin fish and the known number of hatchery-origin fish leaving the tributary. *Tributary to* first mainstem dam SAR estimates are calculated by dividing the number of PIT tagged adults returning to first mainstem dam by the number of PIT tagged juveniles tagged in the tributary. There is no associated variance around this estimate. The adult detection probabilities at first mainstem dam are near 100 percent. First mainstem dam *to tributary* SAR estimates are calculated by dividing the number of PIT tagged adults returning to the tributary by the estimated number of PIT tagged juveniles at first mainstem dam. The estimated number of PIT tagged juveniles at first mainstem dam is calculated by multiplying lifestage specific survival estimates (with standard errors) by the number of juveniles PIT tagged in the tributary. The variance for the estimated number of PIT tagged juveniles at first mainstem dam is calculated as follows, where X = the number of PIT tagged fish in the tributary and Y = the variance of the lifestage specific survival estimate: $Var(X \cdot Y) = X^2 \cdot Var(Y)$ The variance around the SAR estimate is calculated as follows, where X = the number of adult PIT tagged fish returning to the tributary and Y = the estimated number of juvenile PIT tagged fish at first mainstem dam : $Var\left(\frac{X}{Y}\right) = \left(\frac{EX}{EY}\right)^2 \cdot \left(\frac{Var(Y)}{(EY)^2}\right)$	3.2.1, 3.2.2, 3.7.4
	Progeny-per- Parent Ratio	Adult to adult calculated for naturally spawning fish and hatchery fish separately as the brood year ratio of return adult to parent spawner abundance using data above weir. Two variants calculated: 1) escapement, and 2) spawners.	3.2.1, 3.2.2, 3.7.4

Performance Measure		Definition	Related Indicator
	Recruit/spawner (R/S)(Smolt Equivalents per Redd or female)	Juvenile production to some life stage divided by adult spawner abundance. Derive adult escapement above juvenile trap multiplied by the prespawning mortality estimate. Adjusted for redds above juv. Trap. *Recruit per spawner* estimates, or *juvenile abundance (can be various life stages or locations) per redd/female*, is used to index population productivity, since it represents the quantity of juvenile fish resulting from an average redd (total smolts divided by total redds) or female. Several forms of juvenile life stages are applicable. We utilize two measures: 1) juvenile abundance (parr, presmolt, smolt, total abundance) at the tributary mouth, and 2) smolt abundance at first mainstem dam.	3.2.1, 3.2.2, 3.7.4
	Pre-spawn Mortality	Percent of female adults that die after reaching the spawning grounds but before spawning. Calculated as the proportion of "25% spawned" females among the total number of female carcasses sampled. ("25% spawned" = a female that contains 75% of her egg compliment].	3.2.3, 4.5.1
	Juvenile Survival to first mainstem dam	Life stage survival (parr, presmolt, smolt, subyearling) calculated by CJS Estimate (SURPH) produced by PITPRO 4.8+ (recapture file included), CI estimated as 1.96*SE. Apply survival by life stage to first mainstem dam to estimate of abundance by life stage at the tributary and the sum of those is total smolt abundance surviving to first mainstem dam . Juvenile survival to first mainstem dam = total estimated smolts surviving to first mainstem dam divided by the total estimated juveniles leaving tributary.	3.2.2, 3.6.2, 3.7.5, 3.9.3,
	Juvenile Survival to all Mainstem Dams	*Juvenile survival to first mainstem dam and subsequent Mainstem Dam(s)*, which is estimated using PIT tag technology. Survival by life stage to and through the hydrosystem is possible if enough PIT tags are available from the stream. Using tags from all life stages combined we will calculate (SURPH) the survival to all mainstem dams.	3.2.2, 3.6.2, 3.7.5, 3.9.3,
	Post-release Survival	Post-release survival of natural and hatchery-origin fish are calculated as described above in the performance measure "Survival to first mainstem dam and Mainstem Dams". No additional points of detection (i.e screwtraps) are used to calculate survival estimates.	3.2.2, 3.6.2, 3.7.5, 3.9.3,
Distribution	Adult Spawner Spatial Distribution	Extensive area tributary spawner distribution. Target GPS red locations or reach specific summaries, with information from carcass recoveries to identify hatchery-origin vs. natural-origin spawners across spawning areas within populations.	3.2.3, 3.2.4, 3.6.3, 3.7.3, 4.3.3, 4.6.1
	Stray Rate (percentage)	Estimate of the number and percent of hatchery origin fish on the spawning grounds, as the percent within MPG, and percent out of ESU. Calculated from 1) total known origin carcasses, and 2) uses fish released above weir. Data adjusted for unmarked carcasses above and below weir.	3.4.1, 3.4.2, 3.4.3
	Juvenile Rearing Distribution	Chinook rearing distribution observations are recorded using multiple divers who follow protocol described in Thurow (1994).	
	Disease Frequency	Natural fish mortalities are provided to certified fish health lab for routine disease testing protocols. Hatcheries routinely samples fish for disease and will defer to then for sampling numbers and periodicity	3.10, 4.4.3
Genetic	Genetic Diversity	Indices of genetic diversity – measured within a tributary) heterozygosity – allozymes, microsatellites), or among tributaries across population aggregates (e.g., FST).	3.2.5, 3.8.3, 3.9.1
	Reproductive Success (Nb/N)	Derived measure: determining hatchery:wild proportions, effective population size is modeled.	3.7.2
	Relative Reproductive Success (Parentage)	Derived measure: the relative production of offspring by a particular genotype. Parentage analyses using multilocus genotypes are used to assess reproductive success, mating patterns, kinship, and fitness in natural populations and are gaining widespread use of with the development of highly polymorphic molecular markers.	3.2.1, 3.2.2, 3.2.4, 3.6.1, 3.7.1, 3.7.2 3.7.4, 5.3.1
	Effective Population Size (Ne)	Derived measure: the number of breeding individuals in an idealized population that would show the same amount of dispersion of allele frequencies under random genetic drift or the same amount of inbreeding as the population under consideration.	3.2.5

Performance Measure		Definition	Related Indicator
Life History	Age Structure	Proportion of escapement composed of adult individuals of different brood years. Calculated for wild and hatchery origin conventional and captive brood adult returns. Accessed via scale method, dorsal fin ray ageing, or mark recoveries. Juvenile Age is determined by brood year (year when eggs are placed in the gravel) Then Age is determined by life stage of that year. Methods to age Chinook captured in screwtrap are by dates; fry – prior to July 1; parr – July 1-August 31; presmolt – September 1 – December 31; smolt – January 1 – June 30; yearlings – July 1 – with no migration until following spring. The age class structure of juveniles is determined using length frequency breakouts for natural-origin fish. Scales have been collected from natural-origin juveniles, however, analysis of the scales have never been completed. The age of hatchery-origin fish is determined through a VIE marking program which identifies fish by brood year. For steelhead we attempt to use length frequency but typically age of juvenile steelhead is not calculated.	3.8.1, 3.8.2, 3.9.2
	Age–at–Return	Age distribution of spawners on spawning ground. Calculated for wild and hatchery conventional and captive brood adult returns. Accessed via scale method, dorsal fin ray ageing, or mark recoveries.	3.8.1, 3.8.2, 3.9.2
	Age–at-Emigration	Juvenile Age is determined by brood year (year when eggs are placed in the gravel) Then Age is determined by life stage of that year. Methods to age Chinook captured in screwtrap are by dates; fry – prior to July 1; parr – July 1-August 31; presmolt – September 1 – December 31; smolt – January 1 – June 30; yearlings – July 1 – with no migration until following spring. The age class structure of juveniles is determined using length frequency breakouts for natural-origin fish. Scales have been collected from natural-origin juveniles, however, analysis of the scales have never been completed. The age of hatchery-origin fish is determined through a VIE marking program which identifies fish by brood year. For steelhead we attempt to use length frequency but typically age of juvenile steelhead is not calculated.	3.8.1, 3.8.2, 3.9.2
	Size-at-Return	Size distribution of spawners using fork length and mid-eye hypural length. Raw database measure only.	3.8.1, 3.9.2
	Size-at-Emigration	Fork length (mm) and weight (g) are representatively collected weekly from natural juveniles captured in emigration traps. Mean fork length and variance for all samples within a lifestage-specific emigration period are generated (mean length by week then averaged by lifestage). For entire juvenile abundance leaving a weighted mean (by lifestage) is calculated. Size-at-emigration for hatchery production is generated from pre release sampling of juveniles at the hatchery.	3.8.2, 3.9.2
	Condition of Juveniles at Emigration	Condition factor by life stage of juveniles is generated using the formula: $K = (w/l^3)(10^4)$ where K is the condition factor, w is the weight in grams (g), and l is the length in millimeters (Everhart and Youngs 1992).	3.8.2, 3.9.2
	Percent Females (adults)	The percentage of females in the spawning population. Calculated using 1) weir data, 2) total known origin carcass recoveries, and 3) weir data and unmarked carcasses above and below weir. Calculated for wild, hatchery, and total fish.	3.8.1, 3.9.2
	Adult Run-timing	Arrival timing of adults at adult monitoring sites (weir, DIDSON, video) calculated as range, 10%, median, 90% percentiles. Calculated for wild and hatchery origin fish separately, and total.	3.2.4, 3.6.4, 3.8.1, 3.9.2
	Spawn-timing	This will be a raw database measure only.	3.2.4, 3.6.4, 3.8.1, 3.9.2
	Juvenile Emigration Timing	Juvenile emigration timing is characterized by individual life stages at the rotary screw trap and Lower Granite Dam. Emigration timing at the rotary screw trap is expressed as the percent of total abundance over time while the median, 0%, 10, 50%, 90% and 100% detection dates are calculated for fish at first mainstem dam.	3.2.4, 3.6.4, 3.8.2, 3.9.2, 3.9.3, 4.8.1
	Mainstem Arrival Timing (Lower Granite)	Unique detections of juvenile PIT-tagged fish at first mainstem dam are used to estimate migration timing for natural and hatchery origin tag groups by lifestage. The actual Median, 0, 10%, 50%, 90% and 100% detection dates are reported for each tag group. Weighted detection dates are also calculated by multiplying unique PIT tag detection by a life stage specific correction factor (number fish PIT tagged by lifestage divided by tributary abundance estimate by lifestage). Daily products are added and rounded to the nearest integer to determine weighted median, 0%, 50%, 90% and 100% detection dates.	3.2.4, 3.6.4, 3.8.2, 3.9.2, 3.9.3, 4.8.1
b it	Physical Habitat	TBD	

Performance Measure		Definition	Related Indicator
	Stream Network	TBD	
	Passage Barriers/Diversions	TBD	
	Instream Flow	USGS gauges and also staff gauges	
	Water Temperature	Various, mainly Hobo and other temp loggers at screw trap sights and spread out throughout the streams	
	Chemical Water Quality	TBD	
	Macroinvertebrate Assemblage	TBD	
	Fish and Amphibian Assemblage	Observations through rotary screwtrap catch and while conducting snorkel surveys.	2.4.3, 3.3.3, 3.4.1
In-Hatchery Measures	Hatchery Production Abundance	The number of hatchery juveniles of one cohort released into the receiving stream per year. Derived from census count minus prerelease mortalities or from sample fish- per-pound calculations minus mortalities. Method dependent upon marking program (census obtained when 100% are marked).	2.5.2, 2.5.3, 2.6.1, 4.4.2
	In-hatchery Life Stage Survival	In-hatchery survival is calculated during early life history stages of hatchery-origin juvenile Chinook. Enumeration of individual female's live and dead eggs occurs when the eggs are picked. These numbers create the inventory with subsequent mortality subtracted. This inventory can be changed to the physical count of fish obtained during CWT or VIE tagging. These physical fish counts are the most accurate inventory method available. The inventory is checked throughout the year using 'fish-per-pound' counts. Estimated survival of various in-hatchery juvenile stages (green egg to eyed egg, eyed egg to ponded fry, fry to parr, parr to smolt and overall green egg to release) Derived from census count minus prerelease mortalities or from sample fish- per-pound calculations minus mortalities. Life stage at release varies (smolt, premolt, parr, etc.).	2.5.1, 2.5.2, 2.5.3, 2.5.4
	Size-at-Release	Mean fork length measured in millimeters and mean weight measured in grams of a hatchery release group. Measured during prerelease sampling. Sample size determined by individual facility and M&E staff. Life stage at release varies (smolt, premolt, parr, etc.).	2.5.1, 2.5.3
	Juvenile Condition Factor	Condition Factor (K) relating length to weight expressed as a ratio. Condition factor by life stage of juveniles is generated using the formula: $K = (w/l^3)(10^4)$ where K is the condition factor, w is the weight in grams (g), and l is the length in millimeters (Everhart and Youngs 1992).	2.5.3,3.8.2, 3.9.2
	Fecundity by Age	The reproductive potential of an individual female. Estimated as the number of eggs in the ovaries of the individual female. Measured as the number of eggs per female calculated by weight or enumerated by egg counter.	3.8.1, 3.8.2, 3.9.2
	Spawn Timing	Spawn date of broodstock spawners by age, sex and origin, Also reported as cumulative timing and median dates.	3.2.4, 3.6.4, 3.8.1, 3.9.2
	Hatchery Broodstock Fraction	Percent of hatchery broodstock actually used to spawn the next generation of hatchery F1s. Does not include prespawn mortality.	2.2.1
	Hatchery Broodstock Prespawn Mortality	Percent of adults that die while retained in the hatchery, but before spawning.	4.7.2
	Female Spawner ELISA Values	Screening procedure for diagnosis and detection of BKD in adult female ovarian fluids. The enzyme linked immunosorbent assay (ELISA) detects antigen of *R. salmoninarum.*	3.10, 4.4.3
	In-Hatchery Juvenile Disease Monitoring	Screening procedure for bacterial, viral and other diseases common to juvenile salmonids. Gill/skin/ kidney /spleen/skin/blood culture smears conducted monthly on 10 mortalities per stock	3.10, 4.4.3
	Length of Broodstock Spawner	Mean fork length by age measured in millimeters of male and female broodstock spawners. Measured at spawning and/or at weir collection. Is used in conjunction with scale reading for aging.	3.9.2
	Prerelease Mark Retention	Percentage of a hatchery group that have retained a mark up until release from the hatchery. Estimated from a sample of fish visually calculated as either "present" or "absent"	3.1.1, 3.1.2

Performance Measure		Definition	Related Indicator
	Prerelease Tag Retention	Percentage of a hatchery group that have retained a tag up until release from the hatchery - estimated from a sample of fish passed as either "present" or "absent". ("Marks" refer to adipose fin clips or VIE batch marks).	3.1.1, 3.1.2
	Hatchery Release Timing	Date and time of volitional or forced departure from the hatchery. Normally determined through PIT tag detections at facility exit (not all programs monitor volitional releases).	2.5.4, 4.8.1
	Chemical Water Quality	Hatchery operational measures included: dissolved oxygen (DO) - measured with DO meters, continuously at the hatchery, and manually 3 times daily at acclimation facilities; ammonia (NH_3) nitrite (NO_2), -measured weekly only at reuse facilities (Kooskia Fish Hatchery).	4.2.1
	Water Temperature	Hatchery operational measure (Celsius) - measured continuously at the hatchery with thermographs and 3 times daily at acclimation facilities with hand-held devices.	

For further information associated with assessing the risks and benefits to the natural population of Snake River fall Chinook, the current monitoring and evaluation (M&E) program, and what the M&E studies will tell us by 2017 please refer to Addendum 1 attached to this document – Addendum to Snake River fall Chinook HGMPs for Lyons Ferry Hatchery, Fall Chinook Acclimation Project, Idaho Power Company, and Nez Perce Tribal Hatchery.

1.11) Expected size of program.

The originally designed target production for NPTH was 2.8 million fall Chinook sub-yearlings (Table 3). A two phase development process was approved by the Northwest Power Planning Council for NPTHC. Phase I production goals were set at 1.4 million fall Chinook sub-yearlings and biological triggers established for the implementation of Phase II full production (Table 4).

Table 3. NPTH fall Chinook production – original design target and Phase I goal based on NPTH Master Plan.

Species	Original Design Target	Phase I Goal
Fall Chinook salmon		
Green Eggs*	3,960,000	1,978,000
"0+" Smolt	2,800,000	1,400,000
"1+" Smolt	- 0 -	- 0 -

* Green egg goal numbers based on Master Plan production profile

Table 4. Summary of Biological Triggers for fall Chinook required to proceed to Phase II.

Stock	Biological Trigger
Fall Chinook salmon	Returning NPTH adults to NPTH sufficient to produce 500,000 sub-yearling smolts (approximately 800 returning adults to the Clearwater River Subbasin from Phase I production).

Early-Fall Chinook salmon	Returning naturally produced adults to Luke's Gulch or Cedar Flats sufficient to produce 100,000 sub-yearling smolts (approximately 120 to 170 returning adults to the Clearwater River Subbasin from early-fall Chinook salmon natural production).

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

Approximately 1,052 adults are necessary to meet current smolt production goals of 1.4 million subyearlings. The target is to incorporate up to 30% (or 316) natural-origin fish in the broodstock. Age composition and fecundity of adults varies from year to year, however, using a 1:1 female to male spawning ratio, and using a fecundity of 3,762 eggs per female (average for brood years 2003-2010), coupled with a green egg to release average survival of 78% from brood years 2006-2009, NPTH will need a total of 526 females and 526 males (from both LGR and NPTH trapping) to meet full production annually. This number will be adjusted as needed to ensure adequate broodstock are trapped.

Broodstock are collected at Lower Granite Dam (LWG) and transported to Nez Perce Tribal Hatchery, in accordance with the *U.S. vs. Oregon* 2008-2017 Management Agreement. Fall Chinook are collected in the trap as a sub-sample of the returning run. The sub-sample rate is determined on an annual basis by co-managers based on projected run size of fall Chinook and steelhead. It typically ranges from 10-20% of the run over LWG.

Broodstock are also collected at NPTH from fish entering the ladder. When the program was first being developed, adult fall Chinook were also be collected at weirs on the Potlatch River and Lapwai Creek, as well as in the ladder at Dworshak National Fish Hatchery. Adults collected at these sites were uniquely marked prior to transport to NPTH. Since 2006, adults have been collected only at Lower Granite Dam and swimins to NPTH. There are no plans to trap adults in lower Clearwater River tributary weirs in the future – unless adult returns were extremely low.

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

Total juvenile fall Chinook production is set at 1.4 million subyearling smolts annually.

- 1.0 million Snake River fall Chinook acclimated release from;
  - 500,000 released from NPTH onsite, lower mainstem Clearwater River
  - 500,000 released from North Lapwai Valley satellite, lower mainstem Clearwater River
- 400,000 Early-type Snake River fall Chinook acclimated release from;
  - 200,000 released from Lukes Gulch satellite, lower S.F. Clearwater River
  - 200,000 released from Cedar Flats satellite, lower Selway River

Table 5. U.S. v. Oregon Management Agreement Table B4B cont. Snake River fall Chinook salmon production priorities for Nez Perce Tribal Hatchery - for Brood Years 2008-2017.

Production Program					
Priority	Number	Age	Life History	Release Location(s)	Marking
1	500,000	0+	Standard	On station	100K AdCWT 200K CWT only 200K Unmarked
2	200,000	0+	Early-spawning	Luke's Gulch	100K AdCWT 100K CWT only
	200,000	0+	Early-spawning	Cedar Flats	100K AdCWT 100K CWT only
3	500,000	0+	Standard	North Lapwai Valley	100K AdCWT 200K CWT only 200K Unmarked
TOTAL	1,400,000	Subyearlings			

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

Smolt to Adult Survival Rates

Table 6. Estimated average percent smolt-to-adult return survivals to the Snake River basin through return year 2008 for CWT tagged subyearlings released by Nez Perce Tribal Hatchery (NPTH).

Release site	Brood year	Fin clip	Average % SAR	STD % SAR	min % SAR	max % SAR
Completed Returns						
NPTH	BY02-03	No clip	0.118	0.135	0.024	0.273
Incomplete returns through return year 2008						
NPTH	BY04-06	AD	0.104	0.100	0.011	0.232
NPTH	BY04-06	No clip	0.327	0.467	0.015	0.864
NPTH-North Lapwai Valley	BY05-06	AD	0.194	0.223	0.036	0.351
NPTH-North Lapwai Valley	BY05	No clip	0.377			
NPTH-Cedar Flats Acclimation	BY05-06	No clip	0.730	0.609	0.119	1.337
NPTH-Lukes Gulch Acclimation	BY05-06	No clip	0.345	0.417	0.050	0.640

Table 7. Estimated average percent smolt-to-adult return survivals to the Snake River basin through return year 2008 of subyearlings released by NPTH by salt water age.

Release site	Brood year	Fin clip		1 salt	2 salt	3 salt	4 salt	5 salt
Completed Returns								
NPTH	BY02-03	Noclip	average	**0.053**	**0.039**	**0.022**	**0.005**	

			std	0.058	0.047	0.027	0.003
			min	0.015	0.004	0.004	0.003
			max	0.120	0.092	0.053	0.007
Incomplete returns through return year 2008							
NPTH	BY04-06	AD	average	**0.099**	**0.037**	**0.010**	
			std	0.070	0.044		
			min	0.018	0.011		
			max	0.144	0.088		
NPTH	BY04-06	Noclip	average	**0.209**	**0.177**		
			std	0.274	0.235		
			min	0.004	0.011		
			max	0.521	0.343		
NPTH-North Lapwai Valley	BY05-06	AD	average	**0.169**	**0.196**		
			std	0.007	0.012		
			min	0.164	0.187		
			max	0.173	0.204		
NPTH-North Lapwai Valley	BY05	Noclip	average	**0.036**			
NPTH-Cedar Flats Acclimation	BY05-06	Noclip	average	**0.454**	**0.415**		
			std	0.426	0.015		
			min	0.119	0.404		
			max	0.933	0.426		
NPTH-Lukes Gulch Acclimation	BY05-06	Noclip	average	**0.186**	**0.317**		
			std	0.193			
			min	0.050			
			max	0.323			

Adult Production

Table 8. Estimated returns of fall Chinook from the NPTH program to the Snake River basin.

		Saltwater age					
	0- salt	1- salt		2-5 salt			
Return year	Mini Jack [a]	Jack [b]	Jill [c]	Adult F	Adult M	Total (A+J)	% of NPTH goal[d]
2004		449				449	0.0
2005		40		38	75	153	3.0
2006		73		43	0	116	1.1
2007		1,758	5	49	46	95	2.5
2008		573		656	1,167	1,823	48.6
2009		8,981		1,191	485	1,676	44.7

[a] Minijacks are males that did not spend a year in salt water.

[b] Jacks are males that spent 1 year in salt water.

[c] Jills are females that spent 1 year in salt water.

[d] Based on an adult return goal of 3,750.

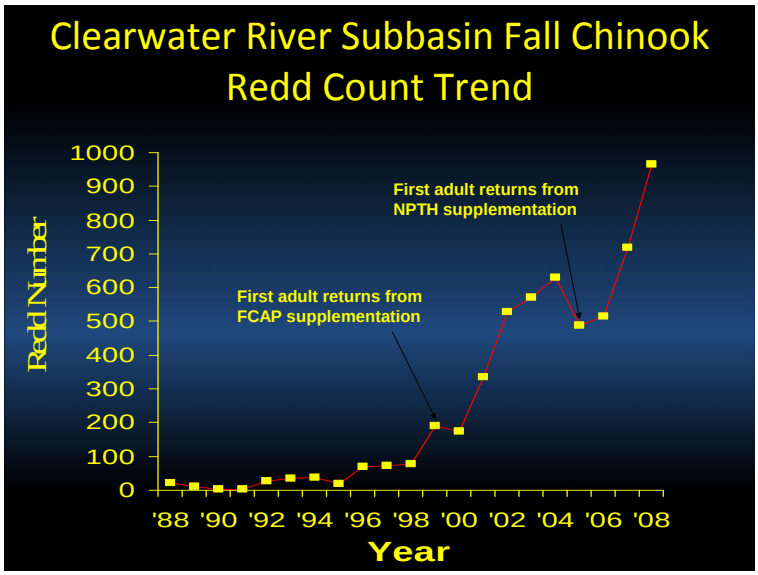
Adult Escapement

Table 9. Aerial Fall Chinook Spawning Ground Surveys 1988- 2010.

Observation Year	Fall Chinook redds counted by year and location					
	Lower CLWTR	N.F. CLWTR	Upper CLWTR	S.F. CLWTR	M.F. CLWTR	SELWAY
	RK 6.4-72.4	RK 0-1.2	RK 72.4-120.4	RK 0-22.5	RK 120.4-157	RK 0-29.6
1988	21	0				
1989	10	0				
1990	4	0				
1991	4	0				
1992	25	0	1	0		
1993	36	0	0	0		
1994	30	7	0	0	0	0
1995	20*	0	0	0	0	0
1996	66	2	0	1	0	0
1997	58	14	0	0	0	0
1998	78	0	0	0	0	0

Observation Year	Fall Chinook redds counted by year and location					
	Lower CLWTR	N.F. CLWTR	Upper CLWTR	S.F. CLWTR	M.F. CLWTR	SELWAY
	RK 6.4-72.4	RK 0-1.2	RK 72.4-120.4	RK 0-22.5	RK 120.4-157	RK 0-29.6
1999	179	1	2	2	0	0
2000	164	0	8	1	0	0
2001	290	1	16	5	0	0
2002	520	0	4	0	0	0
2003	544	8	19	0	0	0
2004	592	2	36	0	0	0
2005	433	0	54	0	0	0
2006	251*	0*	6*	0	0	0
2007	711	0	7	0	0	0
2008	919	0	22	3	0	5
2009	1142	1	42	12	0	1
2010	1579	8	53	2	0	1

* not a complete count, no surveys after 11/21 in 1995, and 10/30 in 2006 due to rains and turbid water conditions. It was estimated that 50% of the redds were missed in 2006.



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

Nez Perce Tribal Hatchery fall Chinook production began in October 2002 with Tribal staff spawning broodstock at Lyons Ferry Hatchery and transporting gametes to NPTH. The first releases occurred with 505,973 fall Chinook subyearling smolts in May/June 2003.

1.14) Expected duration of program.

Nez Perce Tribal Hatchery is currently operated under a 25-year Memorandum of Agreement (MOA) with Bonneville Power Administration commencing in June 2000. Quarterly and annual reports are developed along with the Annual Operating Plan and periodic reviews every five years. This agreement is renewable depending on success and need as determined by the Monitoring and Evaluation program.

The Monitoring and Evaluation Plan for Nez Perce Tribal Hatchery: Phase 1 Action Plan calls for evaluations over 15-20 years (Hesse and Cramer 2000). Reports occur quarterly with annual summaries, e.g., NOAA Section 7 and Section 10 reviews and 5-year project reviews and assessments.

1.15) Watersheds targeted by program.

- Lower Clearwater River: Confluence with Snake River to Lolo Creek confluence (Rkm 87) above North Fork Clearwater River confluence is habitat designated as Critical under ESA-listing. Two release locations within this critical habitat, Site 1705 at NPTH and the North Lapwai Valley satellite. Redds are typically counted upstream of Rkm 6.4 on the lower Clearwater River up to confluence of South Fork Clearwater River at Rkm 120.
- South Fork Clearwater River: Release location is Lukes Gulch satellite at Rkm 14. Redd surveys are typically conducted from mouth upstream to Rkm 22.5.
- Lower Selway River: Release location is Cedar Flats satellite at Rkm 8. Redd surveys are typically conducted from mouth upstream to Rkm 29.6.

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

The Final EIS (BPA et al. 1997) lists the three alternatives; 1) Proposed Action, 2) Use of Existing Facilities, and 3) No-Action. Neither alternative 2 nor 3 could achieve the composite purpose found in the goals listed below:

- Protect, mitigate and enhance Columbia River Basin anadromous fish resources,
- Develop, increase and reintroduce natural spawning populations of salmon with in the Clearwater River subbasin,
- Sustain long-term fitness and genetic integrity of targeted fish populations,
- Keep ecological and genetic impacts to non-targeted fish populations within acceptable limits,
- Promote the Nez Perce Tribal management of Nez Perce Tribal Hatchery facilities and production areas within Nez Perce Treaty lands, and
- Provide long-term harvest opportunities for Tribal and non-Tribal anglers within Nez

Perce Treaty lands with four salmon generations (20 years) following project completion.

Given the low abundance and eventual ESA listed status of Snake River fall Chinook in the 1970's to 1990's and the fact that the major limiting factors are out-of-basin effects and habitat limitations, initiating and maintaining a hatchery program is currently the only method to supplement the natural population and provide harvest opportunity in the Snake River Basin.

SECTION 2. PROGRAM EFFECTS ON NMFS ESA-LISTED SALMONID POPULATIONS.

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

- ESA Construction and Operation Section 7, 29 June 2000 with several letters for instream construction extension.
- NOAA Fisheries Scientific Research Permit #1134.
- NOAA Fisheries ESA Section 10 Permit No. 1530 (expired December 2010) – was authorized to WDFW, IDFG, and Bureau of Indian Affairs for the operation of Lower Granite Trap for broodstock collection and run reconstruction. A letter of determination for handling and sampling (but not broodstock collection) fall Chinook adults at LGR Dam has been provided to the managers and will be in effect through December 2013.
- U.S. Fish and Wildlife Service Section 10 Permit #TE001598-3.

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

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

Identify the NMFS ESA-listed population(s) that will be directly affected by the program.

Snake River fall Chinook salmon - ESA-listed as Threatened.

The following information provided under Background and Limiting Factors and Threats is excerpted from Chapter 8.2 (Snake River Fall Chinook Salmon) of the Federal Columbia River Hydropower System Biological Opinion (FCRPS BiOp) Supplemental Comprehensive Analysis (SCA) (NOAA et al. 2008).

Background

The Snake River (SR) fall Chinook salmon ESU is a single population in one major population group (MPG) that spawns and rears in the mainstem Snake River and its tributaries below Hells Canyon Dam. The decline of this ESU was due to heavy fishing pressure beginning in the 1890s and loss of habitat with the construction of Swan Falls Dam in 1901 and the Hells Canyon Complex from 1958 to 1967, which extirpated two of the historical populations. Only 10 to 15% of the historical range of this ESU remains. Hatcheries have played a major role in the production

of Snake River fall Chinook since the 1980s. Snake River fall Chinook were listed under the ESA as threatened in 1992.

Designated critical habitat for Snake River fall Chinook salmon includes all Columbia River estuarine areas and river reaches proceeding upstream to the confluence of the Columbia and Snake rivers; the Snake River, upstream to Hells Canyon Dam; the lower reaches of the Palouse; and the North Fork Clearwater River (upstream to Dworshak Dam).

Life History

Fall Chinook are generally considered an 'ocean-type' (after sea-type, in Gilbert, 1913) run of salmon which migrate to the Pacific Ocean during their first year of life, normally within 3 months of emergence from spawning substrate. Adult Snake River fall Chinook enter the Columbia River in August and migrate into the Snake River from late August through November. Spawning occurs from late October through early December. Fry emergence typically occurs during April. Most out-migration occurs within several months following emergence with peak migration past Lower Granite Dam in late June. There is also a 'stream-type', which rears in the reservoirs and migrate to the Pacific Ocean during the second year of life. Some emigrate throughout the fall and some over-winter before migrating (Connor et al. 2005). In 2004, scale samples were taken on unmarked/untagged returning adults. Of 443 fish that were determined to be of natural Snake River Origin, 257 (58.0%) showed yearling out-migrant patterns indicating they reservoir reared. Reservoir rearing is also occurring in unmarked/untagged Snake River origin hatchery fish at a rate of 55.9%, based upon scale sampling of 463 fish during spawning activities at LFH. This phenomenon is occurring in subyearlings released above LGR Dam.

Limiting Factors and Threats

Limiting factors for SR fall Chinook include mainstem hydroelectric projects in the Columbia and Snake rivers, predation, harvest, hatcheries, the estuary, and tributary habitat. Ocean conditions have also affected the status of this ESU. Generally, ocean conditions have been poor for this ESU over the past 20 years, improving only recently.

Identify the NMFS ESA-listed population(s) that may be <u>incidentally</u> affected by the program.

The NPTH fall Chinook hatchery production program may incidentally affect ESA-listed Snake River spring Chinook, Snake River summer steelhead, and Snake River sockeye. Potential effects on each of these species are listed with specific information details provided in Section 2.2.3.

Snake River spring/summer Chinook salmon

Snake River spring/summer Chinook is a threatened species composed of 28 extant populations in five major population groups (MPGs) in the Snake Basin. Adult spring Chinook salmon enter the Columbia River in March through May. Movement into summer holding areas ranges from April through July. Age 4 fish typically dominate returns to the Snake Basin. Spawning occurs

from early August through September and generally peaks in late August. Fry emergence begins in January and extends through June. Fry expand their distribution after emerging in the spring. The extent and direction of fry movement depends on environmental conditions. Juveniles rear for one year and smolt the spring of the year following emergence. Smolt migration from the subbasin begins in January and extends through late June.

Key statistics associated with the current status of Snake River spring/summer Chinook salmon are summarized in Tables 8.3.2-1 through 8.3.2-4 of the Federal Columbia River Hydropower System Biological Opinion (FCRPS BiOp) Supplemental Comprehensive Analysis (SCA) (NOAA et al. 2008). Following is a short summary of population status from the SCA.

The key limiting factors and threats for the Snake River spring/summer Chinook include hydropower projects, predation, harvest, degraded estuary habitat, and degraded tributary habitat. Ocean conditions generally have been poor for this ESU over the past 20 years, improving only in the last few years. Eleven populations spawn in wilderness areas, where the habitat is considered functional.

For all populations, average abundance over the most recent 10-year period is below the average abundance thresholds that the Interior Columbia Technical Recovery Team identifies as a minimum for low risk (See SCA Table 8.3.2-1 NOAA et al. 2008). Abundance for most Snake River spring Chinook populations declined to extremely low levels in the mid-1990s, increased in the early 2000s, and are now at levels intermediate to those of the mid-1990s and early 2000s (Figure 2).

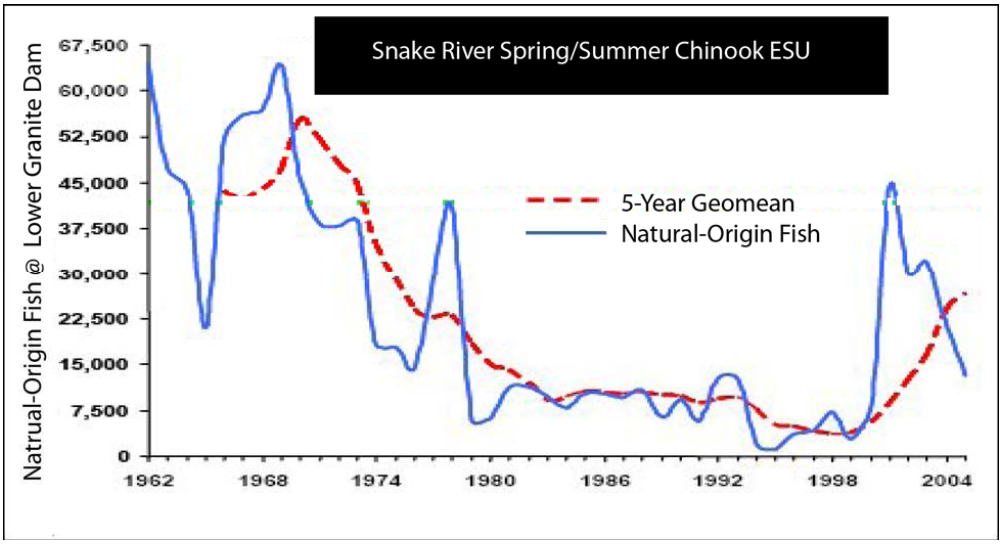


Figure 2. Figure 8.3.2-1. in the FCRPS BiOp Supplemenatal Comprehesive Analysis - Snake River Spring Summer Chinook Abundance Trends (adopted from Fisher and Hinrichsen 2006).

Potential impacts to Snake River spring/summer Chinook from the NPTH fall Chinook production program include effects to adults (broodstock collection and run reconstruction sampling) and juveniles (ecological interactions of rearing and emigrating fish).

- Incidental trapping during broodstock collection and run reconstruction sampling at Lower Granite Dam.

ESA listed Snake River spring/summer Chinook are incidentally trapped at LGR Dam while fall Chinook are being targeted. Trapping begins August 18 at LGR Dam to avoid trapping most summer Chinook run. Spring/summer Chinook are documented at the trap through CWT recoveries. The average number of CWT spring/summer Chinook incidentally caught over the last five years during fall Chinook trapping is minimal – approximately six fish.

- Incidental trapping during broodstock collection at NPTH ladder/trap facility.

Depending on projected return of fall Chinook the ladder/trap at NPTH may or may not be used to collect broodstock. If the projection is that enough fish can be trapped at LGR Dam to make broodstock the ladder at NPTH will not be operated. If the ladder at NPTH does operate it's possible that a listed Snake River spring/summer Chinook may be captured. However, because spring Chinook salmon in the Clearwater Basin are not ESA-listed this scenario is very unlikely.

- Ecological interactions of juvenile rearing and smolt emigration

Natural origin spring Chinook juvenile utilization in the Snake River is minimal due to high summer water temperatures. Spring Chinook smolt migration from the basin tributaries begins in November (earlier in the Tucannon) and extends through early July, thereby overlapping with the hatchery fall Chinook production from this program (Fish Passage Center – **www.fpc.org**).

Juvenile hatchery fall Chinook released as smolts may compete for food and space with naturally reared spring Chinook following release. However, this is generally minimized because of release size, condition of fish at release (smolts), and migration timing. Predation by Chinook smolts is unlikely due to size constraints (See Section 3.5). As with the other species, hatchery-origin fall Chinook from this program have the chance to spread diseases to natural ESA listed populations during the migration period. Regional protocols are followed to ensure healthy fish upon release.

Snake River steelhead – ESA-listed as Threatened

The Snake River steelhead DPS includes all anadromous populations that spawn and rear in the mainstem Snake River and its tributaries between Ice Harbor and the Hells Canyon hydro complex. There are five major population groups with 24 populations. Inland steelhead in the Columbia River Basin are commonly referred to as either A-run or B-run, based on migration timing and differences in age and size at return. A-run steelhead are believed to occur throughout the steelhead streams in the Snake River Basin, and B-run are thought to produce only in the Clearwater and Salmon rivers. This DPS was listed under the ESA as threatened in 1997, reaffirmed in 2006.

Most A-run adults (60%) return to the basin after one year of ocean rearing. The remainder is 2-ocean age adults with an occasional 3-ocean age fish. Females generally predominate with a 60/40 sex ratio on average. Returning adults range in size from 54 to 85 cm and 1.4 to 6.8 kg. Adults generally enter the Columbia River from May through August, subsequently entering the Snake River from July through the following March. Adults in the lower Snake River basin (Washington State) may utilize tributaries to the mainstem. Most B-run adults (60%+) return as 2-ocean age fish, with less returning as 3-ocean, and the least as 1-ocean age. Adults generally return in size from 70-100 cm and 3.0-10.0 kg. B-run fish enter the Columbia beginning in August and continue through early October. The extent of mainstem spawning for both runs is not well documented, but the interaction with fall Chinook is expected to be minimal because of the disparate spawning times for the two species.

Spawning begins in March in the tributaries and continues until May. Juveniles utilize a wide range of habitats throughout the basin including areas adjacent to smolt release locations. Most naturally produced smolts migrate after rearing for two years. A much lower percentage migrate after one or three years. Smolt out-migration through the lower Grande Ronde Basin extends from late winter until late spring, thereby overlapping with hatchery fall Chinook smolts releases as described for this program. Peak smolt movement is associated with increased flow events between mid-April and mid-May (Ann Setter – ODFW, pers. comm.).

Key statistics associated with the current status of Snake River steelhead are summarized in Tables 8.5.2-1 through 8.5.2-4 of the Federal Columbia River Hydropower System Biological Opinion (FCRPS BiOp) Supplemental Comprehensive Analysis (SCA) (NOAA Fisheries 2008). Following are excerpts that summarize the population status from the SCA.

Historically, the key limiting factors for the Snake River steelhead include hydropower projects, predation, harvest, hatchery effects, and tributary habitat. Ocean conditions have also affected the status of this DPS. These generally have been poor over at least the last 20 years, improving only in the last few years.

The abundance of Snake River steelhead has been stable or increasing for most A-run and B-run populations during the last 20 brood cycles. On average, the natural-origin components of the A-run populations have replaced themselves whereas the natural-origin components of the B-run populations have not.

Population-specific adult population abundance is generally not available for SR steelhead due to difficulties conducting surveys in much of their range. To supplement the few population-specific estimates, the ICTRT used Lower Granite Dam counts of A-run and B-run steelhead and apportioned those to A- and B-run populations proportional to intrinsic potential habitat (Appendix A of ICTRT 2007c). The ICTRT generated 10-year geometric mean abundance estimates for two populations in the Grande Ronde MPG and reported average A-run and average B-run abundance as an indicator for the other populations. For the two Grande Ronde MPG populations, recent average abundance exceeds the ICTRT abundance threshold for one and the second is below the threshold (See SCA Table 8.5.2-1 NOAA Fisheries 2008). Both the A- and

B-run averages are below the average abundance thresholds that the ICTRT identifies as a minimum for low risk.

Abundance for Grande Ronde populations, and the average A- and B-run populations, declined to low levels in the mid-1990s, increased to levels at or above the recovery ICTRT abundance thresholds for a few years in the early 2000s, and are now at levels intermediate to those of the mid-1990s and early 2000s (Figure 3). Figure 3 shows the 1980 to most recent abundance and 5-year geometric mean trends for the aggregate of all populations above Lower Granite Dam. The 5-year geometric mean increased from 1980, peaking in 1989 and decreasing throughout the 1990s. Aggregate abundance of natural-origin fish peaked in 2002 and the 5-year geometric mean has been increasing since 2000.

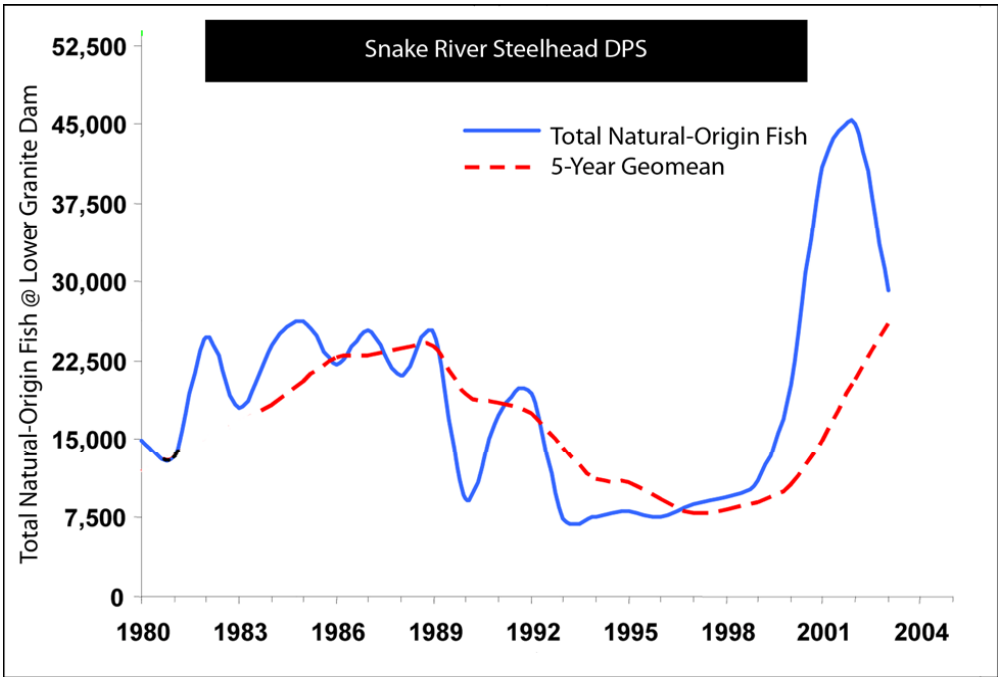


Figure 3. Figure 8.5.2.1-1. in the FCRPS BiOp Supplemenatal Comprehesive Analysis - Snake River Steelhead DPS Abundance and 5-Year Geometric Mean (adopted from Fisher and Hinrichsen 2006).

Potential impacts to Snake River spring/summer Chinook from the NPTH fall Chinook production program include effects to adults (broodstock collection and run reconstruction sampling) and juveniles (ecological interactions of rearing and emigrating fish).

- Incidental trapping during broodstock collection and run reconstruction sampling at Lower Granite Dam.

ESA listed Snake River summer steelhead are trapped at LGR Dam along with fall Chinook salmon during fall trapping. This take involving the trapping, handling, and sampling of

steelhead is permitted by NOAA Fisheries in a separate ESA consultation – previously Section 10 Permit 1530.

- Incidental trapping during broodstock collection at NPTH ladder/trap facility.

Natural-origin adult steelhead can be incidentally collected during the trapping for fall Chinook broodstock at NPTH, although it is very rare. These fish are sorted out at spawning and immediately returned to the river.

- Ecological interactions of juvenile rearing and smolt emigration

Snake River sockeye – ESA-listed as Endangered

The Snake River sockeye salmon ESU includes all anadromous and residual sockeye from the Snake River basin, Idaho, as well as artificially propagated sockeye salmon from the Redfish Lake Captive Broodstock Program. Snake River sockeye are currently listed as "endangered" under the ESA.

Statistics associated with the current status of Snake River sockeye are summarized in Chapter 8.4 of the Federal Columbia River Hydropower System Biological Opinion (FCRPS BiOp) Supplemental Comprehensive Analysis (SCA) (NOAA et al. 2008). Following are excerpts that summarize the population status from the SCA.

Sockeye salmon were historically numerous in many areas of the Snake River basin prior to the European westward expansion. However, intense commercial harvest of sockeye along with other salmon species beginning in the mid-1880s; the existence of Sunbeam Dam as a migration barrier between 1910 and the early 1930s; the eradication of sockeye from Sawtooth Valley lakes in the 1950s and 1960s; the development of mainstem hydropower projects on the lower Snake and Columbia Rivers in the 1970s and 1980s; and poor ocean conditions in 1977 through the late 1990s probably combined to reduce the stock to a very small remnant population. Snake River sockeye salmon are now found predominantly in a captive broodstock program associated with Redfish and the other Sawtooth Valley lakes (NMFS 1991a). At the time of listing, one, one, and zero fish had returned to Redfish Lake in the three preceding years, respectively.

This species has a very high risk of extinction. Between 1991 and 1998, all 16 of the natural-origin adult sockeye salmon that returned to the weir at Redfish Lake were incorporated into the captive broodstock program. Between 1999 and 2007, more that 355 adults returned from the ocean from captive broodstock releases—almost 20 times the number of wild fish that returned in the 1990s.

Sockeye adults utilize the Snake River primarily as a migration corridor to reach Redfish Lake in Idaho. Juvenile utilization in the Snake River is minimal due to high summer water temperatures. Smolt migration from the basin begins in November and extends through early July, thereby overlapping with the hatchery fall Chinook production from this program (Fish Passage Center).

Juvenile hatchery fall Chinook released as smolts may compete for food and space with naturally reared sockeye following release. However, this is generally minimized because of release size, condition of fish at release (smolts), and migration timing. As with the other species, hatchery-origin fall Chinook from this program have the chance to spread diseases to natural ESA listed populations during the migration period. Regional protocols are followed to ensure healthy fish upon release.

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

-Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds

The following information provided is excerpted from Chapter 8.2 (Snake River Fall Chinook Salmon) of the Federal Columbia River Hydropower System Biological Opinion (FCRPS BiOp) Supplemental Comprehensive Analysis (SCA) (NOAA et al. 2008).

Current Status & Recent Trends

The average abundance (1,273) of SR fall Chinook over the most recent 10-year period is below the 3,000 natural spawner average abundance thresholds that the ICTRT identified as a minimum for recovery. Total returns to Lower Granite Dam increased steadily from the mid-1990s to the present (Figure 4). Natural returns increased at roughly the same rate as hatchery origin returns (through run year 2000), but since then hatchery returns have increased disproportionately to natural-origin returns. The median proportion of natural-origin has been approximately 32% over the past two brood cycles (Cooney and Ford 2007).

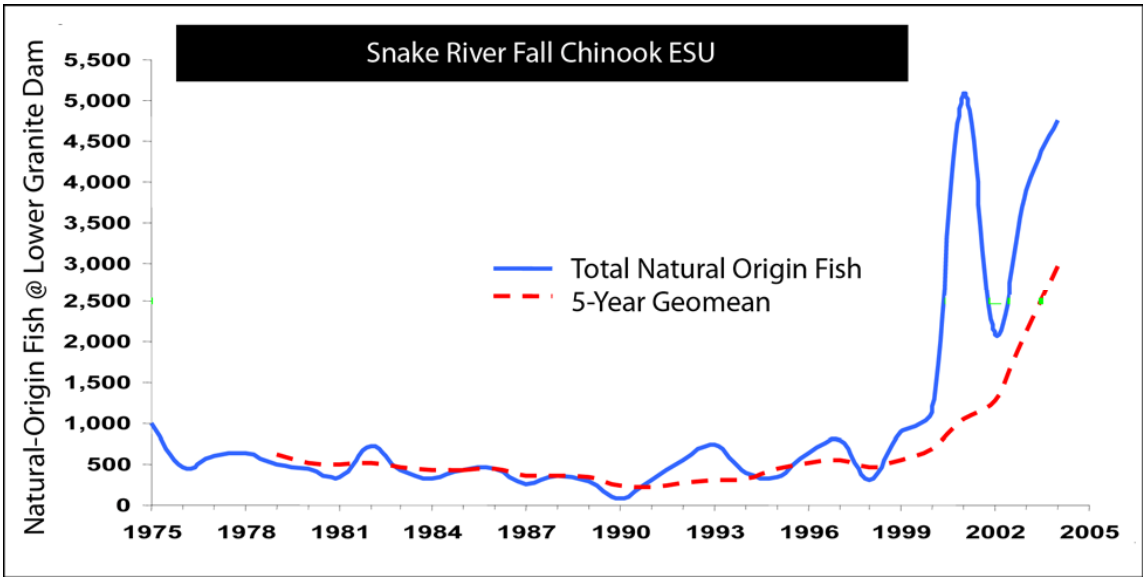


Figure 4. Figure 8.2.2.1-1 of the FCRPS BiOp SCA (NOAA 2008) Snake River Fall Chinook Salmon Abundance Trends (adopted from Fisher and Hinrichsen 2006).

Table 10. Natural and hatchery origin (includes all hatcheries) adult fall Chinook passed above LGR Dam to continue migration to spawning areas. Data compiled using LSRCP annual reports, IDFG harvest data, NPTH spawning data.

Year	Natural Adults [a]	Hatchery adults	Snake River redds	Asotin Creek redds	Clearwater River basin redds	Grande Ronde River basin redds	Imnaha River basin redds	Salmon River basin redds
1988	368	259	64	0	21	1	1	0
1989	295	411	58	0	10	0	1	0
1990	78	258	37	0	4	1	3	0
1991	316	274	46	0	4	0	4	0
1992	549	119	47	-	26	5	3	1
1993	742	210	127	-	36	49	4	3
1994	406	201	67	-	37	15	0	1
1995	350	285	65	-	20[a]	18	4	2
1996	639	280	104	-	69	20	3	1
1997	796	211	58	-	72	55	3	1
1998	304	658	185	-	78	24	13	3
1999	905	957	373	-	191	13	9	0
2000	1171	1497	346	-	173	8	9	0
2001	5216	5291	709	-	336	197	38	22
2002	2235	8155	1113	-	527	111	72	31
2003	3856	9649	1512	3	572	93	43	18
2004	4756	9870	1709	4	631	162	35	21
2005	2704	7421	1442	6	487	129	36	27
2006	2433	5351	1025	1	514[b]	42	36	9
2007	1762	8565	1117	0	718	81	17	18
2008	1853	15413	1819	3	965	186	68	14

[a] Adult criteria was $\geq$ 56 cm total length ($\geq$53cm fork length) to match criteria used at the fish counting window at LGR Dam.
[b] Not full counts. No surveys after 11/21 in 1995 and 10/30 in 2006 due to rains and turbid water conditions.

- 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.

Progeny to Parent Ratios

Data is not collected at this time to calculate progeny-to-parent ratios. Because Snake River fall Chinook are mainstem spawners, it is difficult to determine specific life stage survival rates. Numerous redd surveys are conducted across several subbasins and are used to interpret changes in productivity. However, we cannot differentiate between natural and hatchery productivity. In addition, smolts traps in select areas generate some fall Chinook data; however, trap efficiency is difficult to determine and data is often gathered opportunistically. Currently, fall Chinook adults collected at Lower Granite Dam are used to determine the proportion of natural and hatchery spawners.

Recruit per Spawner Ratios

Productivity of Snake River Basin fall Chinook is currently estimated from trends in redd counts for the mainstem and several sub-basins. Redds often are under-counted because of difficulties detecting redds due to water clarity, depth of water at redd location and weather conditions, however, counts appear to be increasing in many areas. Unfortunately, natural- and hatchery-origin fish productivity cannot be estimated separately, thus contribution of naturally spawning hatchery fish to increased population abundance is unknown. Determining the reproductive success of naturally spawning hatchery and natural fish has been identified as a priority in the NMFS Biological Opinion for the Federal Columbia River Power System (FCRPS) (NOAA Fisheries 2008).

If the proportion of LFH reared natural spawners continues to increase and their reproductive success is high, we expect the genetic profile of natural origin fall Chinook in future years will become indistinguishable from LFH brood stock. It was theorized that a time-series of brood year-based genetic data for Snake River fall Chinook would permit effective monitoring of the genetic change in the wild population as supplementation efforts continue. However, recent results by Marshall and Small (2011) indicate that the current genetic differences between hatchery and natural fish are too small to allow for an accurate or precise measurement of relative reproductive success using genetic change over time as the indicator. In response to the FCRPS RPA's 64 and 65 an Ad Hoc group of researchers was assembled by NOAA Fisheries and BPA to examine what other possibilities exist for measuring RRS in the supplemented Snake River fall Chinook population. A guidance document has been completed (Peven 2010) which lays out research possibilities, but no further action has been taken. If a reproductive success study can accurately determine LFH fall Chinook relative reproductive success, the results have the potential to change management in the Snake River basin, resulting in a biological benefit to the Snake River Fall Chinook ESU.

Juvenile Survival

-Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Refer to Table 10 and explanation above (section 2.2.2).

Spawner Abundance

Refer to Table 10 above.

Juvenile Abundance

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

Refer to Table 11 and explanation above (section 2.2.2).

Table 11. Annual numbers (% of total in parenthesis) of natural and hatchery origin Snake River fall Chinook salmon carcasses collected on spawning grounds in the Clearwater River Subbasin (N/A = data not yet available, ? = scale data on unmarked/untagged not available).

Year	Natural	Hatchery	Unknown[a]	Stray
1998	16 (100%)	0 (0%)	?	0 (0%)
1999	36 (65%)	19 (35%)	?	0 (0%)
2000	37 (40%)	55 (60%)	?	0 (0%)
2001	137 (81%)	33 (19%)	?	1 (<1%)
2002	57 (32%)	200 (52%)	57 (15%)	1 (0.3%)
2003	54 (21%)	171 (65%)	31 (12%)	7 (3%)
2004	38 (25%)	93 (60%)	24 (15%)	0 (0%)
2005	66 (27%)	148 (62%)	24 (10%)	2 (1%)
2006	22 (31%)	41 (58%)	8 (11%)	0 (0%)
2007	29 (38%)	31 (40%)	16 (21%)	1 (1%)
2008	100 (21%)	338 (71%)	34 (7%)	7 (1%)
2009	30 (12%)	206 (80%)	19 (7%)	2 (1%)
2010[b]	221 (41%)	286 (53%)	N/A	31 (6%)

[a] Unmarked/untagged, scales regenerated or could not be taken.
[b] Preliminary data, percent natural based on unmarked/untagged fish, scales have not been read at this time.

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

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

<u>Trapping activities</u>: ESA listed Snake River spring/summer Chinook, Snake River steelhead (Snake River ESU), and Sockeye are incidentally trapped at LGR Dam, while fall Chinook are being targeted. ESA listed Snake River spring/summer Chinook, and Snake River steelhead (Snake River ESU) are incidentally trapped at NPTH, while fall Chinook are being targeted. Duration of trapping at LGR Dam is generally August 18-November 27. Trapping for broodstock collection may end earlier if we have attained our full production needs.

NOAA staff operates the trap at LGR Dam where fish trapped are handled, sampled, and either passed or collected for broodstock. Broodstock fish are transported to LFH by WDFW or to NPTH by NPT staff. Listed Snake River fall Chinook will be collected and transported to LFH

and NPTH in proportion to their presence in the ladder at the dam. This action is being taken as a consensus management action of the Managers to minimize the genetic difference between hatchery and wild components of the Snake River fall Chinook population

Take at LGR Dam was previously permitted through Section 10 Permit #1530 which expired at the end of 2010. NOAA Fisheries determined that ESA coverage for hatchery operations would occur through a Section 10 permit resulting from this HGMP and the Lyons Ferry/IPC/FCAP HGMP. Occasionally, spring/summer Chinook are misidentified and shipped to NPTH. It isn't until the fish dies or is seen at spawning that the fish is identified as a spring/summer Chinook. By then the fish is in too poor of condition to be returned to the spawning grounds and thus is kept from spawning in the wild. The average number of CWT spring/summer Chinook incidentally caught between 2005-2008 during fall Chinook trapping was seven fish from LGR Dam. Over the same period, approximately 6,300 fish annually have been trapped for the fall Chinook program and associated management needs.

The NPTH adult trap operates for collection of spring Chinook and if it is determined that fall Chinook broodstock collection is necessary it will most likely remain open after spring Chinook trapping concludes. Although it is possible that listed Snake River spring/summer Chinook may be captured in the NPTH trap it is unlikely. Spring/summer Chinook salmon in the Clearwater River are not ESA listed. Any spring Chinook trapped during September-November is returned to the Clearwater River.

Listed summer steelhead adults (Snake River ESU) will be incidentally trapped from August 18 through November at the LGR adult trap (Take Table 1). Under the fall Chinook trapping protocol for the LGR Dam adult trap; 10-20% of fish passing the dam will be handled. As a result, a similar percentage of wild steelhead passing the dam at that time will be incidentally handled, and up to 3% of the total sample may be directly sampled for steelhead run composition information by Idaho Fish and Game Personnel. Those fish will be released back to the fishway to continue upstream to spawning areas. At LFH, all steelhead incidentally trapped will be placed in a holding pond with the fall Chinook. It is possible for these fish to be held up to 24 days before they are initially sorted. After sorting, they will be moved to the steelhead raceways, held an additional 21 days (chemical withdrawal period), then released into the Snake River. For estimated take, see ESA Section 10 Permit 1530 and Letter of Determination (NOAA 2011).

Spawning, Rearing and Releases: Once spawning begins, fish will be checked weekly, but fish to be released will still require a 21-day holding period because of chemical withdrawal requirements. Rearing/release of fall Chinook from NPTH has a potential for indirect take of listed fall Chinook that may be present in the mainstem of the Snake River. The release of Snake River Stock fall Chinook may incidentally affect (take) other listed salmonids (spring/summer Chinook, steelhead, bull trout) in the Snake River by displacement or competition. In addition, smolts that might residualize or over-winter will also compete for food and space, though we believe this is minimized because released fish are generally fully smolted to maximize emigration. An estimate of the annual take

level to each of these species is not possible.

Smolt Trapping**:** Takes of out-migrating fall Chinook (natural and hatchery-origin) will occur at NPT's smolt trap located on the mainstem Clearwater River (N46.451358, W116.808117). The NPT is currently working under a Section 10 Permit #1134 that covers juvenile trapping activities. The traps will be operated from October to early July each year to capture natural origin fall Chinook, natural and hatchery origin spring Chinook, and natural and hatchery-origin summer steelhead. Smolt trapping enables NPT staff to estimate natural smolt production from the basin, and evaluate performance of hatchery releases. Some of the natural and hatchery fish captured will be measured, weighed and released. Small groups of captured fish (natural-origin) will receive a partial caudal fin clip for identification and transported back upstream about one kilometer and released to calculate trap efficiency. Most fish will be counted and released immediately back to the stream to continue their out-migration. During peak out-migration, fish may be held in live boxes for two to three hours before release (mark/recapture trial, or PIT tagged). At other times of year the trap may be checked only once a day. Delayed migration will result for fish captured in the trap, and delayed mortality as a result of injury may also occur. Mortality of natural fall Chinook is expected to remain below 0.5%.

Table 12. Requested take from the Nez Perce Tribe Section 10 Permit # 1134 application. Estimated number of adult and juvenile spring/summer and fall Chinook salmon to be captured in rotary screw traps, number to be PIT tagged, and estimated mortalities associated with these activities in the Imnaha River, South Fork Salmon River, Secesh River, Lake Creek, Johnson Creek, and Clearwater River.

ESU/Species and Population Group	Life Stage	*Origin*	Take Activity	Authorized Take	Author-ized Mortality	*Research Location*	*Research Period*	*Details*
Fall Chinook Salmon	Juvenile	Natural	Capture, handle, release[1]	20,000	100	Clearwater River	May 1-Oct 1	Screw Trap
Fall Chinook Salmon	Juvenile	Hatcery Non-adclipped	Capture, handle, release[1]	50,000	250	Clearwater River	May 1-Oct 1	Screw Trap
Fall Chinook Salmon	Juvenile	Natural	Capture, handle, tag, mark[2]	8,000	80	Clearwater River	May 1-Oct 1	Screw Trap
Fall Chinook Salmon	Juvenile	Natural	Capture, handle, tag, mark[2]	2,000	20	Clearwater River	May 1-Oct 1	Screw Trap

Netting Methods

Nez Perce Tribe in the Clearwater also utilizes beach seines, fyke nets, trawling, purse seining, and minnow traps in sampling juvenile fish for length, weight, scale samples, and other biological

information and for the marking of fish with Passive Integrated Transponders to estimate fish survivals. These activities are currently covered under Permit #1134. Fish are anaesthetized in a MS-222 bath [3 ml MS-222 stock solution (100 g/L) per 19 L of water] buffered with propolyaqua (PRO-NOVAQUA). Age-class groups will be determined through scale analysis method (Borgerson et al 1995, Carlander 1986, Davis and Light 1985, Hooton et al 1987, Jearld 1983, Schwartzberg and Fryer 1990, Seelbach and Beyerle 1984). Tissue samples from fin clips will be used for genetic analysis. These surveys will allow collection of baseline information on existing fish densities, fish sizes, age structure, and genetic makeup in selected streams of naturally reproducing fish populations and populations supplemented with hatchery fish. Work plans are coordinated with appropriate management agencies prior to implementation of the project.

Beach seining will be accomplished with the use of a jet boat where appropriate and/or by wading in predetermined sampling sites. Beach seines are 100' x 6' x 3/16" mesh and 50' x 4' x 3/16" mesh in the Clearwater River and 20' x 6' (with a 4' inner bag) x 3/16" mesh, 15' x 6' (with a 4' inner bag) x 3/16" mesh, or 10' x 6' (with a 4' inner bag) x 3/16" mesh in the S.F. Salmon River. Fyke nets will have 4' square openings x 50' wings x 3/16" mesh and minnow traps are 16" long x 8" in diameter x 3/32" mesh. The latter two methods will be used overnight along reduced flow areas and checked and pulled out of the river the following morning. Trawling (10’X10’X30’) and purse seining (500’X 30’) will be conducted in the lower Clearwater River reservoir area (mouth to Rkm 4) using prop boats. Fish used for PIT tagging and/or for biological data collection will be held in 5 to 15 gallon containers, perforated/in-river or aerated, until released, depending on the project and length of time to be held.

Age 0+ Chinook salmon will be captured by beach seines and fyke nets along shoreline areas and in slack water areas with trawls and purse seines. All age 0+ fall Chinook salmon 60 mm and greater will be placed in 5 gallon holding buckets and transferred to a pan of anesthetic water (MS 222 at 60-70 ppm). All fish will be measured, weighed, and scanned for PIT tags. Previously PIT tagged fish will be allowed to recover (at least 15 min) and returned to the place of capture. Remaining fish will be PIT tagged as described by Prentice et al. (1990) and a sub-sample (up to 120/stream per sampling duration) will be caudal fin clipped (small portion of top lobe). The tissue sample will be placed in a buffer solution for DNA analysis. Scales will be taken from fish sub-sampled for genetic analysis and sent to the Columbia River Inter-Tribal Fish Commission (CRITFC) for establishing baseline growth and scale pattern data on the wild population. Genetic analysis (DNA) will also be conducted by CRITFC to determine stock (spring/summer or fall) and genetic profiles.

Table 13. Authorized take from the Nez Perce Tribe Section 10 Permit # 1134. Authorized number of fall Chinook salmon to be observed, collected using seines or fyke nets, trawls, purse seines, and estimated mortality due to observe/harass, capture/handle/release, and capture/handle/tag/mark (numbers in bold are totals for each sample method or take activity).

ESU/ Species and Population Group	**Life Stage**	*Origin*	**Take Activity**	Author-ized Take	Author-ized Mortality	*Research Location*	*Research Period*	*Details*
Fall Chinook Salmon	Juvenile	Natural	Capture, handle, release[1]	5,000	20	Clearwater River	May 1-Oct 1	Beach Seine/ Fyke Net/Trawl/Purse Seine/Minnow Trap
Fall Chinook Salmon	Juvenile	Hatcery Non-adclipped	Capture, handle, release[1]	8,300	32	Clearwater River	May 1-Oct 1	Beach Seine/ Fyke Net/Trawl/Purse Seine/Minnow Trap
Fall Chinook Salmon	Juvenile	Natural	Capture, handle, tag, mark[2]	10,000	100	Clearwater River	May 1-Oct 1	Beach Seine/ Fyke Net/Trawl/Purse Seine/Minnow Trap
Fall Chinook Salmon	Juvenile	Natural	Capture, handle, tag, mark[2]	10,800	156	Clearwater River	May 1-Oct 1	Beach Seine/ Fyke Net/Trawl/Purse Seine/Minnow Trap
				20,000	**200**			

[1] Estimated indirect mortality rate of 0.4%
[2] Estimated indirect mortality rate of 1.0%

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

Table 12 shows the numbers of natural origin fish that contributed to broodstock at NPTH since 2003. Full estimates of take as reported for the 1530 permit can be found in annual reports for return years 2006-2008 (Schuck et al. 2007, 2008, 2009).

Table 14. Estimated numbers of natural origin fish used in broodstock at NPTH.

Return year	Trapping Location	Natural Females	Natural Males	Natural Jacks	Naturals in Broodstock (%)	Total number of fish spawned	Mating protocol
2003	NPTH	1	0	0	1.0	104	Random
2004	LGR	76	33	4			
	NPTH	3	1	0	17.0	688	Random
2005	LGR	30	37	2			
	NPTH	0	3	0	14.4	494	Random
2006	LGR	51	40	0			
	NPTH	0	1	0	21.8	418	Random
2007	LGR	57	20	0			
	NPTH	1	0	0	13.6	574	Random
2008	LGR	48	30	1			
	NPTH	2	0	0	7.6	1064	Random

Table 15. Estimated mortality of natural origin fish at NPTH that were intended for broodstock and numbers of fish returned to the Clearwater River alive.

Return year	Trapping location	Mortality Natural female	Mortality Natural male	Killed outright Natural female	Killed outright Natural male	LIVE fish Hauled back to river Natural female	LIVE fish Hauled back to river Natural male
2003	NPTH	0	0	0	0	0	0
2004	LGR	10	2	2	3	11[a]	57[a]
	NPTH	0	3	0	0	9[a]	41[a]
2005	LGR	1	2	0	7	0	0
	NPTH	0	1	0	1	0	0
2006	LGR	0	2	2	8	0	0
	NPTH	0	0	0	0	0	0
2007	LGR	2	3	1	14	0	0
	NPTH	0	0	0	0	0	0
2008	LGR	4	3	0	3	7	5
	NPTH	0	0	0	0	0	0

[a] Potential natural (no marks/tags, scales not taken).

- 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).

Refer to “Take” Table 30 at back of document.

Table 16. Summary take information from Nez Perce Tribe Permit #1134 for years 2002 to 2010 for, Seine, Fyke Net, Trawls, Purse Seines, and Minnow Traps, and Collection for Juvenile Chinook salmon.

ESU/Species and Population Group	Life Stage	Take Activity	*Sample Year*	*Number of Fish Authorized for Take*	*Actual Number of Fish Taken*	Number Authorized for Unintentional Mortality	Actual Number of Unintentional Mortality	*Details*
Fall Chinook Salmon	Juvenile	Observe	2002	2,000	1,294	0	0	Snorkel
			2003	2,000	551		0	Surveys,
Fall Chinook Salmon	Juvenile	Capture, Handle, Release	2002	2,000	160	100	0	Seines,
			2003	2,000	240	100	21	Fyke nets,
			2004	2,000	1,043	100	2	Minnow
			2005	2,000	**2,616**	100	7	Trapping
			2006	2,000	1,983	100	30	
			2007	5,000	2,560	20	3	
			2008	5,000	926	20	0	
			2009	5,000	187	20	4	
			2010	5,000	13	20	7	
Fall Chinook Salmon	Juvenile	Capture, Handle, Mark, Release	2004	10,000	2,029	100	29	Seines,
			2005	10,000	1,991	100	2	Fyke nets,
			2006	10,000	1,290	100	9	Minnow
			2007	10,000	1,608	100	8	Trapping
			2008	10,000	851	100	9	
			2009	10,000	893	100	11	
			2010	10,000	2,803	100	8	

Table 17. Summary take information from Nez Perce Tribe Permit #1134 for years 2005 to 2010 for, screwtrapping for juvenile Chinook salmon.

ESU/Species and Population Group	Life Stage	Take Activity	*Sample Year*	*Number of Fish Authorized for Take*	*Actual Number of Fish Taken*	Number Authorized for Unintentional Mortality	Actual Number of Unintentional Mortality	*Details*
Fall Chinook Salmon	Juvenile	Capture, Handle, Release	2005	20,000	251	100	1	Screw
			2006	20,000	900	100	2	trapping
			2007	20,000	145	100	0	
			2008	20,000	262	100	0	
			2009	20,000	35	100	2	
			2010	20,000	98	100	52	
Fall Chinook Salmon	Juvenile	Capture, Handle, Mark, Release	2005	8,000	208	80	0	Screw
			2006	8,000	312	80	1	trapping
			2007	8,000	82	80	0	
			2008	8,000	246	80	0	
			2009	8,000	89	80	2	
			2010	8,000	172	80	3	

- 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.

We do not anticipate that take will exceed 20% of the wild return because the trap at LGR Dam will not be set above that rate. If by chance the number of fish taken exceeds the numbers presented in Table 30 – Take Table, the percent take will still remain 20% or less of the run to LGR Dam. At the LGR Dam Adult Trap, most (80-90%) fish pass unhindered above the trap to spawn naturally. Fish collected as part of the systematic sample are hauled to LFH or NPTH and held until spawning. If we were to exceed the number of natural origin fish 'take' identified in

Table 30 trapping at NPTH would cease immediately, but trapping at LGR Dam would have to continue to sample CWTs from hatchery fish for run reconstruction purposes. Untagged fish at Lower Granite Dam in excess of broodstock needs would be sampled and released above LGR Dam.

Operation of the program described in this document is based on the available information and population status at time of consultation. Significant changes in the population status may warrant re-initiation of consultation to assess the program.

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.

This program is consistent with:

- Northwest Power and Conservation Council's Artificial Production Review (APR-1999) According to the Artificial Production Review, the Council stated, "Management objectives such as for harvest opportunities, or for in-kind, in-place mitigation, or for protection of specific natural populations are all equally important."
- Clearwater Subbasin Plan
- Draft Snake River Fall Chinook Management Plan (SRFCMP).

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

- *Nez Perce Tribal Hatchery Memorandum of Agreement (MOA)* – a 25-year plan (2000-2025) for operation of Nez Perce Tribal Hatchery between Bonneville Power Administration and the Nez Perce Tribe. When needed, LFH will help provide broodstock for NPTH. Annual Operating Plans (AOP) are prepared and reviewed to guide the production each year in conjunction with periodic reviews and recommendations and are consistent with the NPTH AOP.
- *US vs. Oregon* - The hatchery program outlined within this HGMP is consistent with the current 2008-2017 Management Agreement for salmon steelhead and other species pursuant to United States of America v. State of Oregon, U.S. District Court, District of Oregon. Appendix B4B hatchery smolt production agreements of the *US vs. Oregon* negotiations and the intent to provide fish for harvest in tribal and sport fisheries into the future.
- *Tribal Resource Management Plan (TRMP) –* the Nez Perce Tribe has developed a draft TRMP to describe fisheries implemented by the Tribe for fall Chinook in the Snake Basin.
- Wy-Kan-Ush-Mi Wa-Kish-Wit: The Columbia River Anadromous Fish Restoration Plan of the Nez Perce Tribe, Umatilla, Warm Springs and Yakama Tribes- this Tribal

Restoration Plan (CRITFC 1995) focuses on restoring salmon runs to the rivers and streams of the Columbia River system and embodies the tribal management philosophy of gravel-to-gravel management. This approach differs from many of the existing state and federal plans which are focused more on providing fish for sport and commercial harvest and returning fish to concrete hatcheries. The plan recognizes the need to ensure that salmon throughout the life cycle from the freshwater to the ocean are protected, managed or restored.

- *Clearwater River Subbasin Plan (NPCC)-* In 2005 the Council completed locally led watershed planning efforts that resulted in separate plans for 58 tributary watersheds or mainstem segments of the Columbia River. One of these plans included a plan for the Clearwater subbasin. The planning effort was guided by the Council and funded by the Bonneville Power Administration. The [Clearwater] subbasin plan (NPCC 2004) identifies priority restoration and protection strategies for habitat and fish and wildlife populations. The plan also guides funds from Bonneville electricity revenues for protection, mitigation and enhancement of fish and wildlife affected by hydropower dams, and provides a mechanism used to review and fund proposed projects within the subbasin.
- *Federal Columbia River HydroPower System Biological Opinion 2008 -* In its 2008 Biological Opinion (NOAA et al. 2008), the National Oceanic and Atmospheric Administration assessed the benefits and risks associated with the artificial propagation of pacific salmon, and provided recommendations for the operation of hatchery programs, as they relate to the conservation and sustainability of associated fisheries mandates (e.g., NOAA et al. 2008 Appendix C). To this end, the Biological Opinion contained an assessment of hatchery effects (NMFS 2008 Appendix D) and provided ratings of artificial production programs in terms of their performance relative to three primary categories: (1) significant factors limiting population viability, (2) slowing trends toward extinction, and (3) improved viability. The NPTH fall Chinook program was not recognized as a limiting factor affecting population viability, it was considered to provide a beneficial effect 'because the program has jump-started production by boosting the numbers of natural spawners and increasing spatial distribution.'
- *Relationship to other recovery projects in the Clearwater River subbasin and Columbia River Basin -* This project is closely allied with other NPT supplementation projects (Imnaha and Lostine Hatchery, Johnson Creek Artificial Propagation Enhancement, and Pittsburg Landing, Capt. John Rapids, Big Canyon Acclimation Facilities). These projects will share knowledge on development of incubation and rearing techniques, production operations, and results from monitoring and evaluation studies. The M&E Plan for NPTH has proven useful for planning these supplementation projects by providing a template for similar M&E studies.

3.3) Relationship to harvest objectives.

As an Integrated Recovery and Mitigation program, the production of Snake River fall Chinook at NPTH is intended to fulfill mitigation goals as outlined under the NPTH Master Plan:

- Provide long-term harvest opportunities for Tribal and non-Tribal anglers within Nez

Perce Treaty lands.

Harvest occurs on this stock in the ocean from Alaska to California and in the Columbia and Snake River basins. Snake Basin fisheries on fall Chinook produced at NPTH are promulgated by ID, WA, and NPT.

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

Snake River fall Chinook are present throughout ocean fisheries from Alaska to California, and in fall season fisheries in the mainstem Columbia River. Incidental catch occurs in fisheries that target harvestable hatchery and natural-origin fish. The total ocean fishery exploitation rate averaged 46% from 1986 to 1991, and 31% from 1992 to 2006. Ocean fisheries have been required since 1996, through ESA consultation, to achieve a 30% reduction in the average exploitation rate observed during the 1988 to 1993 base period. In recent years, about 14% of the incidental take has occurred in the Southeast Alaska fishery, about 23% in the Canadian fishery (primarily off the west coast of Vancouver Island), about 20% in the coastal fishery (primarily off Washington, and to a lesser degree off Oregon and Northern California:, about 11% in the non-treaty fishery in the Columbia River, and about 30% in the Columbia River tribal treaty fishery. The presence of large numbers of harvestable natural-origin fish in the fishing locations from other sources, and unclipped hatchery fish makes it infeasible to distinguish Snake River fall Chinook through means of mark-selective fishing techniques.

Snake River fall Chinook are also caught in fall season fisheries In the Columbia River with most impact occurring in Non-treaty and treaty Indian fisheries from the river mouth to McNary Dam. Fisheries affecting Snake River fall Chinook have been subject to ESA constraints since 1992. Since 1996, Columbia River fisheries have been subject to a total harvest rate limit of 31.29%. This represents a 30% reduction in the 1988 to 1993 base period harvest rate (Figure 5).

Total harvest mortality for the combined ocean and in river fisheries can be expressed in terms of exploitation rates which provide a common currency for comparing ocean and in-river fishery impacts (Fisheries in the Columbia River are generally managed subject to harvest rate limits. Harvest rates are expressed as a proportion of the run returning to the river that is killed in river fisheries. The total exploitation rate had declined significantly since the ESA listing. Total exploitation rate averaged 75% from 1986 to 1991, and 45% from 1992 to 2006 (Figure 5).

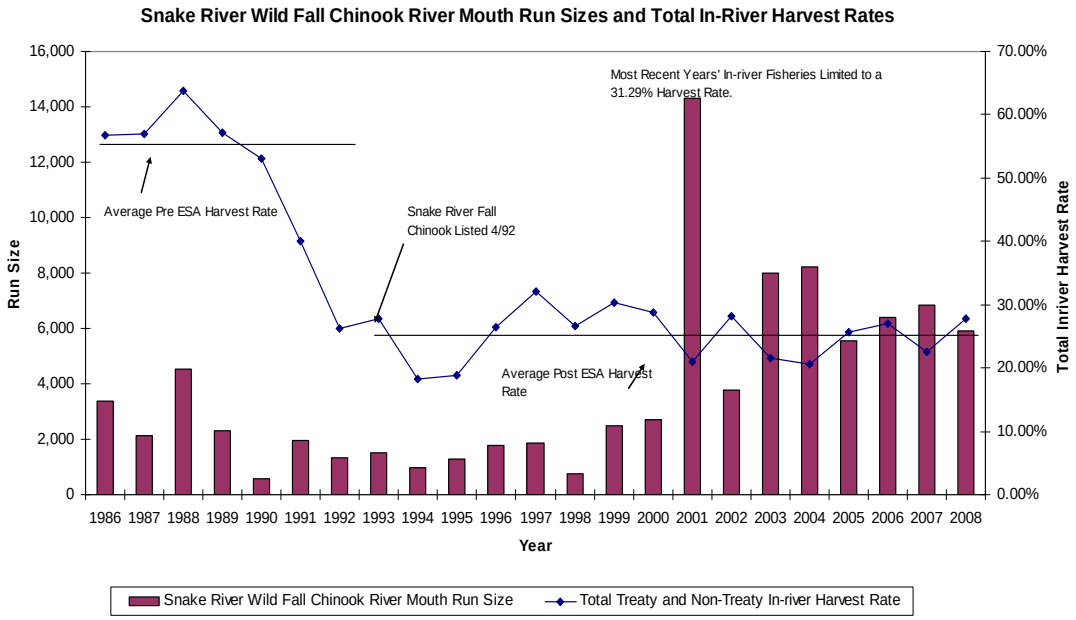


Figure 5. Harvest rates of fall Chinook in Columbia River fisheries and run size of natural-origin Snake River fall Chinook, 1986-2008.

Multiple fisheries benefit from the NPTH fall Chinook mitigation program in the ocean and the Columbia River (Table 18). Ocean and mainstem Columbia River fisheries have been mostly non-selective, although efforts by the states are underway to move to selective sport fisheries in mainstem and tributary areas.

Table 18. Final locations of <u>subyearling</u> fall Chinook released by NPTH to freshwater and ocean areas from run years 2003-2008 by salt water age.

Area	1-salt	2-salt	3-salt	4-salt	5-salt	Total	% of total
Freshwater	2,465	1,550	111	12		4,138	91.0%
COL	1	10	5			16	0.4%
OR							
SN	2,464	1,540	106	12		4,122	99.6%
Ocean	13	352	42	2		409	9.0%
AK		4	1			5	1.2%
BC	1	139	24	2		166	40.6%
CA							
COL							
HS	1					1	0.2%
OR		3				3	0.7%
WA	11	206	17			234	57.2%
Grand Total	2,478	1,902	153	14		4,547	

Snake Basin Harvest Forum

Harvest of Snake River fall Chinook in the Snake River basin is coordinated with fishery co-managers through the Snake Basin Harvest Forum.

Nez Perce Tribal Fishery

The Tribe is in the process of preparing a long-term harvest plan for Snake River steelhead and fall Chinook. The objective of this long-term tributary harvest plan is to describe the Nez Perce Tribe's treaty fishery regime for Snake River steelhead and fall Chinook salmon in the Snake Basin and its tributaries. The Nez Perce Tribe will use the harvest framework as specified in the plan to determine its harvest share of fish in the basin.
At the basin scale, this Nez Perce tributary harvest plan:

1) Provides a reasonable exercise of Nez Perce federally-secured treaty reserved fishing rights in the Snake River basin;
2) Specifies annual Nez Perce fishing opportunities while acknowledging non-tribal fishing opportunities consistent with U.S. v. Oregon;
3) Describes hatchery production that is covered by the *U.S. vs. Oregon* 2008-2017 Management agreement, including associated hatchery operations designed to benefit listed anadromous fish; and
4) Establishes a framework to determine harvestable fish and to allocate harvest between Nez Perce treaty and non-treaty fisheries.

The foundation for the Nez Perce Tribe's treaty fisheries set forth in this Plan is the Tribe's 1855 Treaty with the United States. The Nez Perce Tribe's treaty-reserved fishing rights and fisheries in the Snake Basin continue to be critically important to the Tribe in maintaining and practicing its culture and ways of life.

Due to the Nez Perce Tribe's treaty fishing rights and geography in the Snake Basin, the Tribe's treaty harvest objectives and artificial propagation strategies are sensitive to and compatible with conserving and rebuilding local steelhead and salmon populations. The Tribe structures annual fisheries to ensure adequate fish distribution between harvest, hatchery and natural escapement objectives. Wild fish harvest impacts under this plan will be shared with non-treaty sport fishers. The Tribe expects to manage its fisheries consistent with this harvest plan once it is completed.

Each year, the Tribe will work cooperatively with the appropriate co-managers in developing annual fishery plans and harvest management. Proposed harvest rates are to be applied to total aggregate run of wild/natural fall Chinook projected to return to Snake River to determine Nez Perce treaty fishery harvest levels on an annual basis. The Tribe will provide to appropriate co-managers and NOAA Fisheries its annual fishery expectations based on predicted run forecast. As part of its harvest management and monitoring program, the Nez Perce Tribe conducts annual creel and angler surveys to assess the contribution program fish make toward meeting program harvest objectives. Additional details regarding the Tribe's treaty harvest of Snake River fall Chinook will be provided in its long-term harvest plan.

IDFG Recreational Fishery

Listed SR fall Chinook and SR steelhead may be affected by recreational fisheries targeting adipose clipped hatchery fall Chinook. The current fall Chinook fishery was initiated in 2008. ESA coverage for the fishery is currently associated with the incidental encounters and take of fall Chinook in the steelhead fishery authorized in Permit 1481. IDFG will submit a new FMEP in 2010 that includes specific authorization for harvest of adipose fin clipped fall Chinook and incidental mortalities of unclipped fall Chinook associated with that harvest. The current fishery is confined to the Snake River from the mouth of the Clearwater River upstream to Hells Canyon Dam. IDFG plans to submit a new FMEP that will also include provisions for a fishery in the mainstem and Middle Fork of the Clearwater River in the event that future returns there include sufficient clipped hatchery origin fish for harvest.

No additional incidental mortality impacts are expected beyond those accounted for in the existing steelhead fishery because the fall Chinook fishery is incidental to the fall steelhead fishery. The recreational fall Chinook fishery occurs during a portion of the steelhead fishery fall season. Anglers are required to have a Salmon Permit to fish for and retain adipose clipped hatchery fall Chinook and a Steelhead Permit to fish for and retain adipose clipped hatchery steelhead. Department staff observed that the fall Chinook fishery in 2008 was low-key and incidental to the traditional recreational steelhead fishery. The IDFG found in 2008 that all anglers with a Salmon Permit interviewed in 2008 were targeting steelhead; retention of fall Chinook was essentially a bonus (J. Dupont, IDFG, personal communication). The IDFG anticipates that fall Chinook fishery will continue to be incidental to the steelhead fishery during the term of the FMEP, and few, if any, anglers will target fall Chinook without also targeting steelhead.

Sport fisheries target adipose-clipped hatchery populations in excess of broodstock needs, consistent with hatchery mitigation goals, Treaty and non-Treaty harvest sharing and ESA limitations on allowable incidental mortality from natural origin SR steelhead and fall Chinook. Only fall Chinook with a clipped adipose fin (as evidenced by a healed scar) may be kept. Only barbless hooks may be used when fishing for fall Chinook in the Clearwater River and the Snake River below Hells Canyon. All fall Chinook (and steelhead) with an intact adipose fin must be immediately released unharmed back to the water. The fall Chinook recreational fishery is

incidental to the steelhead fishery, and not likely result in additional incidental mortality to listed species.

In a comparison done by WDFW (Lyons Ferry/IPC/FCAP HGMP) on subyearlings and yearlings releases and where adults were intercepted during 2008 as well as the salt water age at interception it was determined that subyearlings were taken primarily in ocean fisheries whereas yearlings were taken nearly equally in ocean and freshwater fisheries. Harvest of yearlings occurred mostly in the Columbia River then in BC and WA ocean fisheries to a lesser extent. Subyearlings were harvested mainly in ocean fisheries in BC, WA and the Columbia River. The tables below are underestimates of total catch because they do not contain information from yearling and subyearling releases that were not adipose clipped. Although yearlings return or are intercepted at a higher rate than subyearlings at a salt water age less than two, they also return at a higher rate for older salt water ages.

3.4) Relationship to habitat protection and recovery strategies.

- Refer to Clearwater Subbasin Management Plan, Assessment and Plan Supplement for recommended habitat protection and recovery strategies (Ecovista 2003 (a) (b), (c); NPT and IDFG 1990).
- Clearwater Subbasin Management Plan notes particular problems, objectives and strategies as well as referencing the Assessment – synoptically they are;
  - Problem 1, Objective A, Strategies 1-4 and Table 3; Assessment Section 8.3.1
  - Problem 2, Objective B, Strategies 1-7 and Table 3; Assessment Sections 4.4, 7.1 and 8.3.
  - Problem 3, Objective C, Strategies 1.3 and Objective D, Strategies 1-5; Assessment Sections 8.1/8.2
- The Tribe also participated in other Subbasin Plans (Grande Ronde, Imnaha, Salmon, Hells Canyon, etc.) wherein fall Chinook restoration was identified. These documents also contain recommendations for fall Chinook habitat protection and recovery strategies.

3.5) Ecological interactions. [Please review Addendum A before completing this section. If it is necessary to complete Addendum A, then limit this section to NMFS jurisdictional species. Otherwise complete this section as is.]

Predation - Predation requires opportunity, physical ability and predilection on the part of the predator. Opportunity only occurs when temporal and spatial distribution of predator and prey species overlaps. This overlap must occur not only in a broad sense but at a microhabitat level as well.

As hatchery fall Chinook smolts migrate downstream, avian (i.e. kingfishers, mergansers, gulls, terns, etc.) and mammalian predators (i.e. river otter, mink, etc.) will likely prey on them. While not always desired from a production standpoint, these hatchery fish provide an additional food source to natural predators that might otherwise consume listed fish.

Predation by hatchery fish on natural origin smolts is less likely to occur than predation on fry (NMFS 1995). Salmonid predators are generally thought to prey on fish 1/3 or less their length (Horner 1978; Hillman and Mullan 1989; Beauchamp 1990; Canamela 1992; CBFWA 1996). However, Witty et al. (1995) concluded that predation by hatchery production on wild salmonids does not significantly impact naturally produced fish survival in the Columbia River migration corridor.

Relative size of hatchery fall Chinook smolts released as subyearling smolts (75-95 mm) are very unlikely to prey on wild fall Chinook (35-95mm). Also, spring Chinook smolts (90-110 mm) and wild steelhead smolts (130-200 mm) should preclude any substantial predator/prey interaction among the migrating fish.

A varying percentage of hatchery fall Chinook releases do not migrate from the system and some have been documented as reservoir rearing, especially in the Clearwater where juvenile rearing conditions are highly influenced by cold water releases from Dworshak Reservoir. These fish, by remaining in the lower Snake River have an increased opportunity to interact with juvenile listed fish. At this time, it is not known at what level this is occurring in the Snake River.

Competition - Hatchery fall Chinook smolts have the potential to compete with natural spring/summer and fall Chinook, natural steelhead and bull trout juveniles for food, space, and habitat. The Species Interaction Work Group (SIWG, 1984) reported that potential impacts from competition between hatchery and natural fish are assumed to be greatest in the spawning and nursery areas and at release locations where fish densities are highest (NMFS 1995). These impacts likely diminish as hatchery smolts disperse, but resource competition may continue to occur at some unknown, but lower, level as smolts move downstream through the migration corridor. Canamela (1992) concluded that effects of behavioral and competitive interactions would be difficult to evaluate or quantify.

However, Steward and Bjornn (1990) concluded that hatchery fish kept in the hatchery for extended periods before release as smolts may have different food and habitat preferences than natural fish, and that hatchery fish will be unlikely be able to out-compete natural fish. Further, hatchery produced smolts emigrate seaward soon after liberation, minimizing the potential for competition with natural fish. Competition between hatchery origin salmonids with wild salmonids, in the mainstem corridor was judged not to be a significant factor (Witty et al. 1995). All production fish described in this program are released as smolts to minimize the likelihood for interaction, and adverse ecological effects to listed natural Chinook salmon juveniles, bull trout, and steelhead.

Bull trout associated with areas influenced by residual hatchery fall Chinook are generally fluvial adults and are more likely to out compete and prey on hatchery fall Chinook because of a significant size advantage.

Disease - Hatchery operations potentially amplify and concentrate fish pathogens that could affect listed Chinook, steelhead, and bull trout growth and survival. Documentation of disease at NPTH and its satellites is accomplished through monthly, and pre-liberation, fish health examinations.

Returning adult fall Chinook held for spawning at the NPTH potentially create a concentrated source of pathogens and parasites that they carry. The increase in risk posed to natural Chinook, steelhead and bull trout by these fish is considered minimal for several reasons. First, it is unlikely that the hatchery fall Chinook adults that return to the production facilities harbor any agents that naturally spawning steelhead and salmon do not also carry. Second, cold water temperatures during the fall/winter for fall Chinook adults are not conducive to infectious disease processes. This reduces the potential for transmission between adults in holding ponds and from fish-to-fish in the natural habitat. Documentation of the disease status of the adult fall Chinook stocks is accomplished through annual fish health examinations of spawning adults. Results of these examinations over the past years indicate a low prevalence and incidence of serious fish pathogens and parasites in this stock. For the Snake River Stock program described here, bacterial kidney disease (BKD) has been most prevalent. Procedures described later reduce the possibility of outbreaks in the hatchery (Refer to Section 8 and Section 9).

Nutrient flow - Increased hatchery fish in the spawning grounds increase basin level marine nutrients available that have been shown to significantly benefit watershed health, excavate and loosen gravels to make it more useful on a continual basis through the process of redd construction, and provide a food source for direct consumption of carcasses by other fish.

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.

Nez Perce Tribal Hatchery Site 1705 - Water resources and equipment are:

- Four ground water wells with a combined capacity of 930 gallons per minute (gpm).
- Clearwater River surface water is provided by three pumps with a combined capacity of 4,500 gpm. The intake screens were inspected by NOAA Fisheries in 2002 and comply with NOAA fish entrainment standards.
- Centripetal sand separators screen surface water to remove suspended solids consisting of sand and organic fibers prior to use in the hatchery.
- A micro-screen filter, capacity of 580 gpm, filters surface water prior to UV sterilization and chilling for incubation and early rearing.
- The Ultra-Violet irradiation chambers have a 600 gpm capacity and treat the filtered surface water prior to incubation and early rearing.
- The plate chiller treats surface water reducing temperatures down to 34-37 ºF for incubation and rearing.

Ground and surface waters are chemically acceptable based on Piper, et al. (1982). Temperature moderation is needed to meet incubation and production timing needs for spring Chinook stocks

at satellite facilities. Ground water temperatures range from 65 ºF to 72 ºF which is too warm without chilling or mixing with cool surface water. Surface water temperatures range seasonally from 34 ºF to 62 ºF and are influenced by discharges from Dworshak Reservoir – decreased temperature. Ground and surface water sources are blended to meet the biological criteria. Suspended solids problems occur in surface water during periods of high run-off; e.g., December through April or seasonal run-off events.

North Lapwai Valley Satellite: Seasonal rearing and acclimation of fall Chinook subyearlings are programmed for February through May. Most recently, use has occurred in April and May. Water supplied to the site comes from two sources; 1) deep well with a 629 gpm capacity and 2) Lapwai Creek stream water with a capacity of 1,600 gpm. Screens are compliant with NOAA standards. Well water temperature is 65F and seasonal high stream temperatures June through September (>65F) prevent year-around use. Ground and surface water sources are mixed to provide seasonal temperatures acceptable for salmonids February through May (55 to 60F).When temperatures exceed 65F, fish are released which is typically no later than 1 June each year.

Lukes Gulch Satellite: Seasonal fall Chinook subyearling smolt acclimation facility; February through May. Purpose is to restore early-type fall Chinook to lower S. F. Clearwater River, lower M.F. Clearwater and Clearwater River upstream of N.F. Clearwater River confluence. Water supplied to the site comes from two sources; 1) deep well with a 250 gpm capacity and 2) South Fork Clearwater River water with a capacity upwards of 1,000 gpm pumped into the site. Screens are compliant with NOAA standards. Well temperature 65F and seasonal high river temperatures June through September (>65F) prevents year-around use. Ground and surface water sources are mixed to provide seasonal temperatures acceptable for salmonids February through May (55 to 60F).When temperatures exceed 65F, fish are released which is typically no later than 15 June each year.

Cedar Flats Satellite: Seasonal fall Chinook subyearling smolt acclimation facility; operational period is April through mid-June. Water supplied to the site comes from the Selway River via electric pumps and propane powered back up generator with a capacity upwards of 1,000 gpm pumped into the site. Ambient temperatures are anticipated to range between 41-55F. Purpose is to restore early-type fall Chinook to lower Selway and Middle Fork Clearwater rivers. Fish are released no later than June 15.

Sweetwater Springs Satellite: Seasonal juvenile rearing facility for other NPTH hatchery facilities/satellites (February through September). There are no juvenile releases from this facility for spring or fall Chinook. It may also serve as an alternate broodstock holding site. The water source is a spring captivated within a large concrete box with no fish access or presence. No surface water source exists upland of the spring; its origin is the West Fork of Sweetwater Creek. NOAA Fisheries inspected this site in 2003 and determined that no screening is required. Gravity flow capacity is 1,000 gpm. Seasonal flow variation ranges from less than 200 gpm to over 4,000 gpm. The temperature of 48-50F degrees is a constant throughout year.

Water right permits for all Nez Perce Tribal Hatchery facilities listed above are held by Bonneville Power Administration. NPDES permits are not required since total production is less than the 20,000 pound threshold. However, a NPDES Permit Waste Management Plan was developed for all NPTH facilities. Final plans submitted to IDEQ and NPTH Water Quality Division. In 2003, NOAA Fisheries consulted with the Tribe for NPTH and inspected and approved the intake screens.

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.

- All hatchery and satellite intake screens conform to NMFS screening guidelines to minimize the risk of impingement/entrainment of juvenile listed fish.
- Phone communications are enhanced (twice daily check-in and 24 hour emergency support) at remote sites to provide back-up to satellite staff by office/hatchery staff as needed.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Nez Perce Tribal Hatchery Site 1705: The adult collection facility at Nez Perce Tribal Hatchery consists of:

- Concrete fish ladder (4'wide, 160' long) and adult trap (10'wide, 8'deep, 20' long = 1600 cubic feet (ft^3).
- Two holding tanks (10' wide, 10'water depth, 80'long = 8,000 ft^3) (Adult capacity per tank is 800 @ 10 ft^3/adult) equipped with upwelling, subsurface inflow, overspray, variable depth, jump-screens, lockable vandal fence; designed as per NATURES criteria for adults.
- Primary water supply is pumped into packed column head tanks prior to distribution to ponds, trap and ladder. Oxygen levels are maintained at saturation based on elevation and temperature.

Lower Granite Dam adult fish trap: The Lower Granite trap was built primarily for research purposes, with tag detectors and diversion gates to selectively sample PIT and CWT marked adult salmon and steelhead. The trap has been used in recent years for management purposes such as collection of fall Chinook broodstock and run reconstruction. For more details on operational criteria and takes associated with the LGR trap, refer to Section 10 permit #1530 and 2011 NOAA Letter of Determination for ISEMP Research.

Fish enter the south shore ladder and ascend it to the trap facility. Electronic controls direct fish passing through the ladder into a trap holding facility 9-20% of each hour, 24 hours a day. When not directed into the trap, most fish pass the ladder unimpeded. Other studies currently underway at the facility use electronic PIT tag detectors to select specific fish by code to be directed into the trap. Trapped fish are anesthetized, examined, tagged and sampled (scales or tissue) if necessary, injected with Oxytetracycline, and placed in a recovery tank. Once partially recovered, fish are

placed in larger holding tanks to await transportation to LFH or NPTH, or returned immediately to the ladder to continue their upstream migration. The trap operation and layout is described by Harmon (2003). All steelhead are trapped, anesthetized, handled, scale sampled if required, and immediately released to the ladder to resume their upstream travel.

South Fork Clearwater River Weir: The Nez Perce Tribal Hatchery Fall Chinook Monitoring & Evaluation Project (BPA Project Number 1983-350-3) plans on placing a temporary adult fish picket weir just above the mouth of the South Fork Clearwater River beginning fall 2011. The weir will be installed around October 1 and disassembled around December 1, with subsequent years following a similar schedule. The proposed action is expected to primarily capture adult fall Chinook (*Oncorhynchus tshawytscha)*, although steelhead (*Oncorhynchus mykis)s* and Bull Trout (*Salvelinus confluentus)* are present during the time period the weir will be operational.

Description of the Weir Operaton:

- The weir consists of 3" x 3"angle iron with 1" holes drilled on 2" centers placed on tripods to form the frame and four "wings" that extend from the river channel to the shoreline. One inch metal pipes or "pickets" are placed through the angle iron, blocking passage and passively pushes fish into trap boxes. Two 4' x 8' trap boxes will be placed side by side within the stream channel with a 6.5"x 12"entrance cone on both the upstream and downstream locations, allowing all adult fish to be interrogated and passed in either direction. The entrance cones were manufactured slightly larger than typical spring/summer Chinook salmon cones to accommodate the larger and typically deeper adult fall Chinook.
- Weir operation is 24 hours, 7-days a week during the trap season.
- Pass/Keep ratios are initially set for 2:1 until 88 female adults and an equivalent number of males are collected at the weir, total of 88 female adults required (pre-spawn survival estimated at 85% or 75 spawned females).
- Weekly adjustment of pass/keep ratios occurs since historical data is not sufficient to predict the seasonal returns by adult dam counts.
- Adults captured at the weir are transported to Site 1705 for holding until ripe and spawned there.
- Captive adults are treated with formalin three times per week to control fungus.

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

Tanks used by WDFW/NPT for adult transport from Lower Granite Dam are insulated, have re-circulating aeration and oxygen supplementation, and vary in capacity from 400-1,200 gallons. Water from NPTH is used to haul fish because it is generally cooler (approx 52 degrees F) than Snake River water, which can reduce hauling stress. During the transport from LGR to either hatchery, one stop is made to allow the driver to visually inspect the adults for signs of stress, and appropriate adjustments to oxygen flow levels made.

Loading density is typically one adult per 10-15 gallons or upwards of 30-50 adults per tank. For example, 400 gallons of water are placed in a 500 gallon tank. The 30 to 50 adult fish fill the void,

and the tank is filled to the lid prior to hauling to minimize motion and impact on adults during transport. Between transports, the tank is cleaned and disinfected. Adults are captured and moved whenever they enter the trap in an effort to minimize stress and prevent either immediate or latent mortality. Also, prior to transport, adults are injected with Gallomycin to begin suppression of latent Bacterial Kidney Disease.

5.3) Broodstock holding and spawning facilities.

Fall Chinook spawning at NPTH occurs adjacent to the adult holding ponds.

- Spawning area is a walled concrete floor (approximately 30' by 30') at the east end of the two adult holding tanks (dim: 10' wide, 10'water depth, 80'long = 8,000 ft^3). The adult capacity per tank is 800 fish @ 10 ft^3 each.
- Method: Water in the ponds is reduced to approximately 3 feet depth; fish are crowed with a screen and sorted by hand. Ripe fish are placed in the holding box at head of each pond until spawned and green fish are passed over the sorting screen back into the pond. Each female placed in the holding box is later netted, rechecked for ripeness, killed and spawned. Green females from the "double-check" are returned to the pond. Males are spawned alive; when needed, they may be held and re-spawned or killed if not needed. Opercular marking tracks repeat spawning males. Carcasses that have not been injected with antibiotics are transported to the Clearwater River for nutrient enhancement.

5.4) Incubation facilities.

NPTH, the central incubation and rearing facility for fall Chinook, has the following capabilities;

- 594 isolation incubation units for disease management – to allow culling of eggs from bacterial or viral infected females. Each female's eggs are labeled and incubated in an isolation bucket until pathology is completed (BKD, IHN, IPN). When the pathology report is confirmed, unacceptable egg lots are identified, removed, destroyed and disposed of in a land-fill. At eye-up, the acceptable eggs are shocked, picked, enumerated and transferred to one of five incubation modules and placed in an incubation tray; one female per tray.
- Five incubation modules each containing two sections with individual water supplies create the capacity to incubate 10 separate stocks of fish. The incubation modules have the capacity to incubate 10 separate lots of fish. Each module has two separate water supplies capable of individual temperature control and recirculation. Each module can be operated as a recirculation system with water make-up or as single-pass systems. Each section has 16/17 incubation stacks (168 stacks total) containing 8 trays – only 7 of the 8 are used for incubation; the top tray controls water flow. Only one female is incubated per tray (general rule is not to exceed 5,000 eggs per tray). Total capacity of all five units is 1,176 females.

5.5) Rearing facilities.

Rearing containers at NPTH are:

- Indoor rearing: 38 fiberglass rearing tanks (210 ft^3/tank; 7,980 cu. Ft. total rearing capacity) for fry/fingerlings. A maximum Density Index (DI) of 0.30 is the rearing goal. Actual numbers of fish is dependent on size.
- Two deep, rock substrate lined final rearing ponds: Two units with 21,500 ft^3/unit; 43,000 ft^3 total operating capacity. The target number of fish is 250,000 fingerlings (parr) per pond @ 78 fish per pound resulting in a Density Index below 0.10 at completion of rearing prior to transfer and release into stream or final rearing.
- Two concrete raceways: Two raceways (approximately 4'deep, 10' wide, 100'long, 4,025 ft^3/ unit; 8,050 ft^3 total operating capacity) which serve the purpose of transfer and rearing prior to marking; thus function as a facilitation step prior to final rearing assignment. Density rearing index goal is less than 0.30.

5.6) Acclimation/release facilities.

North Lapwai Valley satellite (NLV): final rearing and release for up to 500,000 sub-yearling smolts at 50.0 fpp, approximately 3.5" in length, Density Index + 0.10 two juvenile earthen, rock lined ponds (21,500 ft^3 ea.). The Density Index goal is 0.10 for pre-smolts (sub-yearling smolts); they are typically transferred at approximately 150 fpp with a release size goal of 50 fpp. Staffs are stationed at the NLV site and present on a 24-hour, 7-day-a-week schedule. Personnel at satellite facilities are required to call the central hatchery twice daily and report operating conditions or to request additional support as needed. Personnel at the holding and weir sites provide back-up to each other with phone communication 24/7 and through daily contact. Phones (satellite or landline) provide communication between weir and holding sites and with the Tribal central hatchery and offices. Fish release occurs via an underground pipeline that spills into Lapwai Creek approximately ½ mile upstream of its confluence with the Clearwater River. The tendency for instream water temperatures to rise rapidly in late May has caused forced releases on several occasions, but a voluntary release is preferred. In 2003, when given the opportunity, fish smolted and voluntarily left the pond within 72 hours of pulling containment screens.

Lukes Gulch satellite lower South Fork Clearwater River: Final rearing and release of up to 200,000 sub-yearling smolts. Facilities consist of ten tanks that are 20-foot in diameter and 4.5 - 5.0 in depth. The Density Index goal is 0.1 for pre-smolts (sub-yearling smolts); they are typically transferred at approximately 150 fpp with a release size goal of 50 fpp. Juvenile rearing and final acclimation occurs from in April and May. Smolts are released directly into the South Fork Clearwater River from the tanks with the intent of creating a new early-type fall Chinook adult returns to restore natural production in the South Fork. Staff is stationed at the site on a 24-hour, 7-day-a-week schedule. Personnel at satellite facilities are required to call the central hatchery twice daily to report operating conditions or to request additional support as needed. Personnel at the holding and weir sites provide back-up to each other with phone communication 24/7 and through daily contact. Phones (satellite or landline) provide communication between sites and with the Tribal central hatchery and offices.

Cedar Flats satellite lower Selway River: Final rearing and release of up to 200,000 sub-yearling smolts. Facilities consist of ten tanks that are 20 foot in diameter and 4.5 -5.0 in depth. The

Density Index goal is 0.1 for pre-smolts (sub-yearling smolts); they are typically transferred at approximately 150 fpp with a release size goal of 50 fpp. Juvenile rearing and final acclimation occurs in April and May. Smolts are released directly into the Selway River from the tanks with the intent of creating a new early-type fall Chinook adult returns to restore natural production in the Selway River. Broodstock collection is not intended to occur in the lower Selway like it will on the lower South Fork Clearwater River for the Lukes Gulch satellite.

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

- Flash flood of May 6th/7th, 2005 at NPTH Site 1705. Final mortality is uncertain – estimated at 15,000 combined spring and fall Chinook juveniles for FEMA. Approximately 1.266 million juveniles as spring Chinook (396,735) and fall Chinook (869,300) juveniles were released into the Clearwater River to avoid suffocating them in the muddy flash flood waters. The flash flood bedload movement blocked the river water intake screens causing loss of the 5,700 gpm flow for over 17 hours. Fish were maintained from 8:00 p.m. until about 2:00 a.m. before initiating the release while we tried to recover the surface water system. Since, only the 930 gpm well water flow remained, we could not keep ponds full and when fish showed signs of oxygen depletion, they were released. Some marking that occurred prior to release may help determine survival to the Snake River dams and from adults returning in 2007-09.

- Mechanical system failure produced excess coagulated yolk disease in 2002 and 2003 broodyear fall Chinook. This disease also causes fry to be unable to start on feed; the result is an excess of pin-headed fry that eventually die by the time the fish reach 200 fpp. Power failures, power spiking and auto-transfer from treated, temperature controlled water sources to direct well sources produced temperature spikes that resulted in alevin coagulated-yolk disease. We have since modified the system and personnel now understand the mechanics of managing this complex system so that impacts due to temperature spikes associated with power fluctuations are reduced or controlled.

- Lukes Gulch and Cedar Flats satellite testing in 2006 experienced pump failures while using 25,000 fish at each site. Having experienced this failure, staff have repaired equipment and modified operating routines to improve facility operations. In 2007, site operations were retested with 25,000 fish at each site to insure success. Full production releases of 200,000 fish per site began in 2008.

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.

Nez Perce Tribal Hatchery central and satellite facilities are staffed with personnel on site 24/7, including weekend and holiday duty. Automated alarm systems and phone emergency call alarms are maintained for personnel both on- and off-station. Each duty person has an assigned back-up person. Two staff members live on-station year around. Water flow alarms, water level alarms,

pump alarms, and temperature alarms are routinely checked both electronically and manually to prevent water system failures.

- Commercial electrical power failure at the central hatchery is backed up with diesel generators that are tested each week.
- The incubation modules are capable of being operated for an indefinite period if/when commercial power failure occurs.
- Gravity flow systems are used where ever possible, but their duration is short (minutes).
- Additional oxygen and standby pumps are utilized in the case where we can anticipate the need.
- Staff stationed at hatchery 24-hours, 7-days a week to provide operational and site security for all hatchery facilities. Personnel at satellite facilities are required to call the central hatchery twice daily to report operating conditions or request back-up support. Personnel at the remote weirs and satellites facilities provide back-up support to each other.
- Phones (satellite or landline) provide communication between weir and holding sites and with the Tribal central hatchery offices for security and back-up.
- Personnel at the holding and weir sites provide back-up to each other with phone communication 24/7 and through daily contact.
- Phones (satellite or landline) provide communication between weir and holding sites and with the Tribal central hatchery and offices.

5.9) Facilities Maintenance

Annual maintenance activities at NPTH include–

- Annual water supply pump rehabilitation.
  a. Well column shafting, spiders, and impellers need to be pulled, inspected and repaired or replaced every six to eight years.
  b. Pump seals and bearings replaced every eight years or less.
- Pump columns replaced every eight years. Pump parts on hand for expediting repairs when needed – an additional cost from above pump maintenance estimate
- Fire safety and maintenance service.

Non-recurring Maintenance (next 5 years)

- Cover existing intermediate rearing area with bird netting
  a. ESA listed Chinook juveniles are reared in these units, currently exposed to all the elements and predators.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

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

6.1) Source.

Currently, ESA listed Snake River origin, hatchery (stock essential for recovery) and naturally

produced fall Chinook are used for broodstock. Fish are currently trapped at NPTH and LGR Dam. As described in Section 5 above, broodstock will be collected in the South Fork Clearwater River to produce juveniles for the early-spawning fall Chinook reintroduction program in the South Fork Clearwater and Selway rivers.

6.2) Supporting information.

6.2.1) History.

Snake River fall Chinook in the Clearwater River were extirpated by Lewiston dam (RM 4.0) built in 1927 (Fulton 1970). The dam was removed in 1973 and the Snake River stock recolonized the Clearwater River.

Snake River fall Chinook salmon were listed as Threatened April 22, 1992 as a single population. The NPTH program is integrated with production at Lyons Ferry Hatchery, the Fall Chinook Acclimation Program, and the Idaho Power mitigation program (as described in the Lyons Ferry/IPC/FCAP HGMP). Currently broodstock for the fall Chinook program are obtained from two sources: volunteers to the ladder/trap at NPTH and adults collected at Lower Granite Dam. The Nez Perce Tribe (NPT) and Washington Department of Fish and Wildlife (WDFW) share adults collected at Lower Granite Dam, annually working out an allocation and transport schedule.

The Nez Perce Tribe, Confederated Tribes of the Umatilla Indian Reservation, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife and NOAA Fisheries technical team has drafted a Snake River Fall Chinook Hatchery Management Plan (Zimmerman et al. 2005). This entire document has not been adopted by co-managers and U.S. vs. Oregon parties as an official management plan but was utilized in developing U.S. vs. Oregon production agreements, marking strategies, and annual operation plan strategies for hatchery operation. For broodyear 2006 the production priority plan identified in the Snake River Fall Chinook Hatchery Management Plan has been adopted by U.S. vs. Oregon parties, with a “pending” decision on the fall Chinook transportation evaluation production.

The Snake River Fall Chinook Hatchery Management Plan has identified biological objectives for adult escapement. The objectives were developed by co-managers NPT, CTUIR, WDFW, IDFG, ODFW, USFWS, and NOAA; but have not been adopted by U.S. vs. Oregon.

Hatchery-Origin Snake River Fall Chinook Adult Return Goals

- Interim goal is to return 14,568 hatchery-origin adults above Lower Monumental Dam comprised of 9,988 from Lower Snake River Compensation Plan (LSRCP), 2,290 from NPTH, and 2,290 from IPC.

- Long-term goal is to return 24,340 hatchery-origin adults above Lower Monumental Dam comprised of 18,300 from LSRCP, 3,750 from NPTHC, and 2,290 from Idaho Power Company (IPC).

- Provide approximately 4,000 adults annually to meet the interim hatchery production broodstock requirements. This total is comprised of 3,600 adults needed for Lyons Ferry Hatchery and 1,000 for Nez Perce Tribal Hatchery Complex.

Natural-Origin Snake River Fall Chinook Adult Return Goals

- Maintain genetic attributes and life history characteristics of the naturally spawning Chinook aggregate by sustaining a minimum adult spawner (hatchery and/or natural-origin) abundance threshold of 7,500 adults.

- Achieve ESA delisting by attaining interim population abundance in the Snake River of at least 3,000 naturally produced spawners and an eight year geometric mean cohort replacement rate exceeding 1.0 during the eight years.

- Interim goal is to achieve a self-sustaining population of 8,250 natural-origin adult fall Chinook above Lower Monumental Dam. This is comprised of a natural spawning population of 6,500 for the Snake River mainstem and its tributaries, 1,250 for the Clearwater River, and 500 for the Grande Ronde River.

- Long term goal is to achieve a self-sustaining population of 14,360 natural-origin adult fall Chinook above Lower Monumental Dam.

- Maintain out-of-basin straying above Lower Granite Dam at levels of 5% or less

These objectives, although not identical, are similar to biological objectives identified in the Clearwater Subbasin Plan (See Table 3, Clearwater Management Plan, p. 16).

Should NPTHC, as a supplementation hatchery program, meet its goals and objectives, it will also work towards achieving the biological objectives defined in the Clearwater Subbasin Plan. http://www.nwcouncil.org/fw/subbasinplanning/clearwater/plan/assessment.pdf.

6.2.2) Annual size.

Target broodstock collection is 1,052 adults – with 316 (30%) being of natural origin.

Several factors determine how many adults are needed to meet the entire 1.4 million FCS release goal within NPTH. Run forecasts determine the initial trapping rate at LGR, which allows for estimating how many adults NPTH can expect to get from LGR. This in turn dictates how many adults must be trapped at the NPTH ladder. Adults trapped at LGR are prioritized over those trapped at NPTH, to try to meet a 30% natural broodstock goal. Adult returns and hauled fish

from LGR are monitored by M&E staff on a weekly basis to affect in-season changes to NPTH adult ladder operations. Significant changes in actual returns to LGR versus predicted returns often require a change in the sample rate at LGR. NPTH FCS adult holding mortality for females has been as low as 1.8% in 2006 and as high as 9.1% in 2009. Fecundities and age composition also change from year to year, and by trapping source, as do the number of eggs culled due to high optical density BKD values. These factors in all make accurately defining trapping goals specific to LGR or NPTH challenging. Hatchery and M&E staffs actively track adults on hand in an effort to meet full production while avoiding trapping excess adults.

In calculating the broodstock need for FCS production within NPTH, a trapping rate of 12% at LGR is assumed, as is an adult holding loss rate of 10% annually. Egg fecundity for all females used for FCS production within NPTH from brood years 2003-2010 has averaged 3,762 eggs per female. Using that rate, coupled with a green egg to release average survival of 78% from brood years 2006-2009, NPTH will need a total of 526 females and 526 males (from both LGR and NPTH trapping) to meet full production annually. This number will be adjusted as needed to ensure adequate broodstock are trapped.

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

If using an existing hatchery stock, include specific information on how many natural fish were incorporated into the broodstock annually.

Target natural-origin adults incorporated into the broodstock is 30%. However, no more than 20% of the natural origin adults returning over Lower Granite Dam may be collected for brood.

Table 19. Estimated numbers of natural origin fish used in broodstock at NPTH.

Return year	Trapping Location	Natural Females	Natural Males	Natural Jacks	Naturals in Broodstock (%)	Total number of fish spawned	Mating protocol
2003	NPTH	1	0	0	1.0	104	Random
2004	LGR	76	33	4			
	NPTH	3	1	0	17.0	688	Random
2005	LGR	30	37	2			
	NPTH	0	3	0	14.4	494	Random
2006	LGR	51	40	0			
	NPTH	0	1	0	21.8	418	Random
2007	LGR	57	20	0			
	NPTH	1	0	0	13.6	574	Random
2008	LGR	48	30	1			
	NPTH	2	0	0	7.6	1064	Random

6.2.4) Genetic or ecological differences.

Genetic relationship between Snake River origin, hatchery produced fall Chinook and natural spawners above LGR Dam is unanswerable at present (Marshall and Blankenship et al 2000).

The ecological differences are also unknown at present. Phase 1 of a Reproductive Success Study began in 2004 to examine the applicability of new technology (ad-mixture stock analysis procedure using DNA samples) in understanding hatchery/wild relative reproductive success in a large river system where traditional intensive DNA pedigree sampling is not practical.

6.2.5) Reasons for choosing.

The indigenous fall Chinook stocks of the Clearwater Subbasin were extirpated by Lewiston Dam (1927-1973) blocking summer and fall returns for a period of 14 years specifically 1927-40. Recolonization occurred slowly over time and in 1988 Tribal staff surveyed the river for fall Chinook redds and counted 21 redds (Arnsberg et al. 1992). To avoid conflict with the Endangered Species Act listing, restoration efforts were to use stocks/populations native to the Snake River Basin and/or those that re-colonized in the Clearwater.

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.

Non-Snake River origin fall Chinook (based on CWT information) are removed from the broodstock at NPTH. Unmarked/untagged fish are included in broodstock in an effort to include wild fish. Broodstock (i.e. eggs) for the NPTH Snake River fall Chinook program are collected over the entire run timing. Spawning occurs weekly to cover the run and spawn timing.

SECTION 7. BROODSTOCK COLLECTION

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

Adults:
Lower Granite Dam: Trapping protocols for LGR Dam are attached (Attachment 1). These protocols change yearly depending upon expected run size and sex composition of the return, but the general intent is to systematically sample and collect brood stock from across the full extent of the run at Lower Granite Dam. However, there may be implementation uncertainties that in some years will make this sampling of the entire return period infeasible. Records will be maintained that document the broodstock collection dates for each year and will be periodically reviewed to assess whether or not the long-term multiyear pattern of broodstock collection shows a chronic bias to one segment of the return period.

The primary broodstock source for the production described in this document has been identified as LGR Dam. Additional broodstock will be collected at NPTH as needed to reach production goals. Trapping at LGR Dam also occurs to estimate the run composition to LGR Dam.

Hauling of fish from the LGR adult trap begins after August 18 and generally ends the third week in November. Very few fall Chinook adults pass LGR after November 20. Broodstock will be collected at the adult trap at LFH starting on September 1 to limit the number of spring/summer

Chinook encountered. The trap will be checked daily, possibly more, depending upon expected return. Fish are directed to a chute where they are identified by species and directed to the appropriate pond where they are to be held until spawning. Trapping at NPTH will be adjusted to assure that fish are trapped throughout the run.

Known strays are removed in accordance with the guidelines in the Snake River Fall Chinook Hatchery Management Plan (Zimmerman et al. 2005).

NPTH: Adults returning to the NPTH hatchery ladder are trapped and placed in one of the two adult holding units adjacent to the trap as described in Section 5. Adults that voluntarily return to NPTH will be injected with erythromycin prior to the first spawning. Additionally, all adults will receive formalin treatments every-other day to control fungus and decrease pre-spawning mortality. Trap operation is 24 hours, 7-days a week during the trapping season. Captive adults are treated with formalin three times per week to control fungus.

South Fork Clearwater Weir: Adults trapped at the South Fork Clearwater weir (Refer to Section 5 for description) will be transported to NPTH for holding.

7.2) Collection or sampling design.

Section 7.1 of this document contains the location, timing, and methods information. Also refer to Attachment 1 for the Lower Granite sampling protocols and Attachment 2 for the NPTH Annual Operating Plan.

7.3) Identity.

Adult fall Chinook will be 100% electronically sampled before spawning. Origin of fish used for spawning will be determined by CWT, BWT, PIT tag, fin-clip, and visual implant elastomer (VIE) tag detections prior to spawning. Unmarked/untagged fish that are spawned will be scale sampled to determine age and juvenile rearing patterns. Natural-origin fish will be estimated at season's end after CWTs are expanded to account for associated untagged hatchery releases. Untagged fish remaining after the associated hatchery fish are removed will be assigned to the natural- origin category.

7.4) Proposed number to be collected:

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

Total number of fall Chinook broodstock needed is 1,052 adult fish or 526 females assuming a fecundity of 3,762 eggs per female and a production goal of 1.4 million subyearling smolts. It is desirable to collect a like number of males (but not necessary). Target natural origin fish is 30% or 316 to incorporate into broodstock.

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

years available:

Table 20. Fall Chinook adults and jacks collected at NPTH and Lower Granite Dam, number of fish spawned and resultant egg take and fecundity, 2003-2010.

Brood Year	Collected Adults						Spawned adults			Green Eggs Collected*	Average Fecundity
	LGR			NPTH							
	Female	Male	Jack	Female	Male	Jack	Female	Males	Jacks		
2003	0	0	0	131		68	98	46	4	307,735	3,140
2004	289	477	57	163	388	175	360	385	23	1,306,229	3,628
2005	202	227	29	78	66	51	278	200	31	958,536	3,448
2006	196	209	239	23	42	76	213	155	54	852,632	4,003
2007	253	322	313	53	62	2,061	290	315	16	1,101,127	3,797
2008	402	563	102	211	497	571	532	495	37	2,105,802	3,958
2009	400	525	904	278	229	5,111	494	278	12	1,814,541	3,673
2010	545	562	72	0	0	0	496	408	53	1,940,243	3,912
TOTALS/AVE.	**2,287**	**2,885**	**1,716**	**937**	**1,284**	**8,113**	**2,761**	**2,282**	**230**	**10,386,845**	**3,762**

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

The intent is to collect only fish needed for broodstock as shown in Section 7.4 above. Because of run reconstruction data needs, wire tagged fish trapped at LGR will be killed and buried. These fish cannot be distributed to food banks because they are treated with chemicals that are potentially hazardous to human consumption.

Any fish returning to NPTH hatchery collected in excess to broodstock needs may be returned to the river to spawn naturally. In the NPTH AOP and Clearwater Basin AOP forums, co-managers identify agreed to locations in the Clearwater River for releasing fish surplus to broodstock needs.

Co-managers may determine to collect surplus fish to serve as donor broodstock for the other fall Chinook programs in the Snake River basin; i.e., LFHC and Oxbow Hatchery.

7.6) Fish transportation and holding methods.

Refer to Sections 5.2 and 5.3. In addition the NPTH Annual Operating Plan is attached (Attachment 2).

7.7) Describe fish health maintenance and sanitation procedures applied.

Adult Broodstock:

- As described above, adults are given antibiotic injections of Erythromycin or Gallamycin (25mg/lb body weight) at the time of capture.
- Formalin bath treatments are flushed through the holding ponds on adults at 1:6000 every other day (3 times per week – M/W/F) to control fungus on adults.
- Personnel handling broodstock whether kept or released are instructed to be careful (gentle) when handling fish.
- At spawning, every adult female will be sampled individually for BKD using enzyme-linked immunosorbant assay (ELISA). Up to 150 ovarian fluid samples (3 fish pools) will be sampled for viruses. An additional 60 tissue samples will be taken for bacteria assays, and

sampled for Myxobolus cerebralis. Samples will be collected by NPTHC staff and delivered to IFHC.

Transportation: Trucks and tanks are periodically cleaned and disinfected as a routine to avoid inception or dissemination of potential pathogens associated with fish transport. Prior to each new transport exercise the truck and tanks are cleaned as follows;

- Pressure washed with a steam cleaner at 225 ºF.
- Sprayed with iodophore 100 ppm and left set for 15 minutes.
- Rinsed with clean ground water.
- When needed physiological support is given to transported fish by adding salt (NaCl) at 1% to reduce transport stress and aid in wound healing.
- Temperature moderation: if needed, ice is added to each tank to maintain desired transport temperatures.

7.8) Disposition of carcasses.

- Pre-spawn mortality carcasses recovered at the trap/holding site are sampled for data – tags and cause of death. The carcass is marked, "tail cut off", and the carcass returned to the stream or river for nutrient enhancement or if the fish has been injected with antibiotics or other chemicals it must be disposed of in a landfill.
- Post-spawning carcasses are handled in the same manner.
- Carcasses showing clinical signs of Bacterial Kidney Disease are frozen and disposed of at a landfill.

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.

Natural fish are systematically sub-sampled at the trap at LGR Dam (9-20% rate depending on year) along with hatchery origin fish. The remaining fish are allowed to continue upstream to their spawning grounds un-delayed, providing substantial numbers of natural and hatchery Snake River stock fish for the up-river spawning grounds. Natural Snake River fall Chinook will be included into the broodstock at LFH to minimize digression of the hatchery origin fish from the genetic makeup of the naturally spawning population.

The trap is checked multiple times daily at LGR Dam when in operation. The goal is to pass fish within minutes or a few hours of being caught. Fish are not generally held more than 8-12 hours (over-night) at LGR Dam before being passed or transported to a holding facility. Fish trapped at LFH are generally not held longer than 24 hours before they are shunted to the hatchery or returned to the river. Returning hatchery fish from the hatchery programs will be allowed to enter the natural spawning population with the exception of those fish removed for hatchery broodstock.

Where weirs are used to collect fish for broodstock, for example South Fork Clearwater River, the goal will be to:

- Trap fish and obtain broodstock across run time.

- A predetermined pass and keep ratio is set for each weir to get representative fish samples from the entire run for broodstock. Broodstock collected is systematically sampled, reported and compared to the projected return.
- The pass/keep ratio will be modified on the basis of the actual return.
- The jack portion of the broodstock is limited to no more than 10% of the adult fish collected. Jacks may be restricted from use for broodstock.
- The trap is checked multiple times daily when in operation. The goal is to pass fish within minutes or a few hours of being caught. Fish are not generally held more than 4-8 hours (over night) before being passed or transported to a holding facility.

Disease control efforts at LFH and NPTH follow standards described and adopted by the Pacific Northwest Fish Health Protection Committee (PNWFHPC 1989) and standards for the best management of Columbia Basin hatcheries (IHOT 1993) will effectively control expansion of species specific or general salmonid diseases.

SECTION 8. MATING

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

8.1) Selection method.

All males and females that have been collected for broodstock will be examined weekly during the spawning season to determine ripeness. All ripe fish of potentially Snake River origin from NPTH will be spawned.

Spawning at NPTH will occur every Tuesday beginning mid October and continue until program egg-take goals are met, usually by early December. Spawning may also occur on Wednesdays to avoid extremely long days during larger egg takes. Out-of-Snake River Basin adults, identified as "strays" by CWT or PIT tag may be culled or transferred to lower river hatcheries to meet production goals. However, to meet NPTH production, strays may be retained at a rate not to exceed 5%. Mating will be a 1 x 1 cross (1 female: 1 male). No fish less than 75 cm will be used for spawning. Natural Snake River fish will be incorporated into the broodstock at a target rate of up to 30%, provided that this number does not exceed 20% of the natural origin population. Scale pattern data will not be used at NPTH in the culling of eggs.

In mid November, Gonadotropin Releasing Hormone (sGnRHa) may be used on remaining un-spawned LGR females to facilitate maturation. Adults from LGR that have CWTs and are excess to broodstock needs will be sacrificed to recover the wire for run-reconstruction purposes. Adults from LGR without a wire tag will have scale samples taken before they are released into Clearwater Basin streams. Fish held at NPTH will have been treated with formalin; so if a fishery is occurring in the Clearwater Basin, these fish may be outplanted into closed waters, and/or marked differentially for easy identification by anglers. However, no inoculated or injected fish will be outplanted. Any action of this type will be coordinated with the NPT Fish and Wildlife Commission and the comanagers. These fish may also be spawned as backfill for LFH if

necessary. Adults and jacks trapped at NPTH in excess to broodstock needs may be returned to the river to spawn naturally, if they have not been injected or inoculated. Whenever possible, eggs from early spawned females will be used for the Luke's Gulch AF and Cedar Flats AF programs, to support an early returning run to the S.F. Clearwater and Selway Rivers. However, the Clearwater River direct release from NPTH is the highest priority in the event of an egg shortage, and that goal will always be met before either the Luke's Gulch or Cedar Flats acclimated programs. The intent of the fall Chinook program is to take eggs across the entire run, and build release groups represented by multiple takes whenever possible. Chinook salmon carcasses will be returned to free-flowing reaches of the Clearwater River for nutrient enhancement, if they have not been injected or inoculated.

NPTH Annual Operation Plan 2009-2010 is attached (Attachment 2).

8.2) Males.

A primary male is selected for semen. Semen collected in a dry plastic bag and stored in a cool but not freezing environment and transported to the hatchery fertilization room prior to combining with the eggs. Repeat spawners are used only when a shortage of males occurs; preferably not twice during the spawning day, but a week following with a different female.

8.3) Fertilization.

At fertilization, the eggs are placed in a clean, dry bucket, the semen added, gently mixed prior to adding water and mixing again. Mating is random on each spawning day. Mating will be a 1 x 1 cross (1 female: 1 male). When spawning matrices are used they will be based on the number of ripe females and males available that day. Generally, a one by one matrices will be use for odd number of females or only one female is available on a given spawn day. The goal is that each matrix contains at least one natural origin adult.

8.4) Cryopreserved gametes.

The Nez Perce Tribe (Tribe) strives to ensure availability of a representative genetic sample of the original male population by establishing and maintaining a germplasm repository (separate project from NPTH). Gamete cryopreservation permits the creation of a genetic repository, but is not a cure for decreasing fish stock problems. The Tribe was funded in 1997 by the Bonneville Power Administration (BPA project number: 199703800) to coordinate gene banking of male gametes from Endangered Species Act (ESA) listed spring and summer Chinook salmon in the Snake River basin. Cryopreserved samples from Snake River fall Chinook from 1997 through 2008 are being held in two independent locations at the University of Idaho and Washington State University.

The NPTH project has not used any cryopreserved samples for spawning. Cryopreserved samples would be used when there is insufficient number of adult male salmon returning to NPTH or a disease issue that has affected that broodyear's ability to be spawned. Use of these samples will

follow standard protocols developed for salmonid species (Tiersch and Mazik 2000).

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

A 1x1 cross has been used to simulate natural spawning and increases the chance of high reproductive genetic diversity. Also, in 2009 and 2010 jack contribution to broodstock was limited to prevent undesirable contribution by younger age fish to the stock. (Refer to LFH Annual Operation Plan 2009-2010 and Lyons Ferry/IPC/FCAP HGMP for a more detailed discussion). However the protocol for selecting older age fish was not entirely responsive to changes in ocean productivity and the resulting size at age for younger fish. At Lyons Ferry Hatchery it was determined that in some years a significant proportion (15-45%) of 1-ocean age males (jacks) and even 1-ocean age females (jills) were incorporated in the brood stock, raising concerns about the long term effect on population age structure. Starting in 2009 older age fish were selected for broodstock whenever possible based on CWT information, or by establishing a size selection criteria to exclude jacks and jills from brood by using within year length at age data from CWT tagged fish. Moreover, recent research within the Columbia Basin (Schroeder et al. 2008) has shown that large adult males contribute disproportionately to spawning, presumably due to competitive dominance. Following these results, older age males (3- and 4-ocean) at NPTH were utilized multiple times (up to 3) in place of jacks to more closely mimic a natural spawning assemblage.

SECTION 9. INCUBATION AND REARING

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

9.1) Incubation:

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

Table 21. Number of green eggs, eyed eggs, ponded fry and subyearling releases from NPTH, 2002-2009.

Brood Year	Green Eggs	Eyed Eggs		Ponded Fry		Subyearling Release		Green Egg to Release % Survival	Eyed Egg to Release % Survival
	Number	Number	% Survival	Number	% Survival	Number	% Survival		
2002	528,000	510,048	96.60%	509,626	99.92%	505,911	99.27%	95.82%	99.19%
2003	355,560	270,353	76.04%	211,629	78.28%	169,596	80.14%	47.70%	62.73%
2004	1,306,229	1,193,763	91.39%	1,035,856	86.77%	869,300	83.92%	66.55%	72.82%
2005	958,536	885,783	92.41%	854,838	96.51%	683,008	79.90%	71.26%	77.11%
2006	852,632	751,700	88.16%	733,240	97.54%	704,798	96.12%	82.66%	93.76%
2007	1,101,127	936,728	85.07%	910,268	97.18%	865,222	95.05%	78.58%	92.37%
2008	2,105,802	1,819,528	86.41%	1,781,899	97.93%	1,534,360	86.11%	72.86%	84.33%
2009	1,814,541	1,646,713	90.75%	1,491,037	90.55%	1,390,328	93.25%	76.62%	84.43%
TOTALS/AVE.	**9,022,427**	**8,014,616**	**88.83%**	**7,528,393**	**93.93%**	**6,722,523**	**89.30%**	**74.51%**	**83.88%**

1. All green eggs shown in BY2002 transferred from Lyons Ferry Hatchery.
2. Green eggs shown in BY2003 includes 47,825 green eggs transferred from Lyons Ferry Hatchery.
3. 197,912 eyed eggs (BY2007) transferred to Irrigon Hatchery on December 28, 2007.
   155,991 of these fish were transferred back to NPTH for final rearing on March 20, 2008.
4. 136,580 eyed eggs (BY2009) transferred to Irrigon Hatchery on December 29, 2009.

9.1.2) Cause for, and disposition of surplus egg takes.

Females trapped at LGR tend to be more fecund than females trapped at NPTH. Causes for surplus eggs include 1) using a fecundity that underestimates the average fecundity of fish in the return, resulting in more trapped and spawned fish to meet egg take goals than were actually needed. 2) spawning more fish anticipating a high stray rate when actually fish were all in-basin, 3) actual number of eggs on hand is not known until eye up, 4) changes in survival rates of the gametes, 5) additional eggs are requested to backfill production at Lyons Ferry.

Surplus eggs were provided to Lyons Ferry from NPTH in 2009 (Table 18). Surplus production may also be folded into production groups as listed in Table B.4.B of the U.S. v. Oregon Management Agreement, if density and flow parameters allow.

9.1.3) Loading densities applied during incubation.

- Egg size data: fecundity is averaging about 3,700 eggs per female.
- Isolation incubator: 1 female per unit; flows: 1 gallon per minute.
- Heath-type incubator: 8-tray stacks; flow: 6-8 gallons per minute.
  - Density during final incubation: 1 female per tray or not to exceed 5,000 eggs per tray. In most years, we anticipate only one female per incubation tray.

9.1.4) Incubation conditions.

Fertilized eggs will be water hardened for 30 minutes in 100 parts per million iodophore and placed in Heath trays for incubation. At between 550 and 620 temperature units (TUs) eyed eggs will be shocked; machine sorted the following day and transferred back into Heath trays to hatch.

The eggs from females with a high BKD ELISA value may be culled. At swim-up, the fish will be transferred to production room tanks at ~1,600 fpp (0.30 grams).

Monitoring for both Isolation and Heath-type incubators occurs daily through visual inspections and timing of flow. NPTH employs 24/7 vigilance at the hatchery with cross-checks between supervisors and technical staff to ensure systems are operational.

9.1.5) Ponding.

NPTH fall Chinook ponding occurs indoors with transfer of button-up fry from the incubator rooms to the rearing floor where up to 28 rearing tanks (dark green color) are prepared for early rearing. During the first 24-48 hours after transferring fry to tanks, no feed is administered to allow fish to inflate swim bladders without ingesting feed that at this developmental stage can induce fungal infection.

For annual survival rate information of eyed egg survival to ponding see Table 18.

9.1.6) Fish health maintenance and monitoring.

NPTH contracts with the U.S. Fish and Wildlife Service at the Dworshak Fish Health Laboratory to provide a fish health specialist who monitors fish health monthly. Juveniles are inspected and mortality collected and recorded daily; fish are watched/observed daily by technicians and supervisor for indications of disease. Mortality is charted and tracked; an acceptable daily mortality is utilized to determine health status of each tank population. Any abnormal behavior is noted and as needed a pathologist is called-in to inspect fish. More frequent care is provided as needed if disease is noted. Treatment for disease is provided by hatchery staff under the direction of the pathologist.

Prior to release, 15 to 30 days, a health inspection is conducted by USFWS Fish Health Laboratory from Dworshak Hatchery. Juveniles are inspected prior to transport, change in rearing station or release into stream.

Sanitation consists of raceway cleaning, and disinfecting equipment between raceways and/or between species on the hatchery site.

The 2009-2010 Annual Operation Plan for NPTH more fully describes fish health monitoring efforts and protocols (Attachment 2). NPTH produces monthly production and pathology reports, and both an annual operation plan and annual operation report for BPA and the co-managers.

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.

9.1.8)

Refer to section 8.5 for discussion about mating protocol. Incubator stacks have water level alarms and a backup system to recirculate water if flow is interrupted to the incubation rooms.

Pathogen free well water reduces the likelihood of disease outbreaks that could affect survival.

9.2) Rearing:

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

Refer to Table 18.

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

Table 22. NPTH fall Chinook mean density index and flow index during early rearing and acclimation, 2002-2009.

Brood Year	Mean Density Index			% of Maximum Flow Index		
	Ave. Early Rearing	Highest	Acclimation	Ave. Early Rearing	Highest	Acclimation
2002	0.279	0.342	0.115	NA	NA	NA
2003	0.163	0.318	0.036	76%	90%	68%
2004	0.296	0.464	0.059	26%	26%	26%
2005	0.187	0.399	0.087	NA	NA	NA
2006	0.186	0.339	0.060	78%	107%	73%
2007	0.217	0.360	0.046	78%	108%	57%
2008	0.178	0.351	0.035	65%	96%	55%
2009	0.149	0.190	0.08	107%	147%	58%

9.2.3) Fish rearing conditions

Refer to section 5.5. NPTH rearing tanks and ponds are supplied with pumped water from the Clearwater River. Approximately 800-1,000 gpm of water enters each pond. Oxygen levels range between 10-12 ppm entering, to 8-10 ppm leaving the raceway, depending on ambient air temperature and number of fish in the raceway. Flow index (FLI) is monitored monthly at all facilities. Rearing containers are broomed daily to remove accumulated feed and fecal material. Fall Chinook are fed by hand. NPTH Annual Operation Plan 2009-2010 is attached (Attachment 2).

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.

Table 23. Monthly fish growth information length, weight and condition factor for fall Chinook production at NPTH, 2005-2009.

Brood Year	Date	Fish Length (millimeters)	Fish Weight (fpp)	Fish Weight (grams)	Condition Factor (K)
2005	Jan	33	1120	0.40	1.13
	Feb	39	750	0.60	1.02
	Mar	59	258	1.76	0.86
	Apr	73	134	3.39	0.87
	May	102	55	8.25	0.78
	Jun	108	44.4	10.22	0.81
2006	Jan	34	1061	0.43	1.09
	Feb	45	518	0.88	0.96
	Mar	61	218	2.08	0.92
	Apr	77	91	4.98	1.09
	May	94	49	9.26	1.11
	Jun	102	38.3	11.84	1.12
2007	Jan	34	1040	0.44	1.11
	Feb	36	888	0.51	1.09
	Mar	51	258	1.76	1.33
	Apr	66	111	4.09	1.42
	May	71	72	6.30	1.76
	Jun	91	54.2	8.37	1.11
2008	Jan	34	1039	0.44	1.11
	Feb	35	1017	0.45	1.04
	Mar	51	325	1.40	1.05
	Apr	69	105	4.32	1.32
	May	71	71	6.39	1.78
	Jun	88	59.72	7.60	1.11
2009	Jan	34	937	0.48	1.23
	Feb	38	763	0.59	1.08
	Mar	53	269	1.69	1.13
	Apr	72	94	4.83	1.29
	May	78	62	7.32	1.54
	Jun	89	57.9	7.83	1.11

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

Refer to Table 20 above.

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*).

Table 24. Feed type, application schedule, feed rate, and average monthly conversion for NPTH fall Chinook.

Site	Rearing Period	Food Type (Bio-Oregon)	Application Schedule (# feedings/day)	Feeding Rate (% BW/day)	Average Monthly Food Conversion
Nez Perce Tribal Hatchery	January	BVS #0	6-7/day by hand	3.0%	0.90%
	February	BVS #0 & #1	6-7/day by hand	3.0%	0.80%
	March	BVS #1 & #2	1-2/day by hand	2.7%	0.80%
	April	BVS #2, BVF 1.2	1-2/day by hand	2.4%	0.90%
	May	BVF 1.2 & 1.5	1-2/day by hand	2.2%	0.90%
	June	BVF 1.5	1-2/day by hand	2.6%	0.90%
North Lapwai Valley Acclimation Facility	April	BVS #2	1-2/day by hand	2.2%	0.70%
	May	BVF 1.2	1-2/day by hand	2.8%	0.60%
	June	-	-	-	-
Cedar Flats Acclimation Facility	April	BVS #2	1-2/day by hand	2.2%	0.80%
	May	BVS #2, BVF 1.2	1-2/day by hand	2.2%	1.50%
	June	BVF 1.2 & 1.5	1-2/day by hand	2.6%	1.00%
Luke's Gulch Acclimation Facility	April	BVS #2	1-2/day by hand	2.2%	0.80%
	May	BVS #2, BVF 1.2	1-2/day by hand	2.0%	0.80%
	June	BVF 1.2 & 1.5	1-2/day by hand	2.5%	0.80%

Rearing Period	Food Type (Bio-Oregon)	Application Schedule *(# feedings/day)*	Feeding Rate *(% .W./day)*	Average Monthly Food Conversion
January	BVS #0	4-5 per/day by hand	2.5%	.6
February	BVS #0 & #1	2-3 per/day by hand	2.5%	.6
March	BVS #1 & #2	1-2 per/day by hand	2.25%	.6
April	BVS #2, BVF 1.2	1-2 per/day by hand	1.5%	.7
May	BVF 1.5	1-2 per/day by hand	1.25%	.7

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

Refer to Section 9.1.6.

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

Subyearling releases are targeted for release in June at 50 fish per pound (fpp). Pre-liberation samples will note smolt development visually based on degree of silvering, presence/absence of parr marks, fin clarity and banding of the caudal fin. No gill ATPase activity or blood chemistry samples to determine degree of smoltification, or to guide fish release timing, are anticipated.

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

- Dark colored containers to develop natural coloration – green and brown backgrounds.
- Depth – Natures, substrate lined deep ponds (10' center channel depth) with shallow areas also present for natural conditioning and feeding along pond margins.
- Shading at satellite sites.
- Natural photo period.

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.

Professional personnel trained in fish cultural procedures operate NPTH facilities. Facilities are state-of-the-art to provide a safe and secure rearing environment through the use of alarm systems, backup generators, and water re-use pumping systems to prevent catastrophic fish losses. In 2011, we are proposing to install netting over the ponds at NPTH to deter bird (merganser, cormorant, and duck) predation.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1) Proposed fish release levels.

Table 25. Proposed releases for NPTH fall Chinook production.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Fingerling (subyearling smolt)	500,000	50 fpp	Early June: 1st-15th	NPTH Site 1705, lower Clearwater River
Fingerling (subyearling smolt)	500,000	50 fpp	Early June: 1st-15th	North Lapwai Valley satellite, Lapwai Creek, lower Clearwater River
Fingerling (subyearling smolt)	200,000	50 fpp	Early June: 1st-15th	Lukes Gulch satellite, South Fork Clearwater River

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Fingerling (subyearling smolt)	200,000	50 fpp	Early June: 1st-15th	Cedar Flats satellite, lower Selway River

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

- Nez Perce Tribal Hatchery, Central Facility, Site 1705 (near Cherrylane):
  - Clearwater River, RM 22.2 (RKM 35.7), Clearwater Subbasin, Idaho
  - GPS: N 46.3058.8509 / W 116.3928.11379
  - HUC: 170603060801
  - Release may vary depending on management circumstances; generally we will release 500,000 subyearling smolts each year; some years due to environmental conditions (low flow, high water temperatures) the North Lapwai Valley group may be released here making a total of 1.0 million smolts.

- North Lapwai Valley Satellite (NPTH):
  - Lapwai Creek, Clearwater River, Clearwater subbasin, Idaho
  - GPS: N 46.44352 / W 116.81387
  - HUC: 170603063103
  - Release may vary depending on management circumstances; generally we will release 500,000 subyearling smolts each year; some years due to environmental conditions (low flow, high water temperatures) the North Lapwai Valley group may be released from Site 1705.

- Lukes Gulch Satellite (NPTH):
  - S.F. Clearwater River, Clearwater subbasin, Idaho
  - GPS: N 46.03247 / W 115.97569
  - HUC: 170603050102
  - Release up to 200,000 subyearling smolts (fingerlings) early June each year for the purpose of restoring the early-type fall Chinook historically found in the S.F. Clearwater and M.F. Clearwater Rivers.

- Cedar Flats satellite (NPTH):
  - Lower Selway River, Clearwater subbasin, Idaho
  - GIS: N46.09381 / W115.53955
  - HUC: 170603020101
  - Release up to 200,000 subyearling smolts (fingerlings) early June each year for the purpose of restoring the early-type fall Chinook historically found in the Selway River.

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

Table 26. Fall Chinook releases from NPTH facilities, 2003-2010.

Acclimation Site	Release Water	Release Year	Release Date	Acclimation Period (Days)	Total Subs Released	CWT Only	AD Clip Only	AD/CWT	Unmarked/ Untagged	PIT Tags	Size At Release (FPP)
NPTH	Clearwater River	2003	3-30 Jun	49	314,596	314,596	-	-	-	-	47.3
		2004	4-11 Jun	25	169,596	164,169	-	-	5,427	2,615	55.2
		2005	7-May	2	869,300	334,505	-	207,659	327,136	-	115.4
		2006	8-15 Jun	45	432,097	197,659	488	99,163	134,787	3,007	59.0
		2007	11-15 Jun	68	491,424	194,988	665	98,947	197,489	3,095	37.9
		2008	10-15 Jun	44	495,937	149,162	388	100,665	245,722	3,986	50.7
		2009	8-12 Jun	13	628,815	181,522	27,725	90,953	328,615	2,963	51.5
		2010	7-11 Jun	23	536,999	199,710	1,229	99,100	236,960	3,086	54.2
NLV	Clearwater River	2003	27-30 May	34	191,382	191,382	-	-	-	-	61.3
		2006	17-May	26	199,746	98,670	490	99,438	1,148	-	72.3
		2007	22-23 May	35	164,105	44,538	674	100,303	18,590	3,090	50.9
		2008	15-May	41	168,623	69,725	378	98,251	269	3,059	73.4
		2009	15-May	23	495,569	182,328	2,341	97,751	213,149	2,983	85.3
		2010	14-May	24	465,949	164,981	1,228	99,024	200,716	3,089	81.2
Lukes Gulch	S.F. Clearwater River	2006	13-Jun	56	25,391	25,099	-	-	292	4,971	36.6
		2007	4-Jun	47	24,955	24,906	-	-	49	3,093	37.2
		2008	12-Jun	48	100,368	99,456	-	-	912	8,332	46.0
		2009	10-Jun	43	209,878	98,025	2,359	98,486	11,008	14,006	51.6
		2010	9-Jun	49	198,969	99,116	1,218	98,220	415	16,409	44.4
Cedar Flats	Selway River	2006	13-Jun	57	25,774	25,478	-	-	296	4,984	32.9
		2007	11-Jun	54	24,988	24,890	-	-	98	3,100	47.3
		2008	12-Jun	49	100,294	99,641	-	-	653	8,375	59.3
		2009	9-Jun	45	200,098	100,760	2,296	95,840	1,202	13,941	57.9
		2010	14-Jun	41	188,411	74,939	1,214	97,930	14,328	14,219	48.3
TOTALS/AVERAGE				**41**	**6,408,668**	**2,845,649**	**42,693**	**1,581,730**	**1,939,261**	**122,403**	**59.5**

10.4) Actual dates of release and description of release protocols.

Refer to Table 23 above.

NPTH and North Lapwai Valley strategy is two fold; 1) volitional release of fish is preferred and 2) forced released occurs in the event of emergency conditions such as high temperatures, lost water flow or other cause. Typically the fish response when containment screens have been pulled is to volitionally migrate with in three days or less. In the event that fish do not volitionally leave, a forced-release condition is created by drawing the ponds down over the course of hourly increments to avoid fish entrapment in pond substrate.

Lukes Gulch and Cedar Flats satellite releases are force released.

10.5) Fish transportation procedures, if applicable.

NPTH fall Chinook produced at the NPTH central facility are transported to satellite facilities. A description of the methodology follows.

Prior to transport the truck and transport tanks are checked to be sure they are fully operational; including, fuel and oil levels, oxygen quantity, gauge function, meter operation and accuracy, tires and spares, and other operational and maintenance requirements are met, including vehicle

licenses and permits.

Prior to each new transport exercise, the truck and tanks are cleaned as follows;

- Pressure washed with a steam cleaner at 225 ºF , and/or
- Sprayed with iodine at 100 ppm and left set for 15 minutes.
- Rinsed/washed with clean ground water.
- Temperature moderation; if needed, ice is added to each tank to maintain the desired transport temperatures.
- When needed, physiological support is given to transported fish by adding Poly-aqua (5ml (1 teaspoon) per 10 gallons of water) or salt (NaCl) at 1% is added to reduce transport stress and aid in wound healing.
- Loading density is always kept as low as possible.
- No acclimation at temperature differences of less than 2-3 ºF difference.
- 30-60 minutes at 4-8 ºF difference; preferably ice is used to moderate temperature while hauling to reach the less than 3 ºF difference.

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

Fish released from NPTH facilities are acclimated for several weeks on river water. See section 4.0 regarding water sources for fish rearing at NPTH facilities and section 5.5 for details on rearing. During or prior to release, staff sample fish to document size, weight, condition factor, degree of visual smoltification, and the number of precocious male fish present in the release population.

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

Marking of hatchery-origin fish is guided by a Snake River Basin Fall Chinook Salmon Production Program Marking Justification white paper. Mark types and quantities have been adopted under the 2008 - 2017 *US vs. Oregon* Management Agreement. At full production levels, 76% of the hatchery-produced fish are marked in some manner, 47% are marked with an adipose fin clip.

Fall Chinook salmon according to release group are marked as follows:

- NPTH and North Lapwai Valley satellite (total of 500,000 smolts) on or before June 15th
  - 200,000 CWT
  - 100,000 CWT/Ad Clipped
  - 200,000 unmarked
- North Lapwai Valley satellite (total of 1,000,000 smolts) on or before June 15th each year
  - 200,000 CWT
  - 100,000 CWT/Ad Clipped
  - 200,000 unmarked
- Lukes Gulch satellite
  - 25,000 CWT (during 2006 and 2007) with up to 5,000 PIT tags prior to release.

    - 100,000 CWT /Ad Clipped, 100,000 CWT
- Cedar Flats satellites
    - 25,000 CWT – during 2006 and 2007 with up to 5,000 PIT tags prior to release.
    - 100,000 CWT /Ad Clipped, 100,000 CWT

In addition to these marks, PIT tags are applied to each release group at NPTH in a coordinated manner with all the Snake River fall Chinook releases. Following is a description of how the number of PIT tags per each release group is determined.

Total tags needed for evaluating adult returns from subyearling fall Chinook salmon releases by release site would be 225,000. Individual broodyear SARs averaged 0.4619 and ranged from 0.1107 for BY 2006 to 1.290 for BY 1998. Lumping of the groups to evaluate all groups as a single sub-yearling releases group would require 50,000 tags given an average SAR of 0.462. Given the variation in SARs over the time period, years with low survival would not return enough tags to estimate the return. Therefore, it would be justified to use the lowest SAR value observed from BY 1994 through 2006 (0.1107 for BY 2006) for the evaluations. At a SAR = 0.1107, a total of 70,000 tags would result in a CV of approximately 20%.

Table 27. Release site, smolt to adult returns (SARs) and number of tags required to estimate adult fall Chinook salmon returns to the Snake River from subyearling releases. SAR estimates were the average survival of brood years 1996 – 2006.

Release site	# releases	Ave. SAR	S.D.	lower CV	upper CV	# tags required	2009 releases	Prop. tagged
LFH	8	0.4700	0.6695	18.72%	22.88%	20000	200,695	9.97%
NPTH	6	0.3325	0.4915	19.82%	24.54%	25000	628,815	3.98%
BC	9	0.6433	0.6933	18.49%	22.52%	15000	474,868	3.16%
CJ	10	0.5101	0.1881	18.92%	23.17%	18000	524,910	3.43%
PL	7	0.1400	0.8660	29.28%	40.69%	25000	415,991	6.01%
Couse Crk	4	0.3613	0.4758	19.08%	23.41%	25000	200,744	12.45%
HC dam	3	0.8443	0.4012	18.06%	21.88%	12000	1006324	1.19%
GRR	2	0.2178	0.4575	24.05%	31.31%	25000	622,450	4.02%
NLV	3	0.3331	1.5096	19.81%	24.52%	25000	495569	5.04%
NPTH-Cedar Flats Accl.	2	1.1863	0.4432	16.76%	20.00%	10000	200,098	5.00%
NPTH-Lukes Gulch Accl.	2	0.3629	0.1050	19.04%	23.35%	25000	209,878	11.91%
All subyrl average	57	0.4619	0.5764	17.02%	20.39%	50000	4,980,342	1.00%

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

Refer to Section 9.1.2. Snake River Stock, hatchery reared fish would be folded back into production groups as listed in the U.S. v. Oregon Management Agreement. Any deviations from standard release areas and production will be discussed and agreed upon by co-managers.

10.9) Fish health certification procedures applied pre-release.

Prior to release, a minimum 60 fish sample is collected for a pre-release health inspection. Bacteriology, virology and parasitic assays are performed. Hatchery staff will take lengths and weights on a minimum of 500 fish just before release.

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

Nez Perce Tribal Hatchery central and satellite facilities are staffed with personnel on site 24/7, including weekend and holiday duty. Automated alarm systems and phone emergency call alarms are maintained for personnel both on- and off-station. Each duty person has an assigned back-up person. Two staff members live on station year-around. Water flow alarms, water level alarms, pump alarms, and temperature alarms are routinely checked both electronically and manually to prevent water system failures.

- Commercial electrical power failure at the central hatchery is backed up with diesel generators that are tested each week.
- The incubation modules are capable of being operated for an indefinite period if/when commercial power failure occurs.
- Gravity flow systems are used whereever possible, but their duration is short (minutes).
- Additional oxygen and standby pumps are utilized in the case that staff can anticipate the need.

During the 2005 flash flood, staff worked in concert to back-up the on-duty personnel and to effect release of fish from all rearing containers while maintaining as many fish as possible on a limited water supply. As a result, less than 2% of the fish were lost; and the spring Chinook satellite groups were saved to complete their production, although 1.3 million fall and spring Chinook juveniles had to be released to the river.

Emergency releases occur under the guidance of the manager responsible for the project. An example of release strategy follows;

- Contact backup staff immediately, notifies supervisors of circumstances and receive final advice on release; e.g., valve settings, tag detectors, oxygen support, special adaptations to ensure fish get out of ponds into stream or river. Usually the supervisor comes to the site if not already there.
- If possible, leave screens in place, remove 1-2 dam board boards every 15-20 minutes and draw pond down about half-way to concentrate fish in center of pond and avoid fish taking

refuge in rock substrate.

- Finally, pull remove containment screens and continue to pull dam boards or standpipe water level control and allow fish to exit container to stream or river.
- Record events of release and discuss with supervisor.
- Notify upper management, policy and co-managers of event.

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.

1. Continuing fish health practices to minimize the incidence of infectious disease agents. Follow IHOT, AFS, and PNFHPC guidelines.
2. Marking hatchery-produced fall Chinook salmon for monitoring and evaluation of program effectiveness.
3. Continuing to reduce the effect of releasing large numbers of hatchery fall Chinook salmon at a single site by spreading annual releases over a number of days.
4. Attempting to program time of release to mimic natural fish emigration for Snake River smolt releases.
5. Continuing to incorporate natural fish into broodstock.
7. Continuing to release fish that are fully smolted to promote rapid emigration to reduce interactions with natural fish.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

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

Table 28. Monitoring and Evaluation performance measures and their status for Snake fall Chinook.

Performance Measure		Definition	Performance Measures Currently Completed (Yes, No, Partial)
Abundance	Adult Escapement to Tributary	Number of adults that have escaped to a certain point (i.e. - mouth of stream). Population based measure. Calculated with mark recapture methods from weir data adjusted for redds located downstream of weirs and in tributaries. Provides total escapement and wild only escapement. [Assumes tributary harvest is accounted for]. Uses TRT population definition where available	PARTIAL
	Fish per Redd	Number of fish divided by the total number of redds. Applied by: The population estimate at a weir site, minus broodstock and mortalities and harvest, divided by the total number of redds located upstream of the weir.	YES

	Female Spawner per Redd	Number of female spawners divided by the total number of redds above weir. Applied in 2 ways: 1) The population estimate at a weir site multiplied by the weir derived proportion of females, minus the number of female prespawn mortalities, divided by the total number of redds located upstream of the weir, and 2) DIDSON application calculated as in 1 above but with proportion females from carcass recoveries. Correct for mis-sexed fish at weir for 1 above.	PARTIAL
	Index of Spawner Abundance - redd counts	Counts of redds in spawning areas in index area(s) (trend), extensive areas, and supplemental areas. Reported as redds and/or redds/km.	YES
	Spawner Abundance	In-river: Estimated number of total spawners on the spawning ground. Calculated as the number of fish that return to an adult monitoring site, minus broodstock removals and weir mortalities and harvest if any, subtracts the number of female prespawning mortalities and expanded for redds located below weirs. Calculated as hatchery spawner abundance, and 2) wild spawner abundance which multiplies by the proportion of natural origin (wild) fish. In-hatchery: Total number of fish actually used in hatchery production. Partitioned by gender and origin.	YES
	Hatchery Fraction	Percent of fish on the spawning ground that originated from a hatchery. Applied in two ways: 1) Number of hatchery carcasses divided by the total number of known origin carcasses sampled. Uses carcasses above and below weirs, 2) Uses weir data to determine number of fish released above weir and calculate as in 1 above, and 3) Use 2 above and carcasses above and below weir.	PARTIAL
	Ocean/Mainstem Harvest	Number of fish caught in ocean and mainstem (tribal, sport, or commercial) by hatchery and natural origin.	YES
	Harvest Abundance in Tributary	Number of fish caught in ocean and mainstem (tribal, sport, or commercial) by hatchery and natural origin.	YES
	Index of Juvenile Abundance (Density)	Parr abundance estimates using underwater survey methodology are made at pre-established transects. Densities (number per 100 m2) are recorded using protocol described in Thurow (1994). Hanken & Reeves estimator.	NO
	Juvenile Emigrant Abundance	Gauss software is (Aptech Systems, Maple Valley, Washington) is used to estimate emigration estimates. Estimates are given for parr pre-smolts, smolts and the entire migration year. Calculations are completed using the Bailey Method and bootstrapping for 95% CIs. Gauss program developed by the University of Idaho (Steinhorst 2000).	NO
	Smolts	Smolt estimates, which result from juvenile emigrant trapping and PIT tagging, are derived by estimating the proportion of the total juvenile abundance estimate at the tributary comprised of each juvenile life stage (parr, presmolt, smolt) that survive to first mainstem dam. It is calculated by multiplying the life stage specific abundance estimate (with standard error) by the life stage specific survival estimate to first mainstem dam (with standard error). The standard error around the smolt equivalent estimate is calculated using the following formula; where X = life stage specific juvenile abundance estimate and Y = life stage specific juvenile survival estimate: $Var(X \cdot Y) = E(X)^2 \cdot Var(Y) + E(Y)^2 \cdot Var(X) + Var(X) \cdot Var(Y)$	NO
	Run Prediction	This will not be in the raw or summarized performance database.	YES

Survival – Productivity	Smolt-to-Adult Return Rate	The number of adult returns from a given brood year returning to a point (stream mouth, weir) divided by the number of smolts that left this point 1-5 years prior. Calculated for wild and hatchery origin conventional and captive brood fish separately. Adult data applied in two ways: 1) SAR estimate to stream using population estimate to stream, 2) adult PIT tag SAR estimate to escapement monitoring site (weirs, LGR), and 3) SAR estimate with harvest. Accounts for all harvest below stream. *Smolt-to-adult return rates* are generated for four performance periods; tributary to tributary, tributary to tributary, tributary to first mainstem dam, first mainstem dam to first mainstem dam, and first mainstem dam to tributary. *Tributary to tributary SAR* estimates for natural and hatchery origin fish are calculated using PIT tag technology as well as direct counts of fish returning to the drainage. PIT tag SAR estimates are calculated by dividing the number of PIT tag adults returning to the tributary (by life stage and origin type) by the number of PIT tagged juvenile fish migrating from the tributary (by life stage and origin type). Overall PIT tag SAR estimates for natural fish are then calculated by averaging the individual life stage specific SARs. Direct counts are calculated by dividing the estimated number of natural and hatchery-origin adults returning to the tributary (by length break-out for natural fish) by the estimated number of natural-origin fish and the known number of hatchery-origin fish leaving the tributary. The variance around the SAR estimate is calculated as follows, where X = the number of adult PIT tagged fish returning to the tributary and Y = the estimated number of juvenile PIT tagged fish at first mainstem dam: $Var\left(\frac{X}{Y}\right)=\left(\frac{EX}{EY}\right)^2\cdot\left(\frac{Var(Y)}{(EY)^2}\right)$	PARTIAL
	Progeny-per- Parent Ratio	Adult to adult calculated for naturally spawning fish and hatchery fish separately as the brood year ratio of return adult to parent spawner abundance using data above weir. Estimates of this ratio for fish spawning and produced by the natural environment must be adjusted to account for the confounding effect of spawner density on this metric. Two variants calculated: 1) escapement, and 2) spawners.	PARTIAL
	Recruit/spawner (R/S)(Smolt Equivalents per Redd or female)	Juvenile production to some life stage divided by adult spawner abundance, adjusted for the confounding effects of spawner density.. Derive adult escapement above juvenile trap multiplied by the prespawning mortality estimate. Adjusted for redds above juvenile Trap. *Recruit per spawner* estimates, or *juvenile abundance (can be various life stages or locations) per redd/female*, is used to index population productivity, since it represents the quantity of juvenile fish resulting from an average redd (total smolts divided by total redds) or female. Several forms of juvenile life stages are applicable. We utilize two measures: 1) juvenile abundance (parr, presmolt, smolt, total abundance) at the tributary mouth, and 2) smolt abundance at first mainstem dam.	PARTIAL
	Juvenile Survival to first mainstem dam	Life stage survival (parr, presmolt, smolt, subyearling) calculated by CJS Estimate (SURPH) produced by PITPRO 4.8+ (recapture file included), CI estimated as 1.96*SE. Apply survival by life stage to first mainstem dam to estimate of abundance by life stage at the tributary and the sum of those is total smolt abundance surviving to first mainstem dam. Juvenile survival to first mainstem dam = total estimated smolts surviving to first mainstem dam divided by the total estimated juveniles leaving tributary.	YES
	Juvenile Survival to all Mainstem Dams	*Juvenile survival to first mainstem dam and subsequent Mainstem Dam(s)*, which is estimated using PIT tag technology. Survival by life stage to and through the hydrosystem is possible if enough PIT tags are available from the stream. Using tags from all life stages combined we will calculate (SURPH) the survival to all mainstem dams.	PARTIAL
	Post-release Survival	Post-release survival of natural and hatchery-origin fish are calculated as described above in the performance measure "Survival to first mainstem dam and Mainstem Dams". No additional points of detection (i.e. screw traps) are used to calculate survival estimates.	PARTIAL
Distribution	Adult Spawner Spatial Distribution	Extensive area tributary spawner distribution. Target GPS redd locations or reach specific summaries, with information from carcass recoveries to identify hatchery-origin vs. natural-origin spawners across spawning areas within populations.	YES

	Stray Rate (percentage)	Estimate of the number and percent of hatchery origin fish on the spawning grounds, as the percent within MPG, and percent out of ESU. Calculated from 1) total known origin carcasses, and 2) uses fish released above weir. Data adjusted for unmarked carcasses above and below weir.	PARTIAL
	Juvenile Rearing Distribution		PARTIAL
	Disease Frequency	Natural fish mortalities are provided to certified fish health lab for routine disease testing protocols. Hatcheries routinely samples fish for disease and will defer to then for sampling numbers and periodicity	NO
Genetic	Genetic Diversity	Indices of genetic diversity – measured within a tributary) heterozygosity – allozymes, microsatellites), or among tributaries across population aggregates (e.g., FST).	PARTIAL
	Reproductive Success (Nb/N)	Derived measure: determining hatchery: wild proportions, effective population size is modeled.	NO
	Relative Reproductive Success (Parentage)	Derived measure: the relative production of offspring by a particular genotype. Parentage analyses using multilocus genotypes are used to assess reproductive success, mating patterns, kinship, and fitness in natural pop8ulations and are gaining widespread use of with the development of highly polymorphic molecular markers.	NO
	Effective Population Size (Ne)	Derived measure: the number of breeding individuals in an idealized population that would show the same amount of dispersion of allele frequencies under random genetic drift or the same amount of inbreeding as the population under consideration.	PARTIAL
Life History	Age Structure	Proportion of escapement composed of adult individuals of different brood years. Calculated for wild and hatchery origin conventional and captive brood adult returns. Accessed via scale method, dorsal fin ray ageing, or mark recoveries. Juvenile Age is determined by brood year (year when eggs are placed in the gravel) Then Age is determined by life stage of that year. Scales have been collected from natural-origin juveniles.	YES
	Age–at–Return	Age distribution of spawners on spawning ground. Calculated for wild and hatchery conventional and captive brood adult returns. Accessed via scale method, dorsal fin ray ageing, or mark recoveries.	YES
	Age–at-Emigration	Juvenile Age is determined by brood year (year when eggs are placed in the gravel) Then Age is determined by life stage of that year. Scales have been collected from natural-origin juveniles. The age of hatchery-origin fish is determined through a VIE marking program which identifies fish by brood year.	YES
	Size-at-Return	Size distribution of spawners using fork length. Raw database measure only.	YES
	Size-at-Emigration	Fork length (mm) and weight (g) are representatively collected weekly from natural juveniles captured in emigration traps. Mean fork length and variance for all samples within a life stage-specific emigration period are generated (mean length by week then averaged by life stage). For entire juvenile abundance leaving a weighted mean (by life stage) is calculated. Size-at-emigration for hatchery production is generated from pre release sampling of juveniles at the hatchery.	PARTIAL
	Condition of Juveniles at Emigration	Condition factor by life stage of juveniles is generated using the formula: $K = (w/l^3)(10^4)$ where K is the condition factor, w is the weight in grams (g), and l is the length in millimeters (Everhart and Youngs 1992).	PARTIAL
	Percent Females (adults)	The percentage of females in the spawning population. Calculated using 1) weir data, 2) total known origin carcass recoveries, and 3) weir data and unmarked carcasses above and below weir. Calculated for wild, hatchery, and total fish.	YES
	Adult Run-timing	Arrival timing of adults at adult monitoring sites (weir, PIT array) calculated as range, 10%, median, 90% percentiles. Calculated for wild and hatchery origin fish separately, and total.	YES
	Spawn-timing	This will be a raw database measure only.	YES
	Juvenile Emigration Timing	Juvenile emigration timing is characterized by individual life stages at the rotary screw trap and Lower Granite Dam. Emigration timing at the rotary screw trap is expressed as the percent of total abundance over time while the median, 0%, 10, 50%, 90% and 100% detection dates are calculated for fish at first mainstem dam.	PARTIAL

	Mainstem Arrival Timing (Lower Monumental)	Unique detections of juvenile PIT-tagged fish at first mainstem dam are used to estimate migration timing for natural and hatchery origin tag groups by life stage. The actual Median, 0, 10%, 50%, 90% and 100% detection dates are reported for each tag group. Weighted detection dates are also calculated by multiplying unique PIT tag detection by a life stage specific correction factor (number fish PIT tagged by life stage divided by tributary abundance estimate by life stage). Daily products are added and rounded to the nearest integer to determine weighted median, 0%, 50%, 90% and 100% detection dates.	PARTIAL
Habit at	Physical Habitat		NO
	Fish and Amphibian Assemblage	Observations through rotary screw trap catch and while conducting snorkel surveys.	NO
In-Hatchery Measures	Hatchery Production Abundance	The number of hatchery juveniles of one cohort released into the receiving stream per year. Derived from census count minus prerelease mortalities or from sample fish- per-pound calculations minus mortalities. Method dependent upon marking program (census obtained when 100% are marked).	YES
	In-hatchery Life Stage Survival	In-hatchery survival is calculated during early life history stages of hatchery-origin juvenile Chinook. Enumeration of individual female's live and dead eggs occurs when the eggs are picked. These numbers create the inventory with subsequent mortality subtracted. This inventory can be changed to the physical count of fish obtained during CWT or VIE tagging. These physical fish counts are the most accurate inventory method available. The inventory is checked throughout the year using 'fish-per-pound' counts. Estimated survival of various in-hatchery juvenile stages (green egg to eyed egg, eyed egg to ponded fry, fry to parr, parr to smolt and overall green egg to release) Derived from census count minus prerelease mortalities or from sample fish- per-pound calculations minus mortalities. Life stage at release varies (smolt, premolt, parr, etc.).	YES
	Size-at-Release	Mean fork length measured in millimeters and mean weight measured in grams of a hatchery release group. Measured during prerelease sampling. Sample size determined by individual facility and M&E staff. Life stage at release varies (smolt, premolt, parr, etc.).	YES
	Juvenile Condition Factor	Condition Factor (K) relating length to weight expressed as a ratio. Condition factor by life stage of juveniles is generated using the formula: $K = (w/l^3)(10^4)$ where K is the condition factor, w is the weight in grams (g), and l is the length in millimeters (Everhart and Youngs 1992).	YES
	Fecundity by Age	The reproductive potential of an individual female. Estimated as the number of eggs in the ovaries of the individual female. Measured as the number of eggs per female calculated by weight or enumerated by egg counter.	YES
	Spawn Timing	Spawn date of broodstock spawners by age, sex and origin, Also reported as cumulative timing and median dates.	YES
	Hatchery Broodstock Fraction	Percent of hatchery broodstock actually used to spawn the next generation of hatchery F1s. Does not include prespawn mortality.	YES
	Hatchery Broodstock Prespawn Mortality	Percent of adults that die while retained in the hatchery, but before spawning.	YES
	Female Spawner ELISA Values	Screening procedure for diagnosis and detection of BKD in adult female ovarian fluids. The enzyme linked immunosorbent assay (ELISA) detects antigen of *R. salmoninarum.*	YES
	In-Hatchery Juvenile Disease Monitoring	Screening procedure for bacterial, viral and other diseases common to juvenile salmonids. Gill/skin/ kidney /spleen/skin/blood culture smears conducted monthly on 10 mortalities per stock	PARTIAL
	Length of Broodstock Spawner	Mean fork length by age measured in millimeters of male and female broodstock spawners. Measured at spawning and/or at weir collection. Is used in conjunction with scale reading for aging.	YES
	Prerelease Mark Retention	Percentage of a hatchery group that have retained a mark up until release from the hatchery. Estimated from a sample of fish visually calculated as either "present" or "absent"	YES
	Prerelease Tag Retention	Percentage of a hatchery group that have retained a tag up until release from the hatchery - estimated from a sample of fish passed as either "present" or "absent". ("Marks" refer to adipose fin clips or VIE batch marks).	YES
	Hatchery Release Timing	Date and time of volitional or forced departure from the hatchery. Normally determined through PIT tag detections at facility exit (not all programs monitor volitional releases).	YES

	Chemical Water Quality	Hatchery operational measures included: dissolved oxygen (DO) - measured with DO meters, continuously at the hatchery, and manually 3 times daily at acclimation facilities.	PARTIAL
	Water Temperature	Hatchery operational measure (Celsius) - measured continuously at the hatchery with thermographs and 3 times daily at acclimation facilities with hand-held devices.	YES

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

Current monitoring and evaluation funding covers most activities listed above. However, funding to monitor potential hatchery/wild interaction, including ratios of hatchery and wild fish in natural spawning areas, and annual production estimates in the Snake River, and genetic monitoring will require commitment of additional resources. Following are RM&E tasks that will require additional time and investment to address:

- Relative reproductive success – The managers and BPA have assembled to assess the available methodologies for measuring reproductive success. The challenges for such a task with Snake River fall Chinook are substantial due to the size of the river and limitations on obtaining samples of the fish. The results of that effort are finalized (Peven et al. 2010) although no decision has been made on how to proceed with a study at this time.
- The productivity and capacity of remaining fall Chinook habitat in the lower Snake River is not well understood. Current recovery goals were described by the ICTRT as part of their status review and need to be revisited with recently updated run reconstruction estimates of hatchery and wild escapement at Lower Granite Dam. Estimates of smolt production from the basin and expanded understanding of the mechanisms behind altered early life history pathways (reservoir rearing and emigration as yearling smolts) need further investigation to understand productive capacities of the altered habitat.

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.

- Utilize recognized fish handling and anesthetization procedures to minimize the affects on juvenile and adult fall Chinook handled for RM&E activities.
- Adhere to accepted fish marking standards for size at marking for the mark or tag used (CWT, PIT, VIE, etc).
- Adult trapping facilities will be monitored daily, or more often as necessary to prevent injury and unnecessary delay.
- Fish seining, trawling, and fyke netting will use specific fish capture, fish handling, fish anesthesia, fish marking and fish PIT tagging protocols that are followed explicitly; and all staff are trained in their use and application before working under field conditions. To the extent possible, we will use snorkeling to obtain relative abundance estimates and seining to collect specimens. We estimate that no mortalities will occur due to observing juvenile or adult Chinook salmon, steelhead, and bull trout underwater. Seines will be the major gear type used to collect juvenile salmonids to minimize adverse effects due to fish collection.

- There is a potential for mortalities to occur through screw trapping and handling. We believe that this potential can be minimized through project planning and implementation by experienced research biologists where survival of the fish is the number one priority. Fish trapping, trap maintenance, fish handling, fish anesthesia, and fish PIT tagging protocols are followed explicitly and all staff are trained in their use and application before working under field conditions. We are exploring approaches that will still maintain study design requirements by sub-sampling or reducing trap efficiency if emigrating juveniles become too numerous because of increased run size. Maintaining comparable methods across years is desired and we are seeking adequate take approval in the absence of a restructured sampling approach.
- Stress and mortality associated with emigration studies are minimized by four methods:
  1. Over sized live-boxes are fitted to two of the three traps available for use in the Clearwater River. These live-boxes are roughly twice as large as the standard live-box fitted to a rotary screw trap. The increased volume in the live-box allows for a lower density, better ability for juveniles to avoid predators (e.g. bull trout), and will help to keep debris from crushing fish. If densities in the live-box become high enough to produce signs of stress, sub-sampling will occur by netting fish out of the live-box and passing them through a PIT tag detector. A portion of each net full will be sub-sampled for species composition. A biologist will determine the exact portion of the catch to be sub-sampled, with the health of the fish given first priority.
  2. A baffle has been fitted to the live box to dissipate water velocity. This will reduce potential fish injury/impingement during high runoff conditions.
  3. Field-staff conduct regular checks of the traps and live boxes throughout the day and night to ensure that traps are maintained and that no mortalities occur. Cones and debris drums are also regularly checked to ensure that traps are not causing fish impingement or descaling and that fine debris is removed from the traps. Water temperatures and stream discharge are regularly monitored to ensure safe capture and handling of all fish.
  4. A bypass tube has been attached to the live-box of one trap with a sampling chamber fitted with a Destron Raquette antenna tuned for underwater use by Biomark. If the biologist anticipates a large number of fish and/or debris this trap may be used to subsample the catch on an hourly basis by directing fish from the bypass tube into the sampling chamber where they can be scanned for PIT tags with no handling. Otherwise all fish can escape through the bypass tube directly into the river

SECTION 12. RESEARCH

12.1) Objective or purpose.

The Nez Perce Tribal Hatchery Monitoring and Evaluation objectives are to:

- Document hatchery rearing and release activities as compare to the naturally produced fall Chinook in regards to release size, condition, emigration timing, juvenile survival, fishery contributions, adult return rates, health, age and size at return.

- Determine success of the program through adult return rates to Lower Granite Dam, to the spawning areas, adult weirs, and document spawning success through redd counts and carcass collection/examination.
- Provide recommendations on parameters that improve adult return rates without loss of productivity and adverse impacts to the natural population.

12.2) Cooperating and funding agencies.

- Washington Department of Fish and Wildlife
- US Fish and Wildlife Service-Dworshak Hatchery Complex/Idaho Fishery Resource Office
- Idaho Department of Fish and Game
- Idaho Power Company
- Oregon Department of Fish and Game
- US Army Corps of Engineers: funding agency (on a year-to-year approval process) for additional capturing and PIT tagging of naturally produced fall Chinook.
- NOAA
- US Geological Survey
- Bonneville Power Administration (BPA): funding agency for annual operations and capital expenditures.
- Pacific Salmon Commission: funding agency in part for a portion of the fall Chinook run reconstruction to the Snake Basin.

12.3) Principle investigator or project supervisor and staff.

Jay Hesse – Principle Investigator
Nez Perce Tribe Department of Fisheries Resources Management
Director of Biological Services

Jason Vogel – Technical Coordinator
Nez Perce Tribe Department of Fisheries Resources Management
Research Division Deputy Director

- Bill Arnsberg, Fall Chinook Project Leader II,
- Scott Kellar, Biologist II
- Mike Tuell, Biologist II
- Richard Johnson, Biologist I
- Mark Pishl, Fishery Technician II

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

Same as described in Section 2.

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

1) *Monitoring hatchery/wild ratios in natural spawning streams* - Adult fall Chinook will be captured and enumerated at the existing LGR adult trap. In addition, redd counts and carcass surveys will be performed on the Clearwater River and hatchery/wild ratios calculated. Fish that are systematically sampled and collected for broodstock are hauled to LFH for future spawning. Scale samples collected from unmarked/untagged fish were used to estimate number of hatchery and wild fish passing LGR dam until 2009. The method for determining wild origin was dropped because of inaccuracies. An annual run reconstruction will be built from CWT and PIT tag data, and will be used to track H/W ratios at LFH and LGR dam. Similar samples will be collected from carcasses during spawning ground surveys of the Clearwater River, and will be used to monitor the H/W ratio there. See section 2.2.3.

2) *Genetic monitoring* – Wild juvenile fall Chinook may be sampled periodically from various natural production areas in the course of genetic monitoring. Samples will be collected using a smolt trap located on the lower Clearwater River. Juvenile Chinook sampled will be captured and anesthetized with MS-222, measured, weighed, and scale sample removed. Non-lethal tissue samples will be removed for genetic analysis and the fish will be allowed to recover before release. Snake River Stock hatchery produced juveniles will also be sampled for comparison to natural fish. Juvenile fall Chinook may also be PIT tagged to assess emigration behavior.

   During spawning at LFH and on the spawning grounds in the Clearwater River, unmarked/untagged fall Chinook will have scale samples and fin tissue removed, which can be used for DNA analysis. Fish encountered during spawning surveys are likely to be dead when sampled. In addition, Snake River origin, hatchery reared fall Chinook will be sampled for comparison to historically sampled natural fish and present-day natural fish. Results of this data should tell us if we are maintaining genetic integrity of the stock reared at NPTH or producing a divergent population. Fish sampled in the hatchery will be anesthetized with MS-222 prior sampling.

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

1. Broodstock/Adult Trapping: August-December
2. Spawning and Spawning Ground Surveys: October-December
3. Fecundity estimates: November-January
4. Juvenile Rearing: Year round because of yearling and subyearling production at LFH.
5. Tagging/marking at the hatchery-April-October (based on regular tagging activities)
6. PIT tagging: August and April (based on other PIT tagging activities at the hatchery)
7. Smolt trapping-October through June (on the Tucannon and Clearwater rivers)
8. Seining, fyke netting, and trawling - July – October.

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

Refer to Section 2.2.3

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

Refer to Section 2.2.3 for monitoring and evaluation take estimates. Potential for injury or mortality will be minimized by experienced collectors/taggers and handling techniques.

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

No more than reported in Section 2.

12.10) Alternative methods to achieve project objectives.

We will work closely with the Washington Department of Fish and Wildlife of monitoring the genetic profiles of hatchery and natural broodstock and progeny to preserve the genetic integrity of the Snake River fall Chinook and to aid in ESA delisting of the stock. Spawning protocols may need to change in the future to achieve this objective.

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

Occasionally, we expect to encounter coho salmon, cutthroat trout, steelhead, and bull trout during juvenile sampling, however, the number of encounters and as a result the level of mortality is expected to be less than ten juvenile fish per species. The adult weir on the South Fork Clearwater will be checked often and non-target fish species allowed to continue either upstream or downstream depending on the direction they were headed. The adult fish ladder at the hatchery may attract non-target species which will be returned back to the river as soon as the trap is emptied. Minimal mortality is expected through these adult trapping and holding structures.

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.

Naturally produced juvenile fall Chinook captured and PIT tagged will for guidelines of the PIT tag Steering Committee and non-lethal tissue samples taken on a subsample of the catch. When operating the adult weir, every effort will be made to insure that the structure does not restrict fish movement by checking the trap daily or more often as needed and having an upstream and downstream trap box to release fish in either direction.

SECTION 13. ATTACHMENTS AND CITATIONS

Includes all references cited in the HGMP and Addendum 1.

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Table 29. Estimated listed salmonid take levels by hatchery activity (combined take levels for Lyons Ferry Hatchery Complex (LFH), Idaho Power Company (IPC), Fall Chinook Acclimation Program (FCAP), and Nez Perce Tribal Hatchery (NPTH).

Listed species affected: Fall Chinook **ESU/Population: Snake**

Activity: Broodstock Collection, run reconstruction, spawning, rearing and releases

Location of hatchery activity: Lyons Ferry Complex, Idaho Power Company (Oxbow and Irrigon hatcheries), Fall Chinook Acclimation Program, and Nez Perce Tribal Hatchery

Dates of activity: Year Round

Hatchery program operator: Jon Lovrak (LFH), Jeff Seggerman and Colleen Fagan (IPC), Bruce McLeod (FCAP) and Steve Rodgers (NPTH),

Type of Take	Mark [a]	Annual Take of Listed Fish By Life Stage *(Number of Fish)*			
		Egg/Fry	*Juvenile or Smolt*	*Adult* [b]	*Carcass*
Observe or harass [c]	No fin clip	0	0	1,000	0
	Ad clip	0	0	1,000	0
Collect for transport [d]	No fin clip	0	0	0	0
	Ad clip	0	0	0	0
Capture, handle, and release [e]	No fin clip	0	0	1,500	0
	Ad clip	0	0	2,000	0
Capture, handle, tag/mark/tissue sample, and release [f]	No fin clip	0	1,757,000	3,500	0
	Ad clip	0	2,735,000	1,275	0
Intentional lethal take [g]	No fin clip	0	0	3,000[h]	0
	Ad clip	0	0	2,500	0
Unintentional lethal take [i]	No fin clip	7.5%	7.5%	45	0
	Ad clip	7.5%	7.5%	30	0

a. No fin clip salmon include hatchery and natural origin fish. Of the hatchery fish released in the Snake River basin, approximately 47% are AD clipped, 30% are not clipped but are tagged in some manner, and 23% are not clipped, tagged, or marked.
b. Estimates of adult takes are based on sampling rate at LGR trap not to exceed 20%, and/or trapping efforts at Lyons Ferry Complex and Nez Perce Tribal Complex.
c. Contact with listed fish that could occur from migration delay at dam or traps.
d. Take associated with weir or trapping operations where listed fish are captured and transported – see intentional lethal take below.
e. Take associated with weir or trapping operations where listed fish are captured handled and released upstream or downstream.
f. Take occurring due to tagging/marking/PIT tagging prior to release. The number shown assumes full production. This number could vary depending on annual egg takes and survival in the hatchery. Adults could be captured throughout the Snake basin, with some samples collected for scales and genetics.
g. Intentional mortality of listed fish as a result of removal for broodstock or run reconstruction.
h. Take goal for natural origin fish for broodstock is 1,500 adults.
i. Unintentional mortality of listed fish from operation of adult traps, including loss of fish during transport or holding prior to spawning or prior to release back into the wild following broodstock spawning. Also provided are estimates of egg loss or fry/juvenile loss to the smolt stage as a percent of the total population. Adult mortalities are based on a % of mortality due to trapping/collection of fish from the listed activities.

Table 30. Estimated listed salmonid take levels of by Research, Monitoring and Evaluation activities that occur outside the realm of standard hatchery operations.

Listed species affected: Fall Chinook ESU/Population: Snake

Monitoring and Evaluation Activities: Spawning Ground Surveys; Smolt Trapping, fyke netting and seining; out of basin adult trapping and spawning ground surveys (stray monitoring), etc…

Location of hatchery activity: Snake River and associated Streams and rivers in Washington, Oregon and Idaho.

Dates of activity: Year Round Research/Monitoring/Evaluation program operator: Deborah Milks, Jay Hesse, Jason Vogel, Stuart Rosenberger, Pete Hassemer and numerous other researchers.

Type of Take	Origin	Annual Take of Listed Fish By Life Stage *(Number of Fish)*			
		Egg/Fry	***Juvenile or Smolt***	***Adult***	***Carcass***
Observe or harass [a]	Natural	2,500	2,500 2,500[1]	10	0
	Hatchery	0	2,500[1]	10	0
Collect for transport [b]	Natural	0	0	0	0
	Hatchery	0	0	0	0
Capture, handle, and release [c]	Natural	5,000	5,000 5,000[1] 20,000[2]	50 10[1] 10[2]	10
	Hatchery	0	7,500 8,300[1] 50,000[2]	150 10[1] 10[2]	10
Capture, handle, tag/mark/tissue sample, and release [d]	Natural	0	5,000 10,000[1] 8,000[2]	450	10
	Hatchery	0	1,000 10,800[1] 2,000[2]	100 300[3]	10
Removal (e.g. broodstock) [e]	Natural	0	0	0	0
	Hatchery	0	0	0	0
Intentional lethal take [f]	Natural	0	0	0	0
	Hatchery	0	0	300	0
Unintentional lethal take [g]	Natural	500	400 120[1] 180[2]	10	10

	Hatchery	0	200 188[1] 270[2]	10 30[3]	10
Other Take (specify)	Natural	0	0	0	0
	Hatchery	0	0	0	0

a. Contact with listed fish through snorkeling.
b. Take (non-lethal) of listed fish for transportation only (i.e. smolt trapping).
c. Take associated with smolt trapping operations where listed fish are captured, handled and released upstream or downstream. Adult kelts (live and dead) are sometimes captured in the smolt trap on the Tucannon River. Also includes hatchery endemic origin adults that could be captured in adult traps outside the Tucannon River Basin (e.g. Pataha Cr., Deadman Cr, Almota Cr, Asotin Creek, Alpowa Creek, Penawawa Cr., Tenmile Cr., Couse Cr.).
d. Take occurring due to PIT tagging and/or bio-sampling (length/weight and scales) of fish collected through smolt trapping operations prior to release. Also includes wild origin or hatchery endemic adults that may be captured at adult traps outside the Tucannon River Basin as part of the rotating panel project (e.g. in Pataha creek, Almota Creek, Alkali Flat, Deadman)
e. Broodstock collection activities do not take place under the Research Section, broodstock numbers for the hatchery endemic program are shown in Take Table 1.
f. Intentional mortality of listed hatchery endemic fish during smolt trapping, or intentional removal of listed hatchery endemic adults from area traps in SE Washington that are outside the Tucannon River basin (i.e. Pataha Creek, Penawawa Creek, Deadman Creek, Almota Creek, Asotin Creek, Alpowa Creek, Tenmile Creek, and Couse Cr, etc…).
g. Unintentional mortality of listed fish, including loss of fish during transport during smolt trapping.

1. Nez Perce Tribe activities associated with snorkeling, seines, fyke nets, trawls, and purse seines, Take listed here is consistent with the current Section10 #1334 Permit.
2. Nez Perce Tribe activities associated with emigrant studies using rotary screw traps. Take listed here is consistent with the current Section10 #1334 Permit.
3. Nez Perce Tribe activities associated with proposed study within the Addendum to this HGMP for radio tagging hatchery fall Chinook collected at Lower Granite Dam.

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

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

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Attachment 1. Lower Granite sampling protocols.

2010 Fall Chinook Trapping/Sampling Protocol

by

Debbie Milks, WDFW
Bill Arnsberg, NPT
August 20, 2010

Executive summary:

- The trapping rate will be set at 12%. The gates will open for 1.8 minutes, 4 times/hour.
- The tagging/sampling protocol for broodstock shipped to LFH and NPTH will be the same.
- If the trap is swamped with fish: Shut down trap for an hour or so but clearly identify in the data when the trap was shut down and when it was started up again. Do not shut down and stay shut down for the rest of the day because we need to have a pre and post shut down sample so we can average them to estimate what passed during the shutdown.
- WDFW is providing 2 staff for helping with the broodstock collection activities at LGR. Scales sampled at the LGR Trap for LFH and NPTH broodstock will be mounted by WDFW staff at LGR.
- Data collected from spring/summer chinook should be put on the same form that is used for FCH. Please note Spring or Summer under comments. If you are getting jacks suspected of being summers we will need to subsample those fish for wires as well.
- Males, jacks and minijacks will all be entered on the data forms as males.
- In an effort to reduce the numbers of jills and jacks hauled to the hatcheries and to reduce the numbers of fish sacrificed with wire for run reconstruction purposes the following protocol was approved by co-managers in the basin on 8/17/2010. The sub-sampling of wire tagged fish should allow for ample recoveries for evaluation purposes.

Protocol:

1) COLLECT & HAUL: All <u>WIRE TAGGED</u> FCH <u>></u> 65 cm and every fifth wire tagged FCH < 65cm. Please give 2-ROP punches. Please keep fish <65cm in a tank separate from the larger fish. <u>ALL of these fish will be hauled to LFH.</u>

2) PASS: 4 out 5 <u>WIRE TAGGED</u> FCH <65 cm regardless of sex (even females). Please give 2-LOP punch.

3) COLLECT & HAUL: ALL untagged FCH ≥65 cm. Please give 2-ROP punch. Take scales on every third untagged fish that does not have a PIT tag until September 28 then increase the sampling to 100%.

4) PASS: ALL untagged FCH <65. Please give 2-LOP punch. Take scales on every female and take scales on 1 out of 3 males that do not have a PIT tag.

Note: Overall numbers of scales collected should be similar to what was collected in 2009.

If the trapping rate changes, the numbers of operculum punches will be reduced to 1-ROP for hauled fish and 1-LOP for released fish.

More detailed information regarding trapping/sampling:

1) Trapping at LGR Dam
    a. Trapping/Sampling Protocol based upon water temperature in the ladder at the beginning of the day.
        i. Begin trapping August 18 if temperatures allow
        ii. Water temps at or below 70° F
            1. Set automatic trapping gates to sample 12% of the entire run, 24 hours a day
                a. Any fish that are retained for broodstock must receive 2-ROP. If a fish to be retained is accidentally punched on the left side, give 1-ROP also and make a note in the comments column.
                b. Any fish released must receive 2-LOP and be scale sampled according to protocols listed above. Place scales in an envelope then mount them on cards for age and origin determinations. Please give the filled cards to the WDFW truck driver and we will mail them in for analysis. Please do this bi-monthly to expedite data results.
                c. If these fish (with operculum punches) are caught again DO NOT scale sample, but enter in data as recapture.

    b. Data and Verification
        i. Please note the times you check the trap and when the trap is empty (you are caught up).
        ii. Please write hauling destination (LFH or NPTH) on top of each data form)
        iii. Circle sampling or data recording errors and briefly note in comments column (examples: released with 1-ROP, forgot to scale sample, both sides punched, forgot to record or missing digit in PITTag, sample envelope numbers either out of numerical order or skipped for some reason).
        iv. Briefly check over data forms prior to faxing, sometimes erasures and cross-outs are not transmitted clearly through the fax machine.

c. Hauling of broodstock
    i. Injections at LGR Adult Trap
        1. All fish collected for broodstock (both LFH and NPTH) will be injected as directed by hatchery staff.
    ii. WDFW and NPT will haul fish from LGR Dam (70% go to LFH and 30% go to NPTH).
        1. Fish will be divided weekly unless otherwise agreed to.
        2. It was agreed that trucks would be at LGR at 10am when the 70 degree protocol was in effect.
d. Research
        1. No U of I radio tagging this year.
        2. NOAA sort-by-code fish.
            a. These fish will be used as broodstock at LFH and NPTH.
            b. Doug Marsh will run a program to indicate which fish were trapped during the 12% and which fish were outside of the trapping period (sort-by-code)
            c. Doug will provide a sampling protocol for his fish. These fish may be used for broodstock.
            d. NOAA staff will be in charge of mounting scales collected for NOAA studies
e. Coordination of trapping data and CWT decoding of hauled fish
    i. Fax paper copy of data to LFH, NPT, and SRL daily or whenever fish are hauled.
    ii. Data entry, verification, and finalization by January 14.
        1. WDFW will enter, verify, and finalize the LGR Adult Trap trapping data.
    iii. All database files at seasons end must be sent to NPT (Bill Arnsberg), WDFW (Debbie Milks), and TAC (Stuart Ellis and Henry Yuen).
f. Video monitoring of sort-by-code fish
    i. No video monitoring in 2010
    ii. At seasons end Doug Marsh will let us know what the realized trap rate was for the season (set at 12% then adjusted for time gates left open for sbyc fish)

Attachment 2. **Nez Perce Tribal Hatchery Annual Operating Plan**

NEZ PERCE TRIBAL HATCHERY COMPLEX

ANNUAL OPERATION PLAN
AUGUST 1, 2010 – JULY 31, 2011

Prepared by:

Employees of Nez Perce Tribal Hatchery Complex

Nez Perce Tribe

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1.0 Introduction

The Nez Perce Tribal Hatchery Complex (NPTHC) mitigates for the effects of the Federal Columbia River Hydropower System on naturally-reproducing salmon in the Clearwater River Subbasin. The goal is to release fish that survive to adulthood, spawn in-basin and produce offspring that support natural production and genetic integrity. NPTHC utilizes best management practices (BMP) and Natural Rearing Enhancement Systems (NATURES) techniques to produce sub-yearling fall Chinook salmon (FCS); and parr, pre-smolt and smolt spring Chinook salmon (SCS; Table 1). Fisheries management principles guiding the program include:

- Protect, mitigate, and enhance Columbia River Subbasin anadromous fish resources.
- Develop, reintroduce, and increase natural spawning populations of salmon within the Clearwater River Subbasin.
- Provide long-term harvest opportunities for Tribal and non-Tribal anglers within Nez Perce Treaty lands within four generations (20 years) following project completion.
- Sustain long-term fitness and genetic integrity of targeted fish populations.
- Keep ecological and genetic impacts to non-target populations within acceptable limits.
- Promote Nez Perce Tribal Management of NPTHC and production areas within Nez Perce Treaty lands.

Table 29. Current production within the Nez Perce Tribal Hatchery Complex (NPTHC).

Facility	Location (river mile)	Water Source	Species	Number of Fish Released	Pounds of Fish Released
Nez Perce Tribal Hatchery (NPTH)	Clearwater River (21.7)	Wells, Clearwater River	Fall Chinook Spring Chinook	500,000 600,000[a]	10,000 13,419
Sweetwater Springs Facility	Sweetwater Creek (11.5)	Spring	Fall Chinook Spring Chinook	-0-[b] -0-[c]	-0- -0-
Cedar Flats Acclimation Facility	Selway River (5.3)	Selway River	Fall Chinook	200,000	4,000
Luke's Gulch Acclimation Facility	South Fork Clearwater River (8.8)	South Fork Clearwater River	Fall Chinook	200,000	4,000

North Lapwai Valley Acclimation Facility	Lapwai Creek (0.7)	Well, Lapwai Creek	Fall Chinook	500,000	10,000
Newsome Creek Acclimation Facility	Newsome Creek (0.5)	Newsome Creek	Spring Chinook	75,000	2,586
Yoosa/Camp Creek Acclimation Facility	Yoosa Creek (2.9)	Camp Creek, Yoosa Creek	Spring Chinook	150,000	4,412

a. Includes 200,000 smolts release from NPTH into Clearwater River to provide surrogate broodstock source for Meadow Creek program, and 400,000 parr release into Meadow Creek.
b. No fall Chinook released from Sweetwater Springs (SWS). Both Cedar Flats Acclimation Facility (AF) and Lukes Gulch AF groups are reared there from February to April annually, to reduce densities at NPTH.
c. No spring Chinook released from SWS. Newsome Creek AF group is reared there from April through August annually, to reduce densities at NPTH.

NPTHC consists of several facilities located throughout North Central Idaho (Figure 1). NPTH (used for all spawning and early rearing) is located on the Clearwater River, roughly twenty minutes east of Lewiston, Idaho. Sweetwater Springs (SWS), a secondary rearing facility just south of Lewiston, is located on Sweetwater Creek, a tributary of Lapwai Creek. Five remote acclimation facilities (AF) are utilized for final rearing and release into target streams.

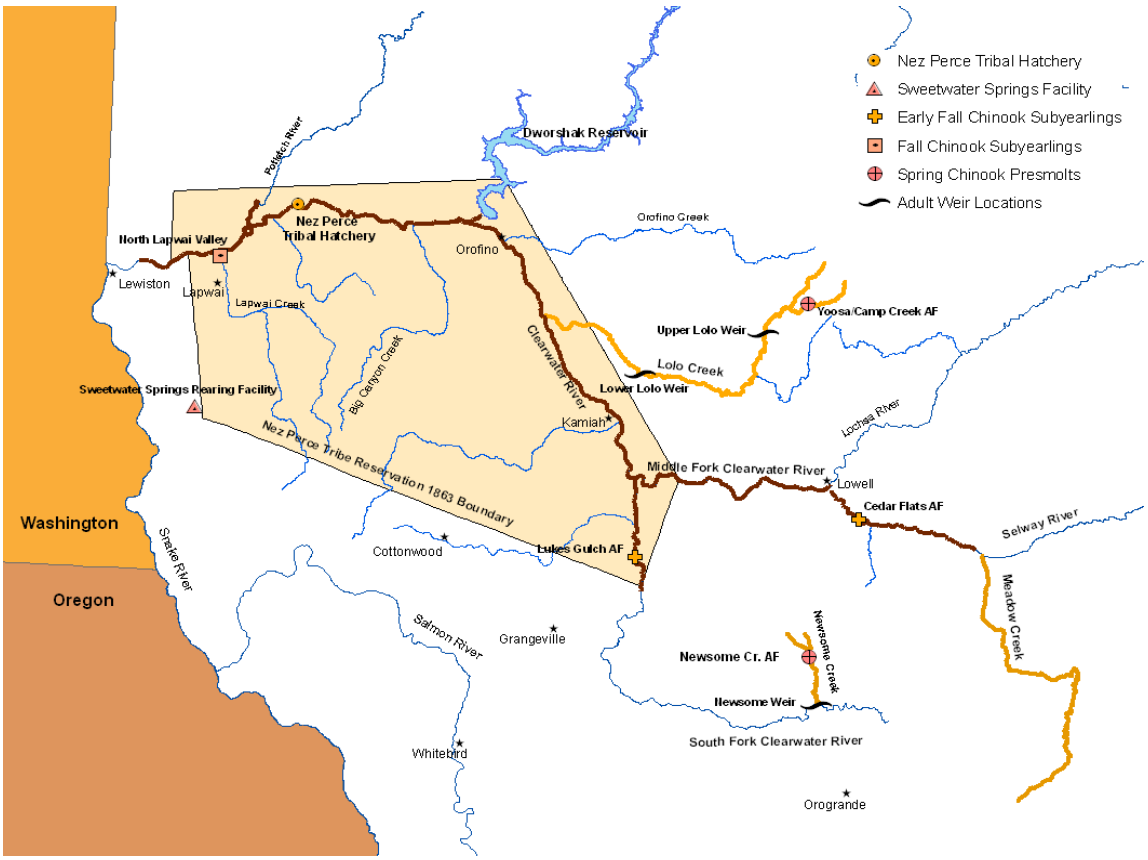

Figure 6. Clearwater River Subbasin map with Nez Perce Tribal Hatchery Complex facilities identified.

Cedar Flats, Luke's Gulch and North Lapwai Valley AF's all acclimate and release FCS. Cedar Flats AF is located on the Selway River about five miles east of its confluence with the Lochsa River, as those two rivers become the Middle Fork Clearwater River. Luke's Gulch AF is located on the South Fork Clearwater River, a few miles south of Stites, Idaho. North Lapwai Valley AF is located on Lapwai Creek just before it enters the mainstem Clearwater River, just north of Lapwai, Idaho.

Newsome Creek and Yoosa/Camp AF's acclimate and release SCS. Newsome Creek AF is located on Newsome Creek, a tributary of the South Fork Clearwater River, about forty miles east of Grangeville, Idaho. Yoosa/Camp AF gets its rearing water from both Yoosa and Camp Creeks, just before they combine and enter Lolo Creek. This facility is roughly fifteen miles east of Weippe, Idaho.

Additionally, NPTHC is utilized to hold adult Pacific Lamprey that are collected and transported from fish ladders in hydro system dams (John Day and The Dalles) on the Columbia River during the fall and early winter. They are released into selected streams to spawn naturally the following

spring each year. Funding for this project is provided by other sources, and NPTHC employees are not involved in any portion of this program.

Since NPTHC began operation in 2002, several factors have restricted production. Limiting factors include broodstock shortages, diminishing well water flows and other environmental limitations, hatchery design flaws, and operational system failures. NPTHC employees continue to address these challenges in an effort to meet identified production targets through capital improvements, production plan modifications, alternative rearing strategies, etc.

1.1 Background

The original design target production for NPTHC was 2.8 million FCS sub-yearlings and 768,000 SCS juveniles. Instead of building facilities to meet this target all at once, a two phase construction plan was approved by the Northwest Power Planning Council. Initial construction was tied to Phase I production goals of 1.4 million FCS sub-yearlings and 625,000 SCS juveniles (Table 2). Biological triggers (Table 3) were also established that must be met before additional construction is approved to meet the full design target of 2.8 million FCS sub-yearlings and 768,000 SCS juveniles.

Table 30. Nez Perce Tribal Hatchery Complex Fish Production Goals.

Species	Original Design Target	Phase I Goal
Fall Chinook Salmon (FCS)		
Green Eggs [a]	3,960,000	1,610,000
"0+" Smolt	2,800,000	1,400,000
"1+" Smolt	- 0 -	- 0 -
Spring Chinook Salmon (SCS)		
Green Eggs [a]	1,004,000	656,250
Parr	503,000	400,000
Pre-Smolts	265,000	225,000
Smolts	- 0 -	200,000 [b]

a. Green egg goals based on actual hatchery survival rates to release.
b. Planning documents for Nez Perce Tribal Hatchery Complex (NPTHC) called for a weir to be installed on Meadow Creek to capture returning adult SCS for that program. Since the temporary weir proved ineffective, managers agreed to an alternative strategy where Idaho Fish and Game's Clearwater Fish Hatchery would provide NPTHC with 200,000 juvenile SCS each fall, to be released into the Clearwater River the following spring as

yearlings. Returning adults from these releases are intended to provide broodstock for the Meadow Creek Program, and act as a backup brood source for other SCS programs.

Table 31. Biological Triggers for expansion of Nez Perce Tribal Hatchery Complex (NPTHC).

Stock	Biological Trigger
Spring Chinook Salmon (SCS)	Smolt-to-adult return rates for NPTHC produced SCS in Lolo and Newsome creeks meet or exceed 0.4% for 4 out of 5 years (approximately 546 returning adults to the Clearwater River Subbasin from Phase I production).
Fall Chinook Salmon (FCS)	Returning adults to Nez Perce Tribal Hatchery from program production sufficient to produce 500,000 sub-yearling smolts (approximately 800 returning adults to the Clearwater River Subbasin from Phase I production).
Early-FCS	Returning naturally produced adults to Luke's Gulch or Cedar Flats sufficient to produce 100,000 sub-yearling smolts (approximately 120 to 170 returning adults to the Clearwater River Subbasin from early-FCS natural production).

1.2 Spring Chinook salmon

SCS in the Clearwater River Subbasin were essentially extirpated by Lewiston Dam (Schoen et al. 1999; USFWS 1999; Murphy and Metsker 1962). However, naturalized populations have been re-established in Lolo Creek and mainstem/tributary reaches of the Lochsa, Selway and South Fork (S.F.) Clearwater rivers (Larson and Mobrand 1992). Founding hatchery stocks used to re-colonize SCS were primarily obtained from the Rapid River Hatchery. Genetic analysis has confirmed that existing natural SCS in the Clearwater River Subbasin are derived from reintroduced Snake River stocks.

The intent of this program is to develop localized brood sources to supplement Lolo Creek, Newsome Creek and Meadow Creek. Broodstock are collected at weirs on Lolo Creek and Newsome Creek, and from other hatcheries in the Clearwater Basin as a backup brood source. Currently, the Nez Perce Tribe (NPT) does not operate a weir on Meadow Creek. Natural production in the treatment streams will take a few generations of persistent population growth to meet all the broodstock needs of the supplementation program. An interim solution was agreed upon between the NPT and Idaho Fish and Game (IDFG) until a permanent weir can be installed on Meadow Creek. Under that agreement, IDFG's Clearwater Fish Hatchery (CFH) raises 200,000 SCS for NPTH. They are transferred to NPTH in September each year, and released as smolts directly into the Clearwater River in April of the following year. These fish are expected to return to the ladder at NPTH as adults, providing broodstock for the Meadow Creek program,

and also backfill for other NPTHC production. Rapid River stock, returning to other locations in the Snake River basin, may also be used for any of these programs in the event of a broodstock shortage.

1.3 Snake River Fall Chinook salmon

Snake River FCS are listed as an Evolutionary Significant Unit (ESU) and considered to be part of a single genetically similar aggregate and are managed as a single population. The NPTH program is integrated with production at Lyons Ferry Hatchery (LFH), the Fall Chinook Acclimation Program (FCAP), and the Idaho Power Company (IPC) mitigation program. Currently broodstock are obtained from two sources: volunteers to the ladder at NPTH and adults collected at Lower Granite Dam (LGR). Broodstock collection protocols at LGR are determined annually by the comanagers. Typically, 30% of the trapped adults are transported to NPTH and 70% to LFH, targeting even distribution of females for spawning. Fish hauling schedules to meet this ratio (along with sex and origin ratios) are coordinated between WDFW and NPT to ensure mutual success, and adjustments are made by both programs as needed. LGR will be the primary broodstock collection point for NPTHC, as it includes fish across all release locations and insures the maximum natural fish incorporation into the brood (target up to 30%) and promotes greater genetic diversity. Volunteers to the NPTH trap tend to be mostly from NPTHC releases with very low numbers of natural fish. NPTHC adult ladder operations will be coordinated with M&E staff in-season, after evaluating actual LGR hauled fish numbers and on-going run updates to determine further broodstock needs.

The NPT, Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Washington Department of Fish and Wildlife (WDFW), Oregon Department of Fish and Wildlife (ODFW), IDFG, U. S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) Fisheries technical staff have drafted a Snake River Fall Chinook Management Plan. This plan has not been adopted by comanagers and U.S. vs. Oregon parties as an official management plan, but was utilized in developing the current U.S. vs. Oregon production agreement, which dictates NPTH production. It identified biological objectives for adult escapement as well, as identified below.

Hatchery-Origin Snake River FCS Adult Return Goals

- Interim goal is to return 14,568 hatchery-origin adults above Lower Monumental Dam – comprised of 9,988 from Lower Snake River Compensation Plan (LSRCP), 2,290 from NPTHC, and 2,290 from IPC. Long-term goal is to return 24,340 hatchery-origin adults above Lower Monumental Dam – comprised of 18,300 from LSRCP, 3,750 from NPTHC, and 2,290 from IPC.

- Provide approximately 5,000 adults annually to meet the interim hatchery production broodstock requirements. This total is comprised of ~3,600 adults needed for LFH and ~1,000 for NPTH.

Natural-Origin Snake River FCS Adult Return Goals

- Maintain genetic attributes and life history characteristics of the naturally spawning FCS aggregate by sustaining a minimum adult spawner (hatchery and/or natural-origin) abundance threshold of 7,500 naturally spawning adults.
- Achieve ESA delisting by attaining interim population abundance in the Snake River of at least 3,000 naturally produced spawners and an eight year geometric mean cohort replacement rate exceeding 1.0 during the eight years.
- Interim goal is to achieve a self-sustaining population of 8,250 natural-origin adult FCS above Lower Monumental Dam. This is comprised of a natural spawning population of 6,500 for the Snake River mainstem and its tributaries, 1,250 for the Clearwater River, and 500 for the Grande Ronde River.
- Long term goal is to achieve a self-sustaining population of 14,360 natural-origin adult FCS above Lower Monumental Dam.
- Maintain out of basin straying above LGR at levels less than 5%.

These objectives, although not identical, are similar to biological objectives identified in the Clearwater Subbasin Plan (See Table 3, Clearwater Management Plan, p. 16).

1.4 Monitoring and Evaluation

A detailed monitoring and evaluation plan for the NPTHC has been developed and is available on request (Monitoring and Evaluation Plan for The NPTH: Action Plan, Hesse and Cramer 2000). All aspects of ongoing or proposed M&E are discussed in detail in that document and subsequent M&E annual reports.

Baseline SCS data collection for adult spawner abundance and spawn timing has been occurring in Lolo and Newsome creeks since 1987 and in Meadow Creek since 1993. Juvenile production and survival data collection has been occurring in Lolo and Meadow creeks since 1993 and in Newsome Creek since 1995. Various habitat evaluations have occurred in the three creeks since 1991. Monitoring and evaluation (M&E) of SCS produced in NPTHC facilities began in 2003. Standardized performance measures quantified and utilized in program performance evaluations are described in Appendix A, Table A1. Experiments to test different hatchery rearing strategies on juvenile survival to LGR, initiated in 2004, are conducted annually by the M&E program.

Baseline FCS data collection for adult spawner abundance, spawn timing, and habitat evaluations has been occurring in the Clearwater River since 1988, and major tributaries including the South

Fork Clearwater River since 1992, and the Middle Fork Clearwater River and lower Selway River since 1994. M&E of fish produced in NPTHC facilities began in 2003. Standardized performance measures quantified and utilized in program performance evaluations are described in Appendix A, Table A.2. Some small scale production experiments may also occur as part of the M&E program.

Results for all project M&E studies can be found on the Bonneville Power Administration's (BPA) report website at http://www.efw.bpa.gov/IntegratedFWP/reportcenter.aspx. The NPT's Department of Fisheries Resource Management (DFRM) now has the equipment infrastructure necessary to ensure efficient and timely exchange of science-based information on regionally accepted performance measures. In the near future, annual reports, metadata, and performance measure data will be available on the new DFRM website http://www.nptfisheries.org. In addition to this website, appropriate components of program data and results are found in other regional websites, including:

- Pacific States Marine Fisheries Commission (PSMFC) (http://www.psmfc.org/),
- PIT Tag Information System (PTAGIS) (http://www.ptagis.org/),
- Regional Mark Processing Centre (RMPC) (http://www.rmpc.org/);
- Integrated Status and Effectiveness Monitoring Program (STEM) (http://www.nwfsc.noaa.gov/research/divisions/cbd/mathbio/isemp/index.cfm);
- Fish Passage Center (FPC) (http://www.fpc.org/);
- StreamNet (http://www.streamnet.org/);
- NOAA Northwest Science Center (https://www.webapps.nwfsc.noaa.gov/apex/f?p=238:1:0::NO::).

2.0 NPTH ANNUAL OPERATION PLAN

Full production is planned for NPTHC (Table 4) in 2011. To do this, SWS must be used for early rearing of both the Lukes Gulch and Cedar Flats FCS programs, as well as early rearing of the Newsome Creek SCS group. The raceways at NPTH will be used significantly, and reuse water will be utilized in several rearing vessels. Finally, oxygen will be added to pond supply water if necessary, to ensure a quality rearing environment. Even though NPTHC is not capable of rearing full production utilizing the facility as designed; it is possible to meet full production using the above mentioned rearing strategies coupled with production flexibility based on emerging needs during the rearing cycle.

Table 32. Nez Perce Tribal Hatchery Complex three-year salmon production profile.

	CY 2010 Goal	**CY 2010 Actual Plants and Transfers**	**Aug 2010 To Jul 2011 Goal**	**Fish/Eggs on Hand For '10 To '11 Goal**	**Aug 2011 To Jul 2012 Plan**
Fall Chinook Salmon					
	BY 2009	**BY 2009**	**BY 2010**	**BY 2010**	**BY 2011**
Nez Perce Tribal Hatchery -on station	500,000	536,999[a]	500,000	-0-	500,000
Cedar Flats AF – Selway R.	200,000	188,411[b]	200,000	-0-	200,000
Lukes Gulch AF–S.F. Clearwater River	200,000	198,969[c]	200,000	-0-	200,000
North Lapwai Valley AF – Lapwai Creek	500,000	465,949[d]	500,000	-0-	500,000
Spring Chinook salmon					
	BY 2009	**BY 2009**	**BY 2010**	**BY 2010**	**BY 2011**
Newsome Creek AF – Newsome Creek	75,000	76,718	75,000	-0-	75,000
Yoosa/Camp Creek AF – Lolo Creek	150,000	164,791	150,000	-0-	150,000
Direct – Meadow Creek/Selway River	400,000	278,580[e]	400,000	-0-	400,000
		BY 2008		**BY 2009**	**BY 2010**
	BY 2008	160,608[f]	**BY 2009**	-0-	200,000
Nez Perce Tribal Hatchery -on	200,000		200,000		

station					

a. These fish were moved outside to reduce densities and water demands while they were still very small. To ensure this priority release was met, culturists were conservative in their weighed-inventory during the transfer, resulting in this overage realized at marking.
b. Approximately 45,188 fish entered the Selway River early (mid-May) when gasket material failed in tanks 2 & 4. They are included in this release number. Gasket material is being replaced.
c. Approximately 3,436 fish entered the SF Clearwater River early (late April) when tank 6 gasket material failed. They are included in this release number. Gasket material is being replaced.
d. The extra fish allotted to the NPTH on station release resulted in this shortage.
e. Extremely high mortalities during incubation (fungus) and early rearing (Costia, Trichodina, Epistylis, Cold Water Disease, Exothalmia) coupled with the loss of 42,987 sac-fry during incubation led to the Meadow Creek outplant shortage. The sac-fry were lost when three water lines were blocked by PVC shavings in the line from facility construction during a turbid water event.
f. High predation by blue herons and Goldeneye ducks combined with unknown losses led to this shortage. No fish escaped during rearing, and Idaho Fish Health Center pathologists were unable to identify any specific pathogen that would explain the deficiency. From January through release, the fish from this group reared in the west S-channel were observed to stay on the pond bottom, and did not feed well regardless of water temperature. In late March, fish were weight-inventoried into trucks and outplanted into the Clearwater River based on their poor health and feeding behavior. The shortage was discovered during the inventory.

2.1 Spring Chinook salmon

2.1.1 2009 BY Pre-Smolt Releases

2.1.1.1 Yoosa/Camp Creek AF Releases into Lolo Creek

For 2010, 150,000 SCS presmolts at 34 fish per pound (fpp; 13.3 g) are programmed for release from Yoosa/Camp Creek AF (Table 5). A volitional release is scheduled for October 5 – 19, 2010.

A pre-release fish health exam consisting of sixty fish is conducted by the IFHC at least three weeks prior to release. Bacteriology, virology and parasitic assays will be performed. Fish may be released early or with a shortened or no volitional release period if fish health, stream conditions or other environmental factors warrant an immediate release. In the event of an early release, the pre-release fish health exam will be completed as soon as possible.

M&E biologists will be on-site during the release to monitor PIT tag detection equipment.

2.1.1.2 Newsome Creek AF Releases into Newsome Creek

For 2010, 75,000 SCS presmolts at 29 fpp (15.6 g) are programmed for release from Newsome Creek AF (Table 5). A volitional release is scheduled for October 4 – 18, 2010.

A pre-release fish health exam consisting of sixty fish is conducted by the IFHC at least three weeks prior to release. Bacteriology, virology and parasitic assays will be performed. Fish may be released early or with a shortened or no volitional release period if fish health, stream conditions or other environmental factors warrant an immediate release. In the event of an early release, the pre-release fish health exam will be completed as soon as possible.

M&E biologists will be on-site during the release to monitor PIT tag detection equipment.

2.1.2 2009 BY Smolt Rearing and Release at NPTH

~210,000 BY 2009 SCS smolts from CFH at 150 fpp will be transferred to NPTH in September, 2010. Prior to transfer and per the U.S. vs. Oregon Management Agreement, two-thirds of these fish will be CWT'd only and the other one-third will be CWT'd and adipose fin clipped (AD).

For 2011, a release of approximately 200,000 fish at 20 fpp (22.7 g) is planned (Table 5). The smolts will be released directly from the S channels into the Clearwater River volitionally from April 4 – 14, with the remainder forced out on April 15, 2011.

A pre-release fish health exam consisting of sixty fish is conducted by the IFHC at least three weeks prior to release. Bacteriology, virology and parasitic assays will be performed. Fish may be released early or with a shortened or no volitional release period if fish health, stream conditions or other environmental factors warrant an immediate release. In the event of an early release, the pre-release fish health exam will be completed as soon as possible.

One week prior to release, hatchery and/or M&E staff will take lengths and weights on up to 250 fish. A portion may be PIT tagged as well.

2.1.3 2010 BY Spawning

Adults will be spawned at NPTH during August and September, with the first spawn expected to occur on Tuesday, August 3, 2010. Mating will be a 1 x 1 cross (1 female: 1 male), and will generally follow the priorities identified in Table 7. Jack contribution should not exceed 5% in the spawning matrix. In the event of male shortages for any program, males may be used on multiple females and/or jacks may be used in excess of 5% contribution to meet production targets.

Every adult female will be sampled individually for Bacterial Kidney Disease (BKD) using enzyme-linked immunosorbant assay (ELISA). 150 individual female ovarian fluid samples will be tested for viruses. An additional sixty tissue samples will be taken for bacterial and viral assays. These samples may come from males or females, but will not come from females whose ovarian fluid has been sampled. Up to sixty wedges or punches from broodstock (from all three trapping sites) will be assayed by IHFC staff for *Myxobolus cerebralis* (whirling disease).

SCS spawned adult female carcasses that have been injected with erythromycin will be buried or taken to a landfill. SCS carcasses of spawned male adults may be returned to their respective streams for nutrient enhancement, dependent upon fish health inspection results. Per IFHC, carcasses should be frozen and pasteurized prior to outplanting. SCS M&E will do this prior to outplanting if possible. The caudal fin will be removed from all carcasses used for nutrient enhancement.

2.1.4 2010 BY Incubation

Fertilized eggs will be water hardened for thirty minutes in 100 parts per million iodophore and placed in heath trays for incubation. A mixture of treated, chilled surface water and well water will be used to incubate the eggs. Water temperatures will be manipulated across takes to minimize size variance at ponding, to reduce loadings in the production room during FCS early rearing, and to slow growth on all groups for maximum incubation. At approximately 600 temperature units (TU's), eggs are shocked, machine sorted the following day, and transferred back into heath trays.

The eggs from females with a high BKD ELISA value (0.250 or greater) may be culled, or they may be reared separately in the event of an egg shortage. Rearing of progeny of high ELISA value parents requires approval of the comanagers and IFHC.

2.1.5 2010 BY Rearing at NPTH

After hatch and yolk sac absorption, fish will be transferred to tanks in the production room, introduced to manufactured fish feed, and reared there until marking. Length/weight samples are taken and feed rates are adjusted accordingly. Each group will be tracked and reared separately whenever possible to minimize fish origin transfer from one stream to another during releases. CWT tagging for all groups of SCS is expected to occur in May or June at NPTH. Fish target size for marking is a minimum of ~160 fpp (2.5 g).

2.1.5.1 Yoosa/Camp Creek Release Group Rearing and Tagging

SCS slated for release into Lolo Creek will be reared in production room tanks from ponding until transfer to the two "S" channels and conventional tank at NPTH, just after marking in June. Per the U.S. vs. Oregon Management Agreement, this group will be 100% CWT marked. They are cultured there until transfer to Yoosa/Camp Creek AF in September, when water temperatures in Yoosa and Camp creeks drop to 10ºC or 50ºF.

The fish destined for Yoosa/Camp Creek AF are part of an ongoing study by NPTH M&E staff. This study is comparing outmigration survival to LGR of fish reared and released from the NATURES' "S" Channels at NPTH and earthen acclimation ponds at Yoosa/Camp Creek AF at lower densities to that of fish reared in conventional tanks at conventional hatchery densities. There are two distinct fish rearing strategies (treatments) being evaluated. NATURES' treatment fish reared in the "S" channels and earthen ponds are cultured in a semi-natural environment, are exercised daily in the "S" channels, and are reared at densities that are about one-third less than that of the fish reared in the conventional tanks. NATURES' rearing is intended to closely mimic natural stream conditions.

The NATURES' group is transferred equally from production room tanks into the two "S" channels at NPTH after marking. Each "S" channel group receives 3,000 PIT tags inserted by M&E staff after CWT marking. Another 3,000 fish receive PIT tags and are transferred from the production tanks to fiberglass "conventional tanks" located adjacent to the "S" channels. Combined, these treatments create three PIT tag groups at 3,000 fish per group to generate survival data. The entire program is then reared at NPTH until water temperatures in Yoosa and Camp creeks drop to 10ºC or 50ºF (late August or early September). At that point they are transferred to the Yoosa/Camp AF for final acclimation and release. The two "S" channel NATURES' treatment replicates are transferred to the two earthen ponds and the conventional hatchery group is transferred to another fiberglass conventional tank at the site.

2.1.5.2 Newsome Creek Release Group Rearing and Tagging

SCS slated for release into Newsome Creek are reared in production room tanks from ponding until transfer to SWS scheduled for early May. Fish may be marked at NPTH or after transfer. Per the U.S. vs. Oregon Management Agreement, this group will be 100% CWT marked. They are cultured at SWS until transfer to the Newsome Creek AF in September, when water temperatures in Newsome Creek drop to 10ºC or 50ºF.

The fish released from Newsome Creek AF are also part of the same study comparing conventional hatchery and NATURES' reared fish. The NATURES' treatment for Newsome supplementation fish seeks to maintain similar rearing densities as the Yoosa/Camp creek NATURES' fish. While at NPTH, they are marked from the production room tanks to the raceways or into other tanks in the production room, depending on space and water availability. In May, 3,000 are transferred to the conventional tank at SWS, and the remainder into circular tanks. M&E biologists insert 3,000 PIT tags into the conventional group in the conventional tank and 3,000 PIT tags into the group in the circular tanks. They will be held at SWS until water temperatures in Newsome Creek approach 10ºC or 50ºF (late August or early September) and then transferred to the Newsome Creek AF. The NATURES' treatment fish are moved to the earthen pond, whereas the 3,000 conventional treatment group held in the conventional tank at SWS will go into an identical conventional tank at the Newsome site. This allows for similar comparisons of rearing habitat and density as that of Yoosa/Camp Creek AF group.

2.1.5.3 Meadow Creek Release Group Rearing and Tagging

SCS production for outplant into Meadow Creek is reared in production room tanks from ponding until limited water requires transfer of this group to the outside raceways. Re-use water may be used in the raceways to supplement river and/or well water. Supplemental oxygen may also be used. They will be marked in production room tanks or in the raceways prior to outplanting in June. Per the U.S. vs. Oregon Management Agreement, this group will be 100% CWT marked. In late May or early June, 10,000 fish will be PIT tagged and divided evenly between the two raceways. Each raceway group receives its own unique PIT tag code.

2.1.6 2010 BY Meadow Creek Releases from NPTH

For 2011, approximately 400,000 SCS parr at 117 fpp (3.9 g) are scheduled for helicopter outplanting into Meadow Creek (Table 5). The helicopter plant is tentatively scheduled for the week of June 22 – 26, 2011.

A pre-release fish health exam consisting of sixty fish is conducted by the IFHC at least three weeks prior to release. Bacteriology, virology and parasitic assays will be performed. Fish may be released early if fish health, stream conditions or other environmental factors warrant an early release. In that case, the pre-release fish health exam will be completed as soon as possible.

The fish are divided evenly between the east and west raceways at NPTH. Fish in one raceway are outplanted into the lower reach of Meadow Creek, and fish in the other raceway are outplanted into the upper reach. The lower reach of Meadow Creek extends from the mouth upstream fifteen miles; the upper reach is located throughout the meadow portion of the creek near the headwaters (about forty miles upstream).

Fish will be trucked to a staging area near the creek, and loaded by weight into a large bucket connected to the helicopter, and filled with sixty gallons of water per load. The helicopter makes multiple flights releasing up to sixty pounds of fish per flight into the creek, with the intent of spreading the releases across and throughout the respective reach. It is expected to take two days to outplant the entire group from the two staging areas, Racetrack and Red River.

Table 33. Proposed Spring Chinook Salmon release numbers, size, and mark type in 2010-11.

Site	Goal	Expected at release	Size (fpp)	Age	Mark/CWT/ Other	PIT Tags	Transfer/Release Date
Newsome Creek Acclimation Facility	75,000	75,000	29	presmolt	75,000 CWT	3,000 Pond 3,000 M&E Tank	October 4-18, 2010 (release into Newsome Creek)
Yoosa/Camp Creek Acclimation Facility	150,000	150,000	34	presmolt	150,000 CWT	3,000 Upper Pond 3,000 Lower Pond 3,000 M&E Tank	October 5-19, 2010 (release into Lolo Creek)
Nez Perce Tribal Hatchery	200,000	200,000	20	smolt	60,000 Ad clip w/some CWT 140,000 CWT	600	April 4-15, 2010 (release into Clearwater River)
Meadow Creek (Selway River)	400,000	400,000	117	parr	400,000 CWT	5,000 Upper Release 5,000 Lower Release	June 22-26, 2011 (Release into Meadow Creek)

2.1.7 2011 BY Trapping

Trapping of adult SCS for broodstock occurs at the NPTH fish ladder, at two temporary weirs on Lolo creek, and at a single temporary weir on Newsome creek. In 2011, construction of a permanent weir on Lolo Creek is planned, replacing the two temporary weirs. Broodstock may be obtained from other Clearwater Basin facilities to ensure program goals are met. Annual

pass/keep ratios and broodstock needs for all NPTHC SCS trapping sites will be determined and agreed to in February (or later) each year for the upcoming trapping season. Table 6 summarizes broodstock needs by program for 2011.

Table 34. Nez Perce Tribal Hatchery Complex spring Chinook broodstock needs by program.

Adult Trap Location	Program	Release Goal	Male Trapping Goal	Female Trapping Goal	Jack Trapping Goal
Nez Perce Tribal Hatchery ladder	Meadow Creek direct release	400,000 parr	146	146	5% contribution or less
Upper and lower Lolo Creek Weirs	Yoosa/Camp Creek acclimated release	150,000 pre-smolts	55	55	5% contribution or less
Newsome Creek weir	Newsome Creek acclimated release	75,000 pre-smolts	28	28	5% contribution or less

2.1.7.1 NPTH

The adult ladder and trap at NPTH will be operated to collect SCS adults from approximately mid-April through early September. The ladder will be operated to collect up to 292 adults (146 females and 146 males) needed for broodstock for the Meadow Creek program, although more may be retained to backfill the Lolo and Newsome Creek programs, or to backfill for other programs within the Clearwater Basin. Broodstock needs are based on an estimated 75% adult survival from collection to spawning, BKD culling, an average egg fecundity from 2004-2008 across all NPTH SCS programs of 3,850 eggs per female, and an estimated 95% survival from green eggs to release. Every effort will be made to select adults representatively across the return while meeting production goals. Broodstock selection will be based on existing fin clips, marks, tags, and gender (when sexually dimorphic characteristics become apparent).

Probable Adult Handling and Collection Guidelines for 2011:

- Only hatchery origin SCS (CWT only, AD only, or CWT and AD) will be collected as broodstock.
- All natural (unmarked and untagged), known Idaho Supplementation Studies (ISS), and radio tagged fish will be returned to the Clearwater River.

- Other trapping protocols or changes for 2011 will be developed and adopted between hatchery and M&E staff in February, 2011 or later, as run return forecasts become available.

Adults retained for broodstock will receive a formalin treatment three times per week by veterinary prescription to control fungus and decrease pre-spawning mortalities. Veterinary prescriptions will be requested at least one week before treatments are needed. Trapped and retained females will be inoculated with erythromycin on July 19, two weeks in advance of the first spawn scheduled for August 2, 2011. From that point until the first spawn, all newly arriving female adults trapped and retained for broodstock at NPTH will be inoculated with erythromycin by veterinary prescription before transfer to the adult raceway. Veterinary prescriptions will be requested at least one week before needed. Bottles of erythromycin will labeled with prescription information and must also be requested at least one week before needed. No inoculated females will be used for nutrient enhancement programs, and instead will be buried or taken to a landfill.

Jacks that volunteer to NPTH excess to program needs may be distributed to Tribal members as coordinated annually through the NPT Fish and Wildlife Commission and Management. Criteria for selection of jacks to be distributed will be based on existing marks and/or tags. Adult length criteria may be modified in-season based on actual year-class data derived during early spawning to avoid over-use of jacks or jills in the broodstock.

2.1.7.2 Lolo Creek

Program adult broodstock needs for Lolo Creek are approximately 55 females and 55 males. Broodstock needs are based on an estimated 75% adult survival from collection to spawning (including BKD egg culling), an average egg fecundity from 2004-2008 across all NPTH SCS programs of 3,850 eggs per female, and an estimated 95% survival from green eggs to release.

Two weirs will be operated on Lolo Creek by SCS M&E staff, an upper weir (river kilometer 51) and a lower weir (river kilometer 21). Trapping operations on Lolo Creek will begin as soon as the weirs can be safely installed and operated and will continue through September 20th, or until zero fish are trapped for seven consecutive days in mid September. In addition to broodstock collection, the adult weirs will also be used for estimating escapement, sex composition, age structure, return timing and genetic tissue sampling. In 2011, a permanent weir will be constructed at the site of the current temporary upper weir, and use of both temporary weirs will no longer be necessary.

Adult Handling and Collection Guidelines for 2011:

- Pass/keep ratios for the upper and lower weirs will be developed and adopted between hatchery and M&E staff in February, 2011 or later, when run forecasts become available.

- All known strays (AD/CWT, AD only, and Ventral fin clipped fish) will be removed in accordance with the NPTHC broodstock policies. Disposition of strays will be determined when pass/keep ratios are established. Strays may be retained for broodstock.
- Adults retained for broodstock at the upper and lower Lolo Creek weirs may be differentially marked to identify which weir they came from, and to distinguish them from Newsome Creek weir or NPTH trapped fish, as agreed to when pass/keep ratios are established.

Those fish selected for broodstock will be transported to NPTH and placed in an adult holding raceway until spawning begins in August. Adults retained for broodstock will receive a formalin treatment three times per week by veterinary prescription to control fungus and decrease pre-spawning mortalities. Veterinary prescriptions will be requested at least one week before treatments are needed. Trapped and retained females will be inoculated with erythromycin on July 19, two weeks in advance of the first spawn scheduled for August 2, 2011. From that point until the first spawn, all newly arriving female adults trapped on Lolo Creek and retained for broodstock at NPTH will not be inoculated. Veterinary prescriptions will be requested at least one week before needed. Bottles of erythromycin will be labeled with prescription information and must also be requested at least one week before needed. No inoculated females will be used for nutrient enhancement programs, and instead will be buried or taken to a landfill.

2.1.7.3 Newsome Creek

Program adult broodstock needs for Newsome Creek are approximately 28 females and 28 males. Broodstock needs are based on an estimated 75% adult survival from collection to spawning (including BKD egg culling), an average egg fecundity from 2004-2008 across all SCS females used of 3,850 eggs per female, and an estimated 95% survival from green eggs to release.

Trapping operations on Newsome Creek will begin as soon as the weir can be safely installed and operated – which typically occurs in mid to late May, after peak flows are reached. Trapping will continue through September 20, or until zero fish are trapped for 7 consecutive days in mid September.

Adult Handling and Collection Guidelines for 2011:

- Pass/keep ratios for the Newsome weir will be developed and adopted between hatchery and M&E staff in February, 2011 or later, when run forecasts become available.
- All known strays (AD/CWT, AD only, and Ventral fin clipped fish) will be removed in accordance with NPTHC broodstock policies. Disposition of strays will be determined when pass/keep ratios are established. Strays may be retained for broodstock.
- Adults retained for broodstock at the Newsome Creek weir may be differentially marked to distinguish them from Lolo Creek or NPTH trapped fish, as agreed to when pass/keep ratios are established.

Those fish selected for broodstock will be transported to NPTH and placed in an adult holding raceway until spawning begins in August. Adults retained for broodstock will receive a formalin treatment three times per week by veterinary prescription to control fungus and decrease pre-spawning mortalities. Veterinary prescriptions will be requested at least one week before treatments are needed. Trapped and retained females will be inoculated with erythromycin on July 19, two weeks in advance of the first spawn scheduled for August 2, 2011. From that point until the first spawn, all newly arriving female adults trapped on Newsome Creek and retained for broodstock at NPTH will not be inoculated. Veterinary prescriptions will be requested at least one week before needed. Bottles of erythromycin will labeled with prescription information and must also be requested at least one week before needed. No inoculated females will be used for nutrient enhancement programs, and instead will be buried or taken to a landfill.

2.1.7.4 Broodstock provided by other facilities

Per agreement with IDFG and the USFWS, adults returning to Clearwater and Dworshak Hatcheries and to Crooked River, Rapid River, Red River, and Powell satellite facilities may also be used for broodstock for any of the NPTHC SCS programs, in the event of shortages. Those fish will be treated with formalin and inoculated with erythromycin by veterinary prescription to control fungus following the same schedule as other transferred fish from NPT weirs. Table 7 prioritizes brood source by program and trapping location for NPTHC programs.

Table 35. NPTHC SCS prioritized broodstock source by trapping location.

Program		
Lolo Creek	**Newsome Creek**	**Meadow Creek**
1 – Lolo Weirs	1 – Newsome Weir	1 – Nez Perce Tribal Hatchery
2 – Nez Perce Tribal Hatchery	2 – Nez Perce Tribal Hatchery	2 – Powell Weir
3 – Powell Weir	3 – Crooked River Weir	3 – Red River Weir
4 – Red River Weir	4 – Red River Weir	4 – Crooked River Weir
5 – Crooked River Weir	5 – Kooskia Hatchery	5 – Kooskia Hatchery
6 – Kooskia Hatchery	6 – Dworshak National Fish Hatchery	6 – Dworshak National Fish Hatchery
7 – Dworshak National Fish Hatchery	7 – Lolo Weirs	7 – Rapid River Hatchery
8 – Newsome Weir	8 – Powell Weir	8 – Lolo Weirs
9 – Rapid River Hatchery	9 – Rapid River Hatchery	9 – Newsome Weir

It is important to stress the priorities identified in Table 7 are only general guidelines, as run returns and hatchery circumstances warrant flexibility when utilizing this table.

2.1.7.5 SCS Adult Outplanting

Adult SCS salmon in excess of NPTH broodstock needs may be outplanted into area streams as identified in Table 8 below (non-prioritized). The comanagers and SCS M&E will be notified in advance of any planned outplant as identified in the table. In the event of an approved fishery in the Clearwater Basin, these fish may be outplanted into closed waters, and/or marked differentially for easy identification by anglers. Marks to distinguish these fish will be determined by the comanagers prior to outplanting, unless specifically identified in the table. Any action of this type will be coordinated with the NPT Fish and Wildlife Commission. These fish may also be transferred to other Clearwater Basin hatcheries for broodstock if necessary.

Table 36. Nez Perce Tribal Hatchery spring Chinook Salmon adult outplant locations.

Release Location	Hatchery or Weir	Purpose	Maximum Outplant Number [a]
Selway River at McGruder	Nez Perce Tribal Hatchery (NPTH)	Supplementation	1,000
Selway River at O'Hara Creek	NPTH	Supplementation	200
Lower Selway River	NPTH	Supplementation	2,000
South Fork (SF) Clearwater River at Mill Creek	NPTH	Supplementation	150
SF Clearwater river at Meadow Creek	NPTH	Supplementation	300
SF Clearwater River	NPTH	Supplementation	500
Lochsa River [b]	NPTH	Supplementation	500
Passed above Lower Lolo Creek Weir [c]	NPT Lower Lolo Creek Weir	Weir evaluation	NA
Passed above Upper Lolo Creek Weir [d]	NPT Upper Lolo Creek Weir	Weir Evaluation	NA
Passed above Newsome Creek Weir [e]	NPT Newsome Creek Weir	Weir Evaluation	NA

a. "Maximum Outplant Number" includes adult outplants from all hatchery facilities covered in the Clearwater Annual Operation Plan.
b. Outplants may occur at either Badger Creek or Boulder Creek
c. Adults passed above the NPT Lower Lolo Creek Weir will be marked with a left and right opercle punch.
d. Adults passed above the NPT Upper Lolo Creek Weir will be marked with a right opercle punch.
e. Adults passed above the NPT Newsome Creek Weir will be marked with a left opercle punch.

2.1.8 Proposed studies For SCS

No studies outside standard M&E are proposed for SCS during the period covered by this AOP.

2.2 Fall Chinook salmon

2.2.1 2010 BY Trapping

Snake River FCS adults will be collected at the LGR trap and transported to NPTH, in accordance with the U.S. vs. Oregon Management Agreement. If necessary to supplement brood, the NPTH adult fish ladder will also be opened to collect adults. In the unlikely event of a broodstock shortage, adults may also be collected at weirs operated in local tributaries, and at Dworshak National Fish Hatchery (DNFH). Adults collected at these sites will be uniquely marked prior to transport to NPTH.

Several factors determine how many adults are needed to meet the entire 1.4 million FCS release goal within NPTHC. Run forecasts determine the initial trapping rate at LGR, which allows for estimating how many adults NPTH can expect to get from LGR. This in turn dictates how many adults must be trapped at the NPTH ladder. Adult returns and hauled fish from LGR will be monitored by M&E staff on a weekly basis to affect in-season changes to NPTH adult ladder operations. Significant changes in actual returns to LGR versus predicted returns may also require a change in the sample rate at LGR. NPTH FCS adult holding mortality for females has been as low as 1.8% in 2006 and as high as 9.1% in 2009. These factors all make accurately defining trapping goals specific to LGR or NPTH challenging. Hatchery employees actively track adults on hand in an effort to meet full production while avoiding trapping excess adults.

In general, based on a trapping rate of 12% at LGR, assumed adult holding losses at NPTH of a conservative 10%, and based on historical sexual maturation timing and egg fecundities for all trapped females used for production, NPTH will need a total of 532 females and 532 males (from both LGR and NPTH trapping) to meet full production for the period covered by this document. This number will be adjusted as needed to ensure adequate broodstock are trapped.

2.2.1.1 Lower Granite Dam

Adult FCS will be collected at LGR beginning the last week in August or when water temperatures are below 70º F (22.2º C). During initial weeks of hauling from LGR when temperature differences are > 5º F between LGR holding and NPTH holding water, hatchery staff will fill the fish transport tank half full with Clearwater River production water prior to leaving NPTH, and then top off the tank with water and fish at LGR. This will minimize water temperature changes during transport to NPTH. Activities involving trapping and collection of adult FCS for broodstock are covered under ESA Section 10 Permit No. 1530. Trapping at LGR will continue throughout the run and is anticipated to end by late November or early December.

FCS are collected in the trap as a sub-sample of the returning run. The sub-sample rate for 2010 will be 12%, but may change up or down in-season based on actual returns. Current expectation is that all adults trapped at LGR and retained for broodstock will receive two right operculum punches (ROP), differentiating them from NPTH trapped fish. If the sample rate changes, a single ROP will be applied to reflect the changed sampling rate. This should assist comanagers with calculating actual fish returns to LGR.

All females trapped at LGR will be injected with erythromycin and oxytetracycline during the sorting process there. They will be re-injected with erythromycin on October 19, 2010 during the first sort/spawn by veterinary prescription. Females injected with erythromycin will not be used for nutrient enhancement. Instead they will be buried on-station or taken to a landfill.

For 2010, males < 65 cm will be considered jacks. One-in-five of the jacks containing CWT's will be retained at LGR and hauled to LFH for processing. Jacks inadvertently transported to NPTH from LGR may or may not be utilized for broodstock, but will be sacrificed to recover the wire for run reconstruction. The jack length range may be adjusted mid-season as agreed to by the comanagers. PIT tagged jacks will not be retained at LGR and released above.

Fish transported to NPTH from LGR are usually placed in the north holding pond, but may also be placed in the south holding pond if densities become a concern. Every effort is made to ensure mixing of fish between the two trapping locations is avoided, and NPTH swim-ins are marked with a right operculum V-notch to differentiate them from the LGR fish.

WDFW and NPT have cooperatively developed a transportation schedule for adults trapped at LGR. The goal of NPTH is to receive 30% of the females trapped and LFH to receive 70%. This schedule will be modified as needed to ensure equitable distribution of fish between the two programs.

LFH-origin FCS are included in the NPTH broodstock from the LGR trap, since Snake River FCS are considered to be one population. Unknown origin hatchery FCS may also be incorporated in the broodstock when trapped at LGR.

2.2.1.2 NPTH

Pre-season meetings with updated run forecasts and fish passage data will determine if and when the NPTH trap is opened to collect FCS adults. Volunteers to NPTH are typically held in the south adult holding raceway. The ladder will be closed when broodstock needs are met.

Trapped adult females will be injected by veterinary prescription with erythromycin on October 19, 2010 during the first sort/spawn. Veterinary prescriptions will be requested at least one week before needed. Bottles of erythromycin will be labeled with prescription information and will also be requested at least one week before needed. Additionally, all adults will receive formalin

treatments three times per week by veterinary prescription to control fungus and decrease pre-spawning mortality. Veterinary prescriptions will be requested at least one week before treatments are needed. No inoculated females will be used for nutrient enhancement programs; rather they will be buried or taken to a landfill.

All volunteers are marked with a right operculum V-notch to differentiate them from LGR trapped fish.

Jacks trapped at NPTH may be retained to meet broodstock needs, but may also be returned to the Clearwater River at the hatchery or upstream as far as "Pink House" boat ramp just west of Orofino. They will not be retained exclusively for CWT recovery.

2.2.2 2010 BY Spawning

Spawning at NPTH will occur every Tuesday beginning on October 19, and continue until program egg-take goals are met, usually by early December. Spawning may also occur on Wednesdays to avoid extremely long days during larger egg takes. Hatchery staff will ensure M&E employees are aware if Tuesday and Wednesday spawning is necessary.

Out-of-Snake River Basin adults identified as "strays" by CWT or PIT tag may be culled or transferred to lower river hatcheries to meet production goals. However, to meet NPTH production, strays may be utilized at a rate not to exceed 5% of the broodstock. Mating will be a 1 x 1 cross (1 female: 1 male), and mixing of LGR fish with NPTH volunteers will occur as much as possible. Adult males may be used more than once if necessary to meet production.

For 2010, fish considered to be one salts (< 75 cm to start the season) will be incorporated into the broodstock with the goal of not exceeding 15% of the fish spawned. No mini-jacks (< 49 cm) will be spawned. A more accurate jack length determination will be made by M&E biologists once CWT's are recovered during spawning. Based on this information, the jack length range for fish from LGR and/or the NPTH trap may be changed to ensure the 15% contribution limit is not exceeded. Females spawned that are < 65 cm and 1-ocean "jills" may be culled to reduce the number of these fish in the brood.

Natural Snake River fish will be incorporated into the broodstock at a target rate of up to 30%, provided that this number does not exceed 20% of the natural origin population.
Scale pattern data will not be used at NPTH in the culling of eggs.

On or after November 2, 2010 Gonadotropin Releasing Hormone (sGnRHa) may be used by an Investigational New Animal Drug (INAD) on remaining un-spawned LGR females to facilitate maturation.

Adults and jacks from LGR that have CWT's and are excess to broodstock needs will be sacrificed to recover the wire for run-reconstruction purposes.

Adults and jacks trapped at LGR without wire will have scale samples taken before they are released into the Clearwater River. They can be outplanted upstream as far as the "Pink House" boat ramp just below the mouth of the North Fork Clearwater River. Any other outplant will be approved by the comanagers and NPTH M&E in advance. In the event of an approved fishery in the Clearwater Basin, these fish may be outplanted into closed waters, and/or marked differentially for easy identification by anglers. Any action of this type will be coordinated with the NPT Fish and Wildlife Commission and the comanagers. These fish may also be spawned to backfill at LFH if necessary.

Adults and jacks trapped at NPTH in excess to broodstock needs may be returned to the Clearwater River to spawn naturally, as far upstream as the "Pink House" boat ramp just below the mouth of the North Fork Clearwater River. Any other outplant will be approved by the comanagers and NPTH M&E in advance. In the event of an approved fishery in the Clearwater Basin, these fish may be outplanted into closed waters, and/or marked differentially with a right operculum V-notch for easy identification by anglers. Any action of this type will be coordinated with the NPT Fish and Wildlife Commission and the comanagers. These fish may also be spawned to backfill at LFH if necessary.

Every adult female will be sampled individually for BKD using enzyme-linked immunosorbant assay (ELISA). 150 individual female ovarian fluid samples will be tested for viruses. An additional 60 tissue samples will be taken for bacterial and viral assays. These samples may come from males or females, but will not come from females whose ovarian fluid has been sampled. Up to 60 wedges or punches from broodstock (taken evenly from both volunteers and LGR transfers) will be assayed by IFHC staff for *Myxobolus cerebralis* (whirling disease).

Whenever possible, eggs from early spawned females will be used for the Luke's Gulch AF and Cedar Flats AF programs, to support an early returning run to the S.F. Clearwater and Selway Rivers. However, the Clearwater River direct release from NPTH is the highest priority in the event of an egg shortage, and that goal will always be met before either the Luke's Gulch or Cedar Flats acclimated programs.

In coordination with IDFG, male Chinook salmon carcasses may be released into free-flowing reaches of the Clearwater River for nutrient enhancement, pending IFHC approval.

2.2.3 2010 BY Incubation

Fertilized eggs will be water hardened for thirty minutes in 100 parts per million iodophore and placed in Heath trays for incubation. At between 550 and 620 temperature units (TU's) eyed eggs will be shocked; machine sorted the following day and transferred back into Heath trays to hatch.

The eggs from females with a high BKD ELISA value may be culled, or reared separately to avoid pathogen transfer in the event of a severe production shortage. At swim-up, the fish will be moved to production room tanks at ~1,600 fpp (0.30 grams).

2.2.4 2010 BY Rearing

2.2.4.1 NPTH

Hatched fry are moved from the heath trays to production room tanks after yolk sac absorption. They are fed, tanks cleaned, and mortalities removed daily. Samples are taken at least bi-weekly, and feed adjusted to meet growth targets. Length/weight samples are taken at least monthly.

After early rearing in the production room tanks, 500,000 fish are transferred to the two earthen ponds and two raceways. Fish transferred to the earthen ponds are marked and tagged directly from the production tanks, once they meet the target marking size of 160 fpp. Those moved to the raceways are reared there until they too are large enough for marking. After marking and tagging they join the other fish already being reared in the earthen ponds. Release of these fish into the Clearwater River is tentatively scheduled for June 6 – 10, 2011.

400,000 fish will be transferred from the tanks to SWS in February for short term rearing, prior to being moved to the Luke's Gulch and Cedar Flats AF's.

The remaining 500,000 fry stay in production room tanks from ponding until transfer to North Lapwai Valley AF in late March or early April.

2.2.4.2 Sweetwater Springs Rearing Facility

400,000 fish will be reared at SWS from mid-February through mid-April. They are fed, screens cleaned and mortalities picked daily. Dissolved Oxygen levels (DO's) and water temperatures are monitored several times per day. An emergency oxygen supplementation system is available to maintain adequate dissolved oxygen levels if necessary. Samples are taken every two weeks through release. Length/weight samples are taken at least monthly, and feed rates are adjusted accordingly. In mid-April these fish are transferred for final acclimation and release. 200,000 go to Lukes Gulch AF, and 200,000 go to Cedar Flats AF. Marking and tagging will probably occur at SWS, based on a target marking size of 160 fpp, but may also occur at NPTH.

2.2.4.3 North Lapwai Valley AF

500,000 fish will be transferred from production tanks at NPTH to North Lapwai Valley AF in early to mid-April. They are fed, screens cleaned and mortalities picked daily. DO's and water temperatures are monitored several times per day. Fish growth samples are taken every two weeks or more as needed. Length/weight samples are taken at least monthly, and feed rates are adjusted accordingly. Marking will either occur at NPTH or North Lapwai Valley AF, based on a target marking size of 160 fpp.

2.2.4.4 Lukes Gulch AF

All rearing tanks will be checked to ensure standpipe gasket material is secure, so the possibility of fish escaping the tank due to a failed gasket is avoided. If a system failure occurs prior to the transfer of fish from NPTH, those fish will remain at NPTH and be direct stream released into the S. F. Clearwater River. Transfer of the 200,000 group from SWS will occur in mid April to early May. Fish are fed, tanks and screens cleaned, and mortalities picked daily. DO's and water temperatures are monitored several times per day. Fish growth samples are taken every two weeks or more as needed. Length/weight samples are taken at least monthly, and feed rates are adjusted accordingly.

2.2.4.5 Cedar Flats AF

All rearing tanks will be checked to ensure standpipe gasket material is secure, so the possibility of fish escaping the tank due to a failed gasket is avoided. If a system failure occurs prior to the transfer of fish from NPTH, those fish will remain at NPTH and be direct stream released into the Selway River. Transfer of the fish will occur in mid April to early May. Fish are fed, tanks and screens cleaned, and mortalities picked daily. DO's and water temperatures are monitored several times per day. Fish growth samples are taken every two weeks or more as needed. Length/weight samples are taken at least monthly, and feed rates are adjusted accordingly.

2.2.5 2010 BY Marking, Tagging and Release

2.2.5.1 NPTH

A release of 500,000 sub-yearlings into the Clearwater River at 50 fpp (9.1 grams) is planned. Each pond will be volitionally released for several days. The release of both ponds should be completed by June 10, 2011.

As identified in the U.S. vs. Oregon Management Agreement, 200,000 fish will be marked with a CWT, and 100,000 fish will be marked with a CWT and an adipose fin clip (AD), and 200,000 will be unmarked and untagged (Table 8). Fish are marked and tagged by NPTH M&E employees during transfer to two earthen ponds from the production tanks or from two raceways, after reaching a target mark size of 160 fpp. 3,000 fish are PIT tagged for standard outmigration monitoring.

A pre-release fish health exam consisting of 60 fish is conducted by the IFHC a minimum of three weeks prior to release. Bacteriology, virology and parasitic assays will be performed. Hatchery or river conditions may warrant a shortened or no volitional release period, in which case the pre-release fish health exam will be completed as soon as possible.

At the start of the scheduled volitional release, hatchery employees take lengths and weights on a minimum of 500 fish (250 from each pond).

2.2.5.2 North Lapwai Valley AF

A release of 500,000 sub-yearlings into the Clearwater River at 75 fpp (6.1 grams) is planned. In early to mid-May each year, as Lapwai creek flows diminish, creek water (used for fish production) temperatures increase significantly, and dissolved oxygen levels decrease. This has led to a consistent emergency release in May each year instead of June. For 2011, scheduled release is on or before May 16 based on rearing conditions, but may be extended to mid-June if possible.

In late March, fish slated for final acclimation and release from North Lapwai Valley AF will be marked at NPTH or NLV, based on meeting the minimum marking size of 160 fpp. Per the U.S. vs. Oregon Management Agreement, this group will be comprised of 200,000 CWT only fish, 100,000 AD and CWT fish, and 200,000 unmarked and untagged fish (Table 8). After marking and tagging, they are final reared at NLV and released into Lapwai Creek. Prior to release, 3,000 fish will be PIT tagged for outmigration monitoring.

A fish health exam consisting of 60 fish is conducted by the IFHC a minimum of three weeks prior to scheduled release. Bacteriology, virology and parasitic assays will be performed. Hatchery or Lapwai Creek conditions may warrant a shortened or no volitional release period (see next paragraph), in which case the pre-release fish health exam will be completed as quickly as possible.

Although the facility was designed for a volitional release at 50 fpp (9.1 grams) in mid-June, decreasing flows and warming water temperatures in Lapwai creek usually warrant an emergency release to avoid massive fish losses. Employees living at the facility monitor both water temperature and dissolved oxygen (DO) levels daily. Fish are released when DO levels drop below 5.5 parts per million (ppm) at the pond outflow, or when fish mortalities increase significantly due to warming water temperatures.

2.2.5.3 Lukes Gulch AF

A release of 200,000 sub-yearlings into the S. F. Clearwater River at 50 fpp (9.1 grams) is planned. Scheduled release date from Luke's Gulch AF is June 13, 2011.

Transfer from SWS occurs in mid April to early May. Per the U.S. vs. Oregon Management Agreement, they will be 100% CWT'd, and half the release group will also have an AD clip (Table 8). Prior to release, up to 14,706 fish will be marked with a PIT tag. Of those, 3,000 are for standard outmigration monitoring by NPT M&E biologists, and the remaining are part of the Army Corps of Engineers (ACOE) transportation study (pending approval and funding).

A fish health exam consisting of 60 fish is conducted by the IFHC a minimum of three weeks prior to release. Bacteriology, virology and parasitic assays will be performed. Hatchery or river

conditions may warrant a shortened or no volitional release period, in which case the pre-release fish health exam will be completed as quickly as possible.

Hatchery staff will take lengths and weights on a minimum of 500 fish just before release.

2.2.5.4 Cedar Flats AF

A release of 200,000 sub-yearlings into the Selway River at 50 fpp (9.1 grams) is planned. Scheduled final release date from Cedar Flats AF is June 14, 2011.

Transfer of the fish from SWS occurs in mid April to early May. Per the U.S. vs. Oregon Management Agreement, they will be 100% CWT'd, and half the release group will also have an AD clip (Table 8). Up to 14,706 fish will be marked with a PIT tag. Of those, 3,000 are for standard outmigration monitoring by NPT M&E biologists, and the remaining are part of the ACOE transportation study (pending approval and funding).

A fish health exam consisting of 60 fish is conducted by the IFHC a minimum of three weeks prior to release. Bacteriology, virology and parasitic assays will be performed. Hatchery or river conditions may warrant a shortened or no volitional release period, in which case the pre-release fish health exam will be completed as soon as possible.

Hatchery staff will take lengths and weights on a minimum of 500 fish just before release.

Table 37. Proposed FCS release numbers, size, and mark type in 2011.

Site	Goal	Expected at release	Size (fpp)	Age	Mark/CWT/ Elastomer	PIT Tags	Release Date
NPTH	500,000	500,000	NA	0+	100,000 AD CWT 200,000 CWT Only 200,000 Unmarked	3,000	June 10, 2011 (release into Clearwater River)
North Lapwai Valley AF	500,000	500,000	NA	0+	100,000 AD CWT 200,000 CWT Only 200,000 Unmarked	3,000	May 16, 2011[a] (release into Lapwai Creek)
Luke's Gulch AF	200,000	200,000	NA	0+	100,000 AD CWT 100,000 CWT	14,706[b]	June 13, 2011 (release into S.F. Clearwater River)

					Only		
Cedar Flats AF	200,000	200,000	NA	0+	100,000 AD CWT 100,000 CWT Only	14,706 [b]	June 14, 2011 (release into Selway River)

[a] Release from North Lapwai Valley AF is dependent on water flows and temperature, and may be earlier than May 16.

[b] Up to 11,706 PIT tags may be inserted into this release group as part of the Army Corps of Engineers transportation study, pending approval and funding. 3,000 PIT tags are inserted for standard outmigration monitoring by NPT M&E.

2.2.5.5 Proposed studies For FCS

The FCS M&E group has an on-going fall Chinook study with Robin Waples (NOAA Fisheries, Seattle) entitled: *Juvenile life history changes in Snake River fall Chinook salmon: evolution or phenotypic plasticity?* This study investigates the recent life history trait of increased yearling migration in FCS, which historically has been predominately a subyearling migrant, to determine if this phenomenon is genetically linked or caused by changes in the environment. This study began with sampling all 2007 BY adults for DNA analysis and determining migration history of each breeding pair through scale analysis. A 3,000 progeny subsample was then taken during the spring of 2008 for DNA analysis to determine the exact parents of each fish. Each fish was then implanted with a PIT tag to determine migration timing, either subyearling or yearling, through the hydro system. Adult returns with PIT tags from the study will be scale sampled to confirm migration history through scale analysis. The 2009 return was the first return of 1-ocean fish or jacks from the study. The same sampling strategy was repeated for the 2008 and 2009 BY adults along with a 3,000 progeny subsample in both 2009 and 2010. The recommended study design is full parental genotyping and subsampling the progeny for 5 consecutive years, followed by sampling returning adults in subsequent years. Therefore, all spawned adult FCS will be sampled in 2010 for DNA analysis, and a subsample taken of 3,000 progeny during PIT tagging in 2011 prior to release.

The Cooperative USFWS/Columbia River Inter-Tribal Fish Commission (CRITFC) Kelt project through the University of Idaho will sample blood and tissue from a total of thirty fall Chinook broodstock (ten male and twenty female) on November 2 and 9, 2010 at NPTH. Blood will be collected from female fall Chinook following euthanasia but prior to the cutting of the caudal peduncle for bleeding. Blood from male fall Chinook will be collected opportunistically from fish lying on the spawning room floor following euthanasia. If possible fillets of white muscle will also be collected from blood sampled fish for proximate after they have been discarded. The purpose of these samples is to provide the research team with a physiological profile of what blood chemistry and proximate tissue composition are for a fish that is biologically programmed to die following spawning. These parameters will be compared with Kelt data.

2.3 Pacific Lamprey (Eels)

In 2006, the NPT initiated a Pacific Lamprey restoration initiative. This initiative involves transporting adult lampreys collected from dewatered fish ladders on mainstem Columbia River dams to NPTH for holding from December to May annually. They are outplanted into approved streams to spawn naturally by the end of May each year.

All lamprey activities are conducted by NPT DFRM employees; however NPTHC employees are not involved, minimizing the likelihood of pathogen transfer to standard hatchery programs. No BPA funding associated with NPTHC is utilized for this program.

In an effort to control the bacterial disease furunculosis, the lampreys will be injected with oxytetracycline by veterinary prescription. Veterinary prescriptions will be requested at least one week before injections are needed. Bottles of erythromycin must be labeled with prescription information and must also be requested at least one week before needed.

The lampreys are held in the M&E tanks located adjacent to the NATURES' "S" channel release structure. To prevent escapement each tank is sealed with a plywood lid secured with clamps. Production water for this program is from the Clearwater River, and is excess to NPTH production requirements. The M&E tanks effluent returns to the Clearwater River downstream of the fish ladder.

A Lamprey Risk Assessment and Lamprey Activity Report are provided to BPA annually.

2.4 Communication

A monthly NPTHC narrative and fish health report will be completed and submitted to BPA, NPT Fishery Management and the comanagers. Quarterly reports are submitted through BPA's Pisces system. An Annual Operation Plan and Annual Operation Report are also submitted to BPA and the comanagers, reporting on planned and actual production and other activities. These project reports can be accessed at http://www.efw.bpa.gov/IntegratedFWP/reportcenter.aspx. As mentioned earlier, DFRM now has the equipment infrastructure necessary to ensure efficient and timely exchange of science-based information on regionally accepted performance measures. In the near future, annual reports, metadata, and performance measure data will be available on the DFRM website http://www.nptfisheries.org. Finally, monthly fish health and pre-release pathology reports will be submitted to NPTHC from contracted fish health staff at IFHC.

2.5 Fish Pathology and Fish Health Monitoring

All fish production within NPTHC is conducted according to the USFWS - National Fish Health Policy, Pacific Northwest Fish Health Protection Committee (PNFHPC) - Model Program, and Integrated Hatchery Operations Team (IHOT) policies and guidelines. Specifically, all lots of fish are monitored for fish health, all broodstock are annually inspected, strict hatchery sanitation procedures and fish culture practices are followed, and egg and fish transfer and release requirements are met. In addition, BKD management strategies for Chinook salmon stocks are employed.

2.5.1 Fish Disease Outbreaks

IFHC fish health specialist will respond the same day or within one business day (48 hours) to all fish disease outbreaks at the request of any NPTHC permanent employee.

2.5.2 Monthly Monitoring

As per contract with USFWS, a fish health specialist from the IFHC will visit NPTH once a month. They will visit remote sites actively producing fish upon request. At most remote sites, the prerelease exam will fulfill the monthly exam requirement since fish at those sites are only acclimated for a short time period. At all sites, mortality records will be checked, and fish from all production groups will be inspected. 5-10 fish of each species will be sacrificed and examined at the discretion of the fish health specialist for monitoring purposes.

2.5.3 Annual Broodstock Viral Inspections

At spawning, all broodstock (both spring and fall Chinook) will be tested for viral pathogens. Ovarian fluid from up to 150 spawned female fish will be sampled and tested. Additionally, sixty fish will have kidney/spleen samples taken and sampled for viral and bacterial pathogens. These samples may come from males or females, but will not come from females whose ovarian fluid has been sampled. Up to sixty wedges or punches from adult broodstock will be assayed for *Myxobolus cerebralis* (whirling disease). Samples will be collected by NPTHC and/or fish health staff and delivered to IFHC for testing.

2.5.4 Pre-release Exams on Juveniles

At least three weeks prior to release, a sixty fish sample will be collected from every release group of NPTHC production for a pre-release inspection. Bacteriology, virology and parasitic assays will be performed.

2.5.5 Specific Fish Health Management

1. BKD management:

a. All female Chinook broodstock will receive a pre-spawning injection by veterinary prescription with erythromycin, with the exception of late arriving SCS from NPT operated weirs. Veterinary prescriptions will be requested at a minimum of one week before needed. Bottles of erythromycin will be labeled with prescription information and must also be requested at least one week before needed. No inoculated females will be used for nutrient enhancement programs. Instead they will be buried or taken to a landfill.
b. Female Chinook used for broodstock will be tested for BKD via ELISA.
c. Juvenile Chinook from parents with a high level BKD ELISA value (currently 0.250 or greater, although this value can change slightly by fish run) may be culled, or they may be reared separately to minimize potential for pathogen transfer. Juvenile Chinook from parents with a BKD ELISA value of 0.249 or lower will typically be included in production. ELISA values of 0.1 or lower are considered to be negative for BKD.
d. Juvenile Chinook (200 fpp or smaller) will be reared at a maximum density index of 0.3 $lbs/ft^3/in$.
e. Juvenile Chinook larger than 200 fpp will be reared at a maximum density of 0.1 $lbs/ft^3/in$.

2. Broodstock and egg fungus management:
    a. Broodstock – All Chinook salmon broodstock will be treated with formalin by veterinary prescription a minimum of three times per week to control fungus during pre-spawn holding. Veterinary prescriptions will be requested at least one week before treatments are needed.
    b. Eggs – All eggs will be treated with formalin on a daily basis to control fungus. Treatments will cease seven days prior to hatch.
3. Gamete maturation of FCS broodstock may be supported through the use of sGnRHa (Ovaplant®), by the use of an INAD.

2.6 NPTHC Organizational Chart

The chart below generally reflects the organizational structure of NPTHC, although reporting chain, work responsibilities, and standby assignments may change during the year.

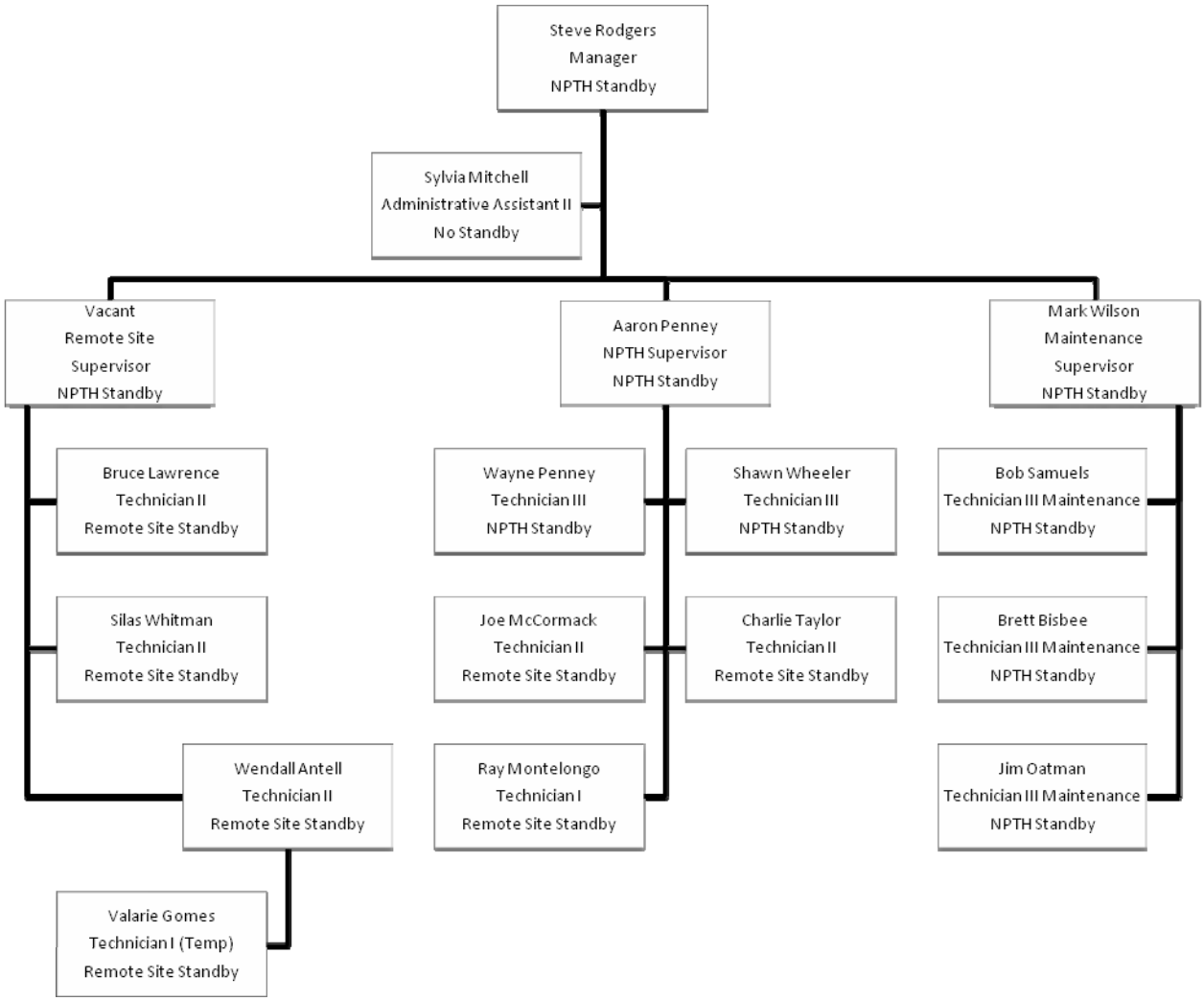

Figure 7. Nez Perce Tribal Hatchery Complex Organizational Chart

2.8 Contact List

The following list of people are either directly involved in the operation of the NPTHC, or related programs and facilities. Questions about this Annual Operation Plan should be directed to the appropriate person from this list.

NAME	AGENCY	POSITION	PHONE	EMAIL
Policy				
Craig Burley	WDFW	Anadromous Program	(360) 902-2784	burleccb@dfw.wa.gov
Pete Hassemer	IDFG	Manager Anadromous	(208) 334-3791	phassemer@idfg.idaho.gov
Gary James	CTUIR	Manager	(541) 276-4109	garyjames@ctuir.com
Dave Johnson	NPT	Fisheries Program Manager DFRM Director	(208) 621-3736	davej@nezperce.org
Production				
Brad George	IDFG	Clearwater Hatchery Assist. Mgr.	(208) 476-3331	bgeorge@idfg.state.id.us
Kent Hills	IDFG	Oxbow Hatchery Manager	(541) 785-3459	oxbowfh@pinetel.com
Jon Lovrak	WDFW	Lyons Ferry Complex Manager	(509) 646-9201	lovrajgl@dfw.wa.gov
Jerry McGehee	IDFG	Clearwater Hatchery Manager	(208) 476-3331	jmcgehee@idfg.state.id.us
Darren Ogden	NOAA	Lower Granite Dam Trap Supervisor	(509) 843-3058	Darren.Ogden@noaa.gov
Aaron Penney	NPT	NPTHC Supervisor	(208) 621-3504	aaronp@nezperce.org
Steve Rodgers	NPT	NPTHC Manager	(208) 621-3502	stever@nezperce.org
Dick Rogers	WDFW	Lyons Ferry Hatchery Supervisor	(509) 646-3454	rogerrcr@dfw.wa.gov
Cassie Sundquist	IDFG	Clearwater Hatchery Assist. Manager	(208) 476-3331	csundquist@idfg.idaho.gov

Management Jay Hesse Becky Johnson Glen Mendel Tom Rogers Sam Sharr Brian Zimmerman	NPT NPT WDFW IDFG IDFG CTUIR	DFRM Research Director DFRM Production Director Regional Fish Manager Hatcheries Supervisor Anadromous Coordinator Production Coordinator	(208) 621-3552 (208) 621-4629 (509) 382-1005 (208) 334-3791 (208) 334-3791 (541) 276-4109	jayh@nezperce.org beckyj@nezperce.org Glen.Mendel@dfw.wa.gov trogrs@idfg.state.id.gov ssharr@idfg.state.id.gov brianzimmerman@ctuir.com
Evaluation Bill Arnsberg Justin Bretz Scott Kellar Debbie Milks Mark Schuck Sherman Sprague Mike Tuell Jason Vogel	NPT NPT NPT WDFW WDFW NPT NPT NPT	NPTHC Fall Chinook M&E NPTHC Spring Chinook M&E NPTHC Fall Chinook M&E Snake River Lab Fall Chinook M&E Snake River Lab Evaluations NPTHC Spring Chinook M&E NPT Fish Marking Coordinator DFRM Research Deputy Director	(208) 621-3578 (208) 621-3579 (208) 621-3574 (509) 382-1710 (509) 382-1004 (208) 621-3585 (208) 621-3577 (208) 621-3602	billa@nezperce.org jbretz@nezperce.org scottk@nezperce.org milksdjm@dfw.wa.gov schucmls@dfw.wa.gov shermans@nezperce.org miket@nezperce.org jasonv@nezperce.org
Fish Health Marilyn Blair Steve Roberts Laura Sprague	USFWS WDFW USFWS	Idaho Fish Health Center Pathologist Regional Fish Health Specialist Idaho Fish Health Center Pathologist	(208) 476-9500 (509) 892-1001 (208) 476-9500	marilyn_j_blair@fws.gov robertsdr@dfw.wa.gov Laura_Sprague@fws.gov

APPENDIX A. NPTH Monitoring and Evaluation Performance Measures

Table A.1. Standardized performance measures and definitions quantified for evaluation of Nez Perce Tribal Hatchery (NPTH) SCS production.

Performance Measure		Definition
Abundance	Adult Escapement (to Snake Basin/Tributary)	Number of adults (including jacks) that have escaped to a certain point (i.e. - mouth of stream). Population based measure. Calculated with mark recapture methods from weir data adjusted for redds located downstream of weirs and in tributaries, and maximum net upstream approach for DIDSON and underwater video monitoring. Provides total escapement and wild only escapement. [Assumes tributary harvest is accounted for].
	Fish per Redd Estimate	Number of fish divided by the total number of redds. Applied by: The population estimate at a weir site, minus broodstock and mortalities and harvest, divided by the total number of redds located upstream of the weir.
	Index of Spawner Abundance - redd counts	Counts of redds in spawning areas in index area (trend), extensive areas, and supplemental areas.
	Spawner Abundance	Estimated number of total spawners on the spawning ground. Calculated as the number of fish that return to an adult monitoring site, minus broodstock removals and weir mortalities and harvest if any, subtracts the number of female pre-spawning mortalities and expanded for redds located below weirs. Calculated in two ways: 1) total spawner abundance, and 2) wild spawner abundance which multiplies by the proportion of natural origin (wild) fish. Calculations include jack salmon.
	Hatchery Fraction	Percent of fish on the spawning ground that originated from a hatchery. Applied in two ways: 1) Number of hatchery carcasses divided by the total number of known origin carcasses sampled. Uses carcasses above and below weirs, 2) Uses weir data to determine number of fish released above weir and calculate as in 1 above, and 3) Use 2 above and carcasses above and below weir.
	Ocean/Mainstem Harvest	Raw measure (primary). Number of fish caught in ocean or mainstem fisheries (commercial, tribal, or recreational). Determined from commercial landings, creel surveys, etc.
	Harvest Abundance in Tributary	Number of fish caught in tributary fisheries (tribal, sport, or commercial) by hatchery and natural origin.
	Index of Juvenile Abundance (Density)	Parr abundance estimates using underwater survey methodology are made at pre-established transects. Densities (number per 100 m2) are recorded using protocol described in Thurow (1994). Hanken & Reeves estimator.
	Juvenile Emigrant Abundance	Gauss software is used to estimate emigration estimates. Estimates are given for parr pre-smolts, smolts and the entire migration year. Calculations are completed using the Bailey Method and bootstrapping for 95% CIs. Gauss program developed by the University of Idaho (Steinhorst 2000) Gauss (Aptech Systems, Maple Valley, Washington)
	Smolt Equivalents	Smolt equivalents estimates, which result from juvenile emigrant trapping and PIT tagging, are derived by estimating the proportion of the total juvenile abundance estimate at the tributary comprised of each juvenile life stage (parr, presmolt, smolt) that survive to LGD. It is calculated by multiplying the life stage specific abundance estimate (with standard error) by the life stage specific survival estimate to LGD (with standard error). The standard error around the smolt equivalent estimate is calculated using the following formula; where X = life stage specific juvenile abundance estimate and Y = life stage specific juvenile survival estimate: $Var(X \cdot Y) = E(X)^2 \cdot Var(Y) + E(Y)^2 \cdot Var(X) + Var(X) \cdot Var(Y)$

Performance Measure		Definition
Survival - Productivity	Smolt-to-Adult Return Rate	The number of adult returns from a given brood year returning to a point (stream mouth, weir) divided by the number of smolts that left this point 1-5 years prior. Calculated for wild and hatchery origin conventional and captive brood fish separately. Adult data applied in two ways: 1) SAR estimate to stream using Population estimate to stream, 2) adult PIT tag SAR estimate to escapement monitoring site (weirs, LGR), and 3) SAR estimate with harvest. Accounts for all harvest below stream. *Smolt-to-adult return rates* are generated for four performance periods; tributary to tributary, tributary to LGD, LGD to LGD, and LGD to tributary. *LGD to LGD* SAR estimates are calculated by dividing the number of PIT tagged adults returning to LGD by the estimated number of PIT tagged juveniles at LGD. Variances around the point estimates are calculated as described above. *Tributary to tributary SAR* estimates for natural and hatchery origin fish are calculated using PIT tag technology as well as direct counts of fish returning to the drainage. PIT tag SAR estimates are calculated by dividing the number of PIT tag adults returning to the tributary (by life stage and origin type) by the number of PIT tagged juvenile fish migrating from the tributary (by life stage and origin type). Overall PIT tag SAR estimates for natural fish are then calculated by averaging the individual life stage specific SARs. Direct counts are calculated by dividing the estimated number of natural and hatchery-origin adults returning to the tributary (by length break-out for natural fish) by the estimated number of natural-origin fish and the known number of hatchery-origin fish leaving the tributary. *Tributary to LGD* SAR estimates are calculated by dividing the number of PIT tagged adults returning to LGD by the number of PIT tagged juveniles tagged in the tributary. There is no associated variance around this estimate. The adult detection probabilities at LGD are near 100 percent. *LGD to tributary* SAR estimates are calculated by dividing the number of PIT tagged adults returning to the tributary by the estimated number of PIT tagged juveniles at LGD. The estimated number of PIT tagged juveniles at LGD is calculated by multiplying life stage specific survival estimates (with standard errors) by the number of juveniles PIT tagged in the tributary. The variance for the estimated number of PIT tagged juveniles at LGD is calculated as follows, where X = the number of PIT tagged fish in the tributary and Y = the variance of the life stage specific survival estimate: $Var(X \cdot Y) = X^2 \cdot Var(Y)$ The variance around the SAR estimate is calculated as follows, where X = the number of adult PIT tagged fish returning to the tributary and Y = the estimated number of juvenile PIT tagged fish at LGD: $Var\left(\frac{X}{Y}\right) = \left(\frac{EX}{EY}\right)^2 \cdot \left(\frac{Var(Y)}{(EY)^2}\right)$
	Progeny-per- Parent Ratio	Adult to adult calculated for naturally spawning fish and hatchery fish separately as the brood year ratio of return adult to parent spawner abundance using data above weir. Two variants calculated: 1) escapement, and 2) spawners.
	Recruit/spawner (Smolt Equivalents per Redd or female)	Juvenile production to some life stage divided by adult spawner abundance. Derive adult escapement above juvenile trap multiplied by the pre-spawning mortality estimate. Adjusted for redds above juvenile trap. *Recruit per spawner* estimates, or *juvenile abundance (can be various life stages or locations) per redd/female*, is used to index population productivity, since it represents the quantity of juvenile fish resulting from an average redd (total smolts divided by total redds) or female. Several forms of juvenile life stages are applicable. We utilize two measures: 1) juvenile abundance (parr, presmolt, smolt, total abundance) at the tributary mouth, and 2) smolt abundance at LGD.
	Pre-spawn Mortality (female 0-25%)	Percent of female adults that die after reaching the spawning grounds but before spawning. Calculated as the number of females 25% spawned divided by the total number of female carcasses sampled. [25% spawned = female that contains 75% of the egg compliment].
	Juvenile Survival to LGR	Life stage survival (parr, presmolt, smolt, subyearling) calculated by CJS Estimate (SURPH) produced by PITPRO 4.8+ (recapture file included), CI estimated as 1.96*SE. Apply survival by life stage to LDG to estimate of abundance by life stage at the tributary and the sum of those is total smolt abundance surviving to LGD. So juvenile survival to LGD = Total estimated smolts to surviving to LGD/Total estimated juveniles leaving tributary.
	Juvenile Survival to all Mainstem Dams	*Juvenile survival to Lower Granite and Mainstem Dam(s)*, which is estimated using PIT tag technology. Survival by life stage to and through the hydro-system is possible if enough PIT tags are available from the stream. Using tags from all life stages combined we will calculate (SURPH) the survival to all mainstem dams.

Performance Measure		Definition
	Post-release Survival	Post-release survival of natural and hatchery-origin fish are calculated as described above in the performance measure "Survival to LGR and Mainstem Dams". No additional points of detection (i.e., screw traps) are used to calculate survival estimates.
Distribution	Adult Spawner Spatial Distribution	Extensive area tributary spawner distribution. Raw database measure only.
	Stray Rate	Estimate of the number and percent of hatchery origin fish on the spawning grounds, as the percent within MPG, and percent out of ESU. Calculated from 1) total known origin carcasses, and 2) uses fish released above weir. Data adjusted for unmarked carcasses above and below weir.
	Juvenile Rearing Distribution	Chinook rearing distribution observations are recorded using multiple divers who follow protocol described in Thurow (1994).
	Disease Frequency	Natural fish morts are provided to IDFG or FWS for routine disease testing protocols. Hatcheries routinely samples fish for disease and will defer to then for sampling numbers and periodicity
Genetic	Relative Reproductive Success (Parentage)	Derived measure: the relative production of offspring by a particular genotype. Parentage analyses using multilocus genotypes are used to assess reproductive success, mating patterns, kinship, and fitness in natural populations and are gaining widespread use with the development of highly polymorphic molecular markers
	Genetic Diversity	Indices of genetic diversity - measured within a tributary (heterozygosity - allozymes, microsats), or among tributaries across population aggregates (e.g., FST).
	Reproductive Success (Nb/N)	Derived measure: determining hatchery/wild proportions, effective population size is modeled.
	Effective Population Size (Ne)	Derived measure: the number of breeding individuals in an idealized population that would show the same amount of dispersion of allele frequencies under random genetic drift or the same amount of inbreeding as the population under consideration
Life History	Age Class Structure	Proportion of escapement composed of adult individuals of different brood years. Calculated for wild and hatchery origin conventional and captive brood. adult returns. Assessed via scale method, dorsal fin ray ageing, or mark recoveries. Juvenile Age is determined by brood year (year when eggs are placed in the gravel), then Age is determined by life stage of that year . Methods to age Chinook captured in screw trap are by dates; fry – prior to July 1; parr – July 1-August 31; presmolt – September 1 – December 31; smolt – January 1 – June 30; yearlings – July 1 – with no migration until following spring. The age class structure of juveniles is determined using length frequency breakouts for natural-origin fish. Scales have been collected from natural-origin juveniles, however, analysis of the scales have never been completed. The age of hatchery-origin fish is determined through a VIE marking program which identifies fish by brood year. For steelhead we attempt to use length frequency but typically age of juvenile steelhead is not calculated.
	Age–at–Return	Age distribution of spawners on spawning ground. Calculated for wild and hatchery conventional and captive brood adult returns. Assessed via scale method, dorsal fin ray ageing, or mark recoveries.
	Age–at-Emigration	Juvenile Age is determined by brood year (year when eggs are placed in the gravel) Then Age is determined by life stage of that year . Methods to age Chinook captured in screw trap are by dates; fry – prior to July 1; parr – July 1-August 31; presmolt – September 1 – December 31; smolt – January 1 – June 30; yearlings – July 1 – with no migration until following spring. The age class structure of juveniles is determined using length frequency breakouts for natural-origin fish. Scales have been collected from natural-origin juveniles, however, analysis of the scales have never been completed. The age of hatchery-origin fish is determined through a VIE marking program which identifies fish by brood year. For steelhead we attempt to use length frequency but typically age of juvenile steelhead is not calculated.
	Size-at-Return	Size distribution of spawners using fork length and mid-eye hypural length. Raw database measure only.
	Size-at-Emigration	Fork length (mm) and weight (g) are representatively collected weekly from natural juveniles captured in emigration traps. Mean fork length and variance for all samples within a life stage-specific emigration period are generated (mean length by week then averaged by life stage). For entire juvenile abundance leaving a weighted mean (by life stage) is calculated. Size-at-emigration for hatchery production is generated from pre release sampling of juveniles at the hatchery.
	Condition of Juveniles at Emigration	Condition factor by life stage of juveniles is generated using the formula: $K = (w/l^3)(10^4)$ where K is the condition factor, w is the weight in grams (g), and l is the length in millimeters (Everhart and Youngs 1992).

Performance Measure		Definition
	Percent Females (adults)	The percentage of females in the spawning population. Calculated using 1) weir data, 2) total known origin carcass recoveries, and 3) weir data and unmarked carcasses above and below weir. Calculated for wild, hatchery, and total fish.
	Adult Run-timing	Arrival timing of adults at adult monitoring sites (weir, DIDSON, video) calculated as range, 10%, median, 90% percentiles. Calculated for wild and hatchery origin fish separately, and total.
	Juvenile Emigration Timing	Juvenile emigration timing is characterized by individual life stages at the rotary screw trap and LGR. Emigration timing at the rotary screw trap is expressed as the percent of total abundance over time while the median, 0%, 10, 50%, 90% and 100% detection dates are calculated for fish at LGR.
	Mainstem Arrival Timing (Lower Granite)	Unique detections of juvenile PIT-tagged fish at LGR are used to estimate migration timing for natural and hatchery origin tag groups by life stage. The actual Median, 0, 10%, 50%, 90% and 100% detection dates are reported for each tag group. Weighted detection dates are also calculated by multiplying unique PIT tag detection by a life stage specific correction factor (number fish PIT tagged by life stage divided by tributary abundance estimate by life stage). Daily products are added and rounded to the nearest integer to determine weighted median, 0%, 50%, 90% and 100% detection dates.
Habitat	Water Temperature	Various, mainly Hobo and other temp loggers at screw trap sights and spread out throughout the streams
	In stream Flow	USGS gauges and also staff gauges
In-Hatchery Measures	Hatchery Production Abundance	The number of hatchery juveniles of one cohort released into the receiving stream per year. Derived from census count minus prerelease mortalities or from sample fish- per-pound calculations minus mortalities. Total release numbers provided by NPT Production Division or Agency releasing fish. NPTH M&E currently testing method of using PIT tag detections prior to release in the acclimation ponds and detections at time of release to get a more accurate estimate.
	In-hatchery Life Stage Survival	Numbers normally provided by hatchery staff. General description would included: In-hatchery survival is calculated during early life history stages of hatchery-origin juvenile Chinook. Enumeration of individual female's live and dead eggs occurs when the eggs are picked. These numbers create the inventory with subsequent mortality subtracted. This inventory can be changed to the physical count of fish obtained during CWT or VIE tagging. These physical fish counts are the most accurate inventory method available. The inventory is checked throughout the year using 'fish-per-pound' counts. Estimated survival of various in-hatchery juvenile stages (green egg to eyed egg, eyed egg to ponded fry, fry to parr, parr to smolt and overall green egg to release) Derived from census count minus prerelease mortalities or from sample fish- per-pound calculations minus mortalities
	Size-at-Release	Mean fork length measured in millimeters and mean weight measured in grams of a hatchery release group. Measured during prerelease sampling. Sample size determined by individual facility and M&E staff
	Juvenile Condition Factor	Condition Factor (K) relating length to weight expressed as a ratio. Condition factor by life stage of juveniles is generated using the formula: $K = (w/l^3)(10^4)$ where K is the condition factor, w is the weight in grams (g), and l is the length in millimeters (Everhart and Youngs 1992).
	Fecundity by Age	The reproductive potential of an individual female. Estimated as the number of eggs in the ovaries of the individual female. Measured as the number of eggs per female calculated by weight or enumerated by egg counter.
	Spawn Timing	Spawn date of broodstock spawners by age, sex and origin, Also reported as cumulative timing and median dates
	Hatchery Broodstock Fraction	Percent of hatchery broodstock actually used to spawn the next generation of hatchery F1s. Does not include pre-spawn mortality.
	Hatchery Broodstock Pres-pawn Mortality	Percent of adults that die while retained in the hatchery, but before spawning.
	Female Spawner ELISA Values	Screening procedure for diagnosis and detection of BKD in adult female ovarian fluids. The enzyme linked immunosorbent assay (ELISA) detects antigen of R. salmoninarum
	In-Hatchery Juvenile Disease Monitoring	Screening procedure for bacterial, viral and other diseases common to juvenile salmonids. Gill/skin/ kidney /spleen/skin/blood culture smears conducted monthly on 10 morts per stock
	Length of Broodstock Spawner	Mean fork length by age measured in millimeters of male and female broodstock spawners. Measured at spawning and/or at weir collection.
	Prerelease Mark Retention	Percentage of a hatchery group that have retained a mark up until release from the hatchery. Estimated from a sample of fish visually calculated as either "present" or "absent"

Performance Measure		Definition
	Prerelease Tag Retention	Percentage of a hatchery group that have retained a tag up until release from the hatchery. Estimated from a sample of fish passed through a CWT detector or PIT tag detector. (All types of tags)
	Hatchery Release Timing	Departures according to date and time of day. Normally determined through PIT tag detections at facility exit
	Chemical Water Quality	Hatchery operational measure (DO); measured continuously at the hatchery with DO meters and 3 times daily at acclimation facilities with hand-held devices. Hatchery operational measures (NH_3 and NO_2); measured weekly only at reuse facilities (Kooskia Fish Hatchery).
	Water Temperature	Hatchery operational measure (Celsius) , Measured continuously at the hatchery with thermographs and 3 times daily at acclimation facilities with hand-held devices.

Table A.2. Standardized performance measures and definitions quantified for evaluation of NPTH FCS production.

Performance Measure		Definition
Abundance	1. Adult Escapement (to Snake Basin upstream of LGR	Number of adult fish, including jacks that have "escaped" past fisheries to LGR. Partitioned by origin, age, and release group. Based on run-reconstruction.
	4. Index of Spawner Abundance - redd counts	Counts of redds in spawning areas via multiple pass extensive area aerial counts.
	5. Spawner Abundance	Derived measure based on Adult Escapement to LGR adjusted for fish removed for broodstock or by harvest at or upstream of LGR.
	6. Hatchery Fraction	1) Percent of fish on spawning ground that originated from a hatchery. Determined from carcass sampling for individual spawning aggregates. 2) Also reported for total spawner abundance upstream of LGR. From run-reconstruction. 3) Percentage of fish used in broodstock of Snake Basin hatchery origin.
	7. Ocean/Mainstem Harvest	Raw measure (primary). Number of fish caught in ocean, mainstem or tributary fisheries (commercial, tribal, or recreational). Determined from CWT commercial landings, creel surveys, etc.
	13. Hatchery Production Abundance	Raw measure (primary). Number of parr, presmolts, or smolts released from a hatchery per year.
	15. Run Prediction	Derived measure. Short-term forecast of expected adult returns to some point (e.g., mouth of Columbia, or Snake River) based on current data (e.g., # smolts out, prior years adult returns, etc.).
Survival – Productivity	16. Smolt-to-Adult Return Rate	Raw measure (secondary): Number of adults from a given brood year returning to a point (e.g., LGR dam) divided by the number of smolts that left this point 1-3 years prior, integrated over all return years.
	17. Progeny-per- Parent Ratio	Derived measure: Lambda, the median annual population growth rate estimate from adult-to-adult data (BiOp 2000, pg 6-4). Raw or derived measure: adult-to-adult can be either the ratio of return spawner to parent spawner abundance using expanded estimates, or a raw measure using ratio of return redds to parent redds.
	20. Juvenile Survival to LGR	Raw measure (secondary): Survival rate measure estimated from detection of PIT tagged smolts at first mainstem dam, or model derived survival rates based on detections at first and second mainstem dams (e.g., using SURPH). Smolts or parr are tagged in the tributary rearing areas.
	21. Juvenile Survival to all Mainstem Dams	Raw measure (secondary): Survival from first dam where stock enters mainstem Columbia or Snake River to Bonneville. Derived from PIT tag detections.
	22. In-hatchery Life Stage Survival	Raw measure (secondary): egg to fry, parr or smolt survival in hatchery. Ratio of number of eggs spawned to number at life stage.
	23. Post-release Survival	Raw measure (secondary): Survival from release (e.g., parr, presmolt, or smolt) to further sampling points (e.g., rotary screw traps at outlet of tributary, first mainstem dam encountered by smolts, dam encountered on return).
Distribution	25. Adult Spawner Spatial Distribution	Raw measure: Tributary spawner distribution – extensive estimates of where spawners are found within a tributary. Subbasin spawner distribution - presence/absence surveys across multiple tributaries within a subbasin.
	26. Stray Rate	1) Percentage of non-Snake Basin hatchery origin adults in the spawner abundance estimate based on run-reconstruction. 2) Percentage of non-Snake Basin hatchery origin fish included in hatchery broodstock (based on known mark type and scale-pattern origin determination.
	28. Disease Frequency	Raw Measure: Percent of fish infected with particular diseases or presence/absence of a particular disease.
Gen etic	30. Genetic Diversity	Raw or derived: The use of genetic data (e.g., micro-satellite, single nucleotide polymorphisms etc.) to; evaluate the distribution of diversity within and/or among groups of fish, track the retention of neutral genetic variation over time (e.g., using allelic richness); etc.

Performance Measure		Definition
	31. Effective Population Size (N_e)	Derived measure: A generational measure of the number of breeding individuals in an idealized population that would show the same amount of dispersion of allele frequencies under random genetic drift or the same amount of inbreeding as the population under consideration
	33. Effective Population Size to Census Size Ratio (N_e/N)	Derived Measure: Estimated effective population size divided by estimated escapement. Used to probabilistically predict the rate at which genetic variation will be lost given current rates of mortality and/or to gauge the value of alternative management actions and/or to evaluate the optimal size of hatchery broodstock and release goals. Can also be calculated using N.
Life History	34. Age Class Structure	Derived measure: The proportion of escapement composed of individuals of different brood years, typically assessed via length measurements and length at age relationships, from analysis of calcified structures, using scales, and recovering marks.
	35. Age–at–Return	Raw measure (primary): Age distribution of spawners on spawning ground determined from length at age relationships, scale analysis, calcified structure analysis, or mark recovery from carcass surveys.
	36. Age–at-Emigration	Raw measure (primary): Age distribution of emigrants (e.g., proportion of emigrants at fry, parr, pre-smolt, and smolt stages) from tributaries, determined from rotary screw trap or weir collection, scale collection, or inferences from size.
	37. Size-at-Return	Raw measure (primary): Size distribution of spawners on spawning ground determined from length or scale analysis from carcass surveys.
	38. Size-at-Emigration/Release	1) Size distribution and average (length, weight) of emigrants (e.g., proportion of emigrants at fry, parr, presmolt, and smolt stages) from tributaries determined from seine or rotary screw trap. 2) Length Frequency, average length, and fish/lb estimates for each release group within 3 days of release (start of volitional).
	39. Condition of Juveniles at Emigration	Derived measure: A species-specific length to weight relationship used as an index of growth (W/L^3). Comparative length/weight data are determined from in-hatchery evaluations, tributaries and rotary screw trap operation, or weir collection.
	40. Adult Spawner Sex Ratio	Raw measure (primary): Carcass or weir counts.
	41. Fecundity by Age	Derived or raw measure (primary): Derived if determined indirectly using existing length-fecundity relationships. Raw measure if based on direct sampling of returning females.
	42. Adult Run-timing	Raw measure (primary): Time at arrival at mouth of major tributaries. Peak, range, 10th-90th percentiles
	43. Spawn-timing	Raw measure (primary): Estimated using the observed dates of redd construction within major tributaries. Peak, range and 10th-90th percentiles.
	44. Juvenile Emigration Timing	Raw measure (primary): Distribution of emigration dates within major tributaries. Peak, range and 10th-90th percentiles.
	50. Water Temperature	Raw Measure: Water temperature