Appendix G - Hatchery and Genetic Management Plan (HGMP)

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Clearwater Fish Hatchery

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

Spring Chinook Salmon (*Oncorhynchus tshawytscha*), not listed
Steelhead Trout (*Oncorhynchus mykiss*), ESA listed

1.3) Responsible organization and individuals

Lead Contact
Name (and title): Tom Rogers (Anadromous Fish Hatchery Manager)
Agency or Tribe: Idaho Department of Fish and Game
Address: 600 South Walnut, POB 25, Boise, Idaho, 83707
Telephone: 208-334-3791
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On-site operations staff lead
Name (and title): Jerry McGehee (Fish Hatchery Manager 2)
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1.4) Funding source, staffing level, and annual hatchery program operational costs.

U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan funded.
Staffing level = 23.7 person-years
Annual operation cost = $1,300,000

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

Clearwater Fish Hatchery - The program consists of the main hatchery and three satellite facilities. The Clearwater Fish Hatchery is located at confluence of the North Fork and main Clearwater rivers, river kilometer 65 on the Clearwater River; 121 kilometers upstream from Lower Granite Dam, and 842 kilometers upstream from the mouth of the Columbia River. The Hydrologic Unit Code (EPA reach code) is 17060300800100.00.

The main hatchery serves primarily as an incubation, rearing, and distribution center for the program. There are no trapping facilities at the main hatchery. The Dworshak National Fish Hatchery program supplies fertilized steelhead eggs (Dworshak National Fish Hatchery provides mitigation for the US Army Corps of Engineers Dworshak Dam. Chinook eggs are obtained from trapping that occurs at three satellite facilities. The main facility has also been used for segregation-rearing of high BKD chinook and incubation and rearing of fish for other programs.

Red River satellite facility is located at river kilometer 27 of Red River, a tributary to the South Fork of the Clearwater River at river kilometer 101. The facility is 310 kilometers upstream from Lower Granite Dam and 1,030 kilometers from the mouth of the Columbia River.

Crooked River satellite facility is located at river kilometer 1 of Crooked River, also a tributary to the South Fork Clearwater River at river kilometer 94. The facility is located 287 kilometers upstream from Lower Granite Dam and 1,007 kilometers upstream from the mouth of the Columbia River.

Powell satellite facility is located at the headwaters of the Lochsa River (river kilometer 0), at the confluence of Brushy Fork Creek and Colt Killed Creek (previously White Sand Creek). The Lochsa River is a tributary to the Middle Fork Clearwater. The satellite facility is 320 kilometers upstream from Lower Granite Dam and 1,040 kilometers upstream from the mouth of the Columbia River.

1.6) Type of program.

Clearwater Fish Hatchery was designed as an *Isolated Harvest Program*. However, some broodstock management, rearing, and juvenile releases support ongoing supplementation evaluations.

1.7) Purpose (Goal) of program.

The goal of this program is to return 12,000 spring chinook salmon and 14,000 steelhead above Lower Granite Dam to mitigate for survival reductions resulting from construction of the four lower Snake River dams.

1.8) Justification for the program.

The primary purpose of this program is harvest mitigation. Spring chinook salmon in the Clearwater River basin are not ESA-listed, and the program was not intended to enhance or benefit the survival of listed steelhead. Steelhead in the basin were listed after design and construction of the facilities.

1.9) List of program "Performance Standards."

The purpose of this program is to mitigate the effects of lower Snake River dams.

Specific program objectives include:

- Conduct within hatchery research and improve the performance of artificial production

- Restore and create viable, naturally spawning populations through associated supplementation programs.

- Determine the contribution of hatchery-produced chinook salmon to fisheries.

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

1.10.1 "Performance Indicators" addressing benefits.

Performance indicators (from NWPPC document 99-15) that address potential benefits include:

1) Manage for increasing trends in redd counts in supplemented areas.
2) Research, monotoring and evaluation effort in place to document survival of juveniles and returning adults.
3) Stringent disease standards in place.
4) Manage program consistent with subbasin goals, objectives and stragegies.
5) Evaluate potential hatchery/wild competition.
6) Evaluate the fate of hatchery population in terms of adult returns.

1.10.2) "Performance Indicators" addressing risks.

Performance indicators (from NWPPC document 99-15) that address potentially detrimental risks include:

1) Application of genetic information to annual broodstock spawning designs.
2) Ongoing evaluation of smolt emigration success (survival) and run timing.
3) Ongoing comparison of relative success of program supplementation strategies.
4) Ongoing protocol in place to manage disease transmission risk
5) Ongoing monitoring of life history characteristics (e.g., weight, length, maturation timing, percent maturation, fecundity, growth, survival, etc.).
6) Ongoing monitoring of hatchery parameters (e.g., percent survival of eggs to eyed stage, percent survival of eggs to hatch, percent survival of fry to release.
7) Ongoing monitoring of pre-release juvenile fish quality and health.

1.11) Expected size of program.

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

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

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling		
Yearling	Red River	334,000 chinook
	Crooked River	700,000 chinook
	Powell	334,000 chinook

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

See tables 1-4 at end of document.

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

Clearwater Fish Hatchery was completed and became operational in 1990. Satellite facilities and completion dates: Powell - 1989, Red River - 1986, and Crooked River - 1990. The Red River facility was originally constructed under the Columbia Basin Development Program, and was later modified under the Lower Snake River Compensation Program.

1.14) Expected duration of program.

This program is expected to operate indefinitely, or until the hydrosystem impacts the program mitigates for are reduced to zero.

1.15) Watersheds targeted by program.

Clearwater River basin, South Fork Clearwater River (Crooked River and Red River), and Lochsa River.

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

The program is designed to mitigate for reduced survival of salmon and steelhead due to the four Lower Snake River dams: Lower Granite Dam, Little Goose Dam, Lower Monumental Dam, and Ice Harbor Dam. No alternative actions have been considered, but would need to be addressed if breaching of the dams occurs.

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

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

Chinook, steelhead, and coho programs at Clearwater Fish Hatchery are authorized for incidental take of listed fall chinook, steelhead, and bull trout through Section 7 consultation conducted between the USFWS and NMFS. These have generally been multi-year consultations. Spring chinook in the Clearwater drainage are not listed, and any mainstem effects were also covered in the consultation and the resulting Columbia Basin-wide hatchery Biological Opinion issued by NMFS. The recent Biological Opinion on the FCRPS called for development of HGMPs for all Snake Basin hatcheries as an off-site mitigation RPA; however, no funds have been provided. Work on an HGMP to meet NMFS guidelines is in progress.

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

Spring chinook salmon in the basin are not ESA-listed. No fall chinook salmon are collected or handled within this program.

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

The Clearwater Fish Hatchery spring chinook salmon and steelhead programs may affect listed Snake River steelhead and Snake River fall chinook salmon.

Salmon and steelhead smolt releases occur in spring, usually the last of March or the first week in April. Releases do occur at about the same time when wild/natural steelhead are migrating. While they are migrating together, there may be some interaction, but we have no data on the exact nature or extent of the interaction. We do not expect any interaction between fall chinook juveniles and hatchery-released juvenile salmon and steelhead because of spatial separation (fall chinook salmon occupy different habitat).

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

No ESA-listed populations will be directly affected by the program.

- Identify the ESA-listed population(s) that may be incidentally affected by the program.

Snake River steelhead and fall chinook salmon.

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

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

Critical or viable population thresholds have not been identified for steelhead or fall chinook salmon. A threshold escapement level of 300 to 400 fall chinook salmon spawners is identified in BRWG (1994) and Connor (1994).

- 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.

Unknown

- 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.

Unknown

- 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.

2.2.3) <u>Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take</u>

- 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.

No take of listed species is expected through the execution of the hatchery program in the target area.

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

Past take is unknown but likely zero.

- **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).**

No take of listed species is expected through the execution of the hatchery program.

- 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.

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.

No ESU-wide hatchery plans for spring chinook salmon or steelhead currently exist. The Clearwater Fish Hatchery spring chinook salmon and steelhead programs are consistent with the following policy excerpts from the NPPC Artificial Production Review (NPPC 99-15):

- The manner and use of artificial production is considered in the context of the environment in which it is used.
- Artificial production is implemented within an adaptive management design that includes evaluation programs to determine benefits and address scientific uncertainties.
- The hatchery is operated in a manner that recognizes that it exists within an ecological system whose behavior is constrained by larger-scale basin, regional and global factors.
- A diversity of life history types and species needs to be maintained in order to sustain a system of populations in the face of environmental variation.
- Naturally selected populations provide the model for successful artificially reared populations, in regard to population structure, mating protocol, behavior, growth, morphology, nutrient cycling, and other biological characteristics.
- The hatchery is authorized and managed as a mitigation facility for decreased survival of spring chinook salmon and steelhead resulting from the Lower Snake River dams.
- Risk management strategies are implemented to reduce adverse effects on other native species.
- Legal mandates and obligations for fish protection, mitigation, and enhancement are addressed.

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

The spring chinook salmon and steelhead production programs at Clearwater Fish Hatchery are part of the Lower Snake River Compensation Plan (LSRCP) program. The LSRCP was authorized by the Water Resources Development act of 1976, Public Law (P.L.) 94-587, to offset losses caused by the four Lower Snake River dam and navigation lock projects.

Chinook, steelhead and coho programs at Clearwater Fish Hatchery are consistent with the production components in the Fall 2000 and the Spring 2000 agreements, negotiated pursuant to U.S. v Oregon. Chinook and steelhead production are also consistent with the IDFG Fish management Plan (2001) and the LSRCP design. For the last few years, Clearwater Fish Hatchery has reared chinook consistent with elements of the Nez Perce Tribal Hatchery plan.

3.3) Relationship to harvest objectives.

Sport harvest fisheries are managed to reduce potential impacts to ESA-listed steelhead and fall chinook salmon. Hatchery fish are marked with an adipose clip; sport anglers may only retain ad-marked fish. Barbless hooks are required in salmon and steelhead sport fisheries.

Harvestable fish (those in excess of broodstock needs) are shared between tribal and nontribal fisheries. When harvestable runs occur, harvest co-management planning identifies numbers of harvestable fish and equal shares for both parties.

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.

Sport angling for steelhead occurs every year, except in 1975 when the season was closed due to poor returns.

Recent sport fisheries for spring chinook salmon occurred in 1990, 1992, 1997, 1998, and 2000.

Tribal subsistence fisheries occurred in 11 of 14 years from 1987-2000.

3.4) Relationship to habitat protection and recovery strategies.

The purpose of the Clearwater Fish Hatchery program is to mitigate for reduced survival that resulted from construction of the four lower Snake River dams. The duration of this program is permanent for the foreseeable future.

Habitat restoration programs in Crooked River and Red River have benefited supplementation programs in those rivers.

3.5) Ecological interactions.

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

(1) negatively impact program;

There are several species in the Clearwater and Lower Snake rivers that could negatively impact program fish. These effects are primarily in the form of predation on juveniles, and less so on returning adults. The most prominent predatory fish species in the area include smallmouth bass and northern pikeminnow. Although they are not in high abundance, bull trout are sometimes observed in North Fork Clearwater River below Dworshak Dam. Program fish likely provide some forage for bull trout in the area. Avian predators commonly observed include gulls, bald eagle, osprey, great blue heron, and kingfisher. River otters also occur in the Clearwater River and have the potential to prey on program fish.

(2) be negatively impacted by program;

Species that could be negatively impacted by the program include ESA listed Snake River steelhead and Snake River fall chinook salmon. Program fish may interact with these species by competing for food and space and preying on subyearlings.

(3) positively impact program;

None.

(4) be positively impacted by program. Give most attention to interactions between listed and Acandidate@ salmonids and program fish.

All species listed in Item 1 above that could negatively impact the program through predation, could, as a result, be positively impacted by the program

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.

Clearwater Fish Hatchery - Clearwater Fish Hatchery receives water through two supply pipelines from Dworshak Reservoir. The warm water intake is attached to a floating platform and can be adjusted from five feet to forty feet below the surface. The cool water intake is stationary at 245 feet below the top of the dam. An estimated 10-cfs of water is provided by the cool water supply and 70 cfs of water from the warm water supply. The cool water supply has remained fairly constant between 38^{o}F and 45^{o}F. The warm water can reach 80^{o}F but is adjusted regularly to maintain 56^{o}F for as long as

possible throughout the year. When water temperatures drop in the fall, the intake will be moved to the warmest water available until water temperatures rise in the spring. All water is gravity flow to the hatchery. The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

Red River Satellite - Red River's water source is from the South Fork of Red River where a hand built diversion diverts water into a screen on the bottom of the river and a pipeline delivers it to the rearing pond and adult facility. The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

Crooked River Satellite - Crooked River's water source is from Crooked River where a hand built diversion diverts water into a screen on the bottom of the river and a pipeline delivers it to the rearing pond and adult facility. The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

Powell Satellite – The water source is from Walton Creek where a hand built diversion diverts water into a screen on the bottom of the river, and a pipeline delivers it to the rearing pond and adult facility. The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

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.

The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

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

5.3) Broodstock holding and spawning facilities.

The main Clearwater Hatchery is not a collection facility, but it does have an adult holding facility. This consists of two ponds with a combined capacity of 8,000 cubic feet and a maximum holding capacity of 800 adult salmon. Each pond measures 10' x 1000' and an average depth of four feet deep. There is a covered spawning area with live tanks at the head of each holding pond.

The Powell facility also has two adult ponds measuring each 100' x 20' x 4'8". The volume of the two ponds is 9,500 cubic feet with a holding capacity of 960 adult chinook. It is supplied with 6.24 cfs of water. There is a covered spawning area with live tanks at the head of each holding pond.

Red River has an adult trapping and holding facility. The two adult holding ponds are each 10' x 45' with an average 4' depth. Total holding space is 3,400 cubic feet and total holding capacity is 350 adult fish. This facility also has a covered spawning area with live tanks at the head of each holding pond.

Crooked River has no broodstock holding or spawning facility.

5.4) Incubation facilities.

The Clearwater Hatchery incubation room contains 40 double stack Heath incubators with a total of 640 trays available for egg incubation. The upper and lower half of each stack (eight trays each) has a different water supply and drain. This design aids in segregation of diseased eggs. The maximum capacity of this facility is five million green eggs. The incubation room is supplied with both water sources to provide the desired temperature for incubation with a flow of 5 to 8 gpm per one-half stack.

Isolation incubation consists of 12 double stack Heath Incubators with a total of 192 trays available for egg incubation. The maximum capacity of this facility is 1.5 million green eggs. The isolation incubation room is supplied with both water sources to provide the desired temperature for incubation with a flow of 5 to 8 gpm per stack.

5.5) Rearing facilities.

Clearwater Fish Hatchery - The steelhead raceways consist of 300 ft x 10 ft x 6-ft deep raceways supplied by a center head raceway with an East and West Bank of 12 raceways each. The total rearing space of 24 raceways is 216,000 cubic feet. This area will rear a maximum capacity of 2.4 million steelhead smolts with 0.3 density index (DI) (Piper 1986). A flow of approximately 1.67 cubic feet per second (cfs) is available for each raceway, but it is suspected that this flow will only allow 1.7 million steelhead to be reared in these raceways without exceeding the flow index (FI) of 1.2 (Piper 1986). All water for these raceways flows through degassing towers and then into the head raceway. These raceways are supplied with water from the surface intake only.

Chinook raceways are 200 ft x 10 ft x 3 ft deep. Eleven raceways have a total rearing space of 66,000 cubic feet. The raceways are supplied with water from both primary and secondary intakes and a mixing chamber, which allows for the control of water temperature to rear chinook. The designed rearing capacity of these raceways is 1.5 million smolts at a 0.3 DI. The estimated flow per raceway is 2.4 cfs.

Early rearing space consists of sixty concrete vats. Each measures 40 ft x 4 ft x 3 ft deep and contains 480 cubic feet of rearing space. This part of the facility can rear 5.9 million fish to 287 fish/lb. at a 0.3 DI. The vats are supplied with water from each intake and have a flow of approximately 120 gallons per minute per vat when all vats are in use. An incubation jar is plumbed directly into each vat. The 60 incubator jars have a total capacity of 2.6 million eggs with a flow of 15 gpm per jar.

Crooked River - The Crooked River facility has two raceways, measuring 145 ft x 20 ft x 4 ft deep, for a total of 23,200 cubic feet. These raceways have a capacity of 700,000 juvenile chinook with a DI of 0.29. Water flow per raceway is 6 cfs. Each raceway is outfitted with three automatic Nielson feeders. The adult trapping facility measures 10 ft x 12 ft x 4 ft deep with a total of 480 cubic feet. Water flow for the adult facility is 10 cfs. This facility has no provision for adult holding.

Powell - The rearing pond measures 165 ft x 65 ft x 5 ft deep and has 53,625 cubic feet of rearing space. The normal loading of 320,000 fish produces the best looking smolts and a DI significantly less than 0.3. The maximum design capacity is 500,000 fish with a DI of 0.092. Water flow through this pond is 6.24 cfs. A catwalk across the length of the pond supports eight automated Nielson feeders.

Red River - A 170-ft x 70 ft x 4 ft 6 in. deep rearing pond will rear a maximum of 320,000 chinook smolts. The maximum design capacity is 500,000 fish with a DI of 0.092. Water flow through this pond is 6.24 cfs. This pond has a hypalon plastic liner with eight to ten inch diameter cobblestones on the inclined banks. The bottom of the pond is a bare liner, which aids in pond vacuuming. A catwalk runs the entire length of the rearing pond and holds eight automatic Nielson feeders. Water flow through the pond is 4.09 cfs.

5.6) Acclimation/release facilities.

Same as described in 5.5.

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

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.

No ESA-listed fish are reared at the facilities. Substantial alarm systems, safety procedures, disease protocols, and personnel staffing are implemented to avoid disasters or impacts to fish.

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.

Chinook Salmon - Indigenous spring chinook salmon populations in the Clearwater basin were believed to have been virtually eliminated by the construction and operation of Lewiston Dam

from 1927 to 1972. However, the dam was modified in the 1960s to facilitate passage of chinook salmon. Other efforts to restore spring chinook salmon runs in the basin consisted of outplants of juveniles from several hatcheries in the Columbia River basin, and the present naturally producing population are likely influenced by fish of nonnative origin. The primary stock used for Clearwater River introductions was Rapid River Fish Hatchery, and this stock has been released in the basin in recent years. Current preferred broodstocks are adult returns to weirs at the satellite facilities. Returns to the Red River and Crooked River weirs are now managed as an aggregate South Fork Clearwater River stock. Powell and South Fork Clearwater River stocks may be used at either facility depending upon broodstock availability. Dworshak National Fish Hatchery stock has also been used in the Clearwater River Program. The original broodstock for the Powell facility was trapped using the floating Mitsubishi weir at the confluence of Colt Killed Creek and Crooked Fork Creek.

Steelhead - Dworshak National Fish Hatchery supplies fertilized B-run steelhead eggs for the Clearwater Fish Hatchery steelhead program.

6.2) Supporting information.

6.2.1) History.

6.2.2) Annual size.

Natural-origin fish are not used in harvest mitigation broodstocks.

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

Natural-origin fish are not currently incorporated into the harvest mitigation broodstock or Crooked River supplementation broodstock. When natural runs are restored to historic self-sustaining levels, they may be incorporated into harvest mitigation broods for genetic management.

Natural-origin fish are incorporated into Red River supplementation broodstocks.

6.2.4) Genetic or ecological differences.

Natural stocks were extirpated by Lewiston Dam.

6.2.5) Reasons for choosing.

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.

Natural-origin fish are not used in harvest mitigation broodstocks.

SECTION 7. BROODSTOCK COLLECTION

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

Only adults are collected for broodstock.

7.2) Collection or sampling design.

At this time no unmarked (natural origin) fish are incorporated into the hatchery broodstock. All adult fish collected for broodstock at all locations are of hatchery origin.

Red River - Collection is accomplished by a weir across Red River, diverting fish into the trapping facility.

Crooked River - Collection is accomplished by a weir across Crooked River, diverting fish into the trapping facility.

Powell - The fish encounter no weir on the Lochsa and turn into the water of Walton Creek following their own instincts to return to the water where they were acclimated and released as smolts.

7.3) Identity.

All harvest mitigation hatchery produced fish are marked with an adipose fin clip. Releases for supplementation programs may be marked with a pectoral fin clip or CWT and no fin clip.

7.4) Proposed number to be collected:

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

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

Year	Adults			Eggs	Juveniles
	Females	Males	Jacks		
1988					
1989					
1990					
1991					

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1992					
1993					
1994					
1995					
1996					
1997					
1998					
1999					

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

7.6) Fish transportation and holding methods.

7.7) Describe fish health maintenance and sanitation procedures applied.

7.8) Disposition of carcasses.

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

ESA-listed species are not collected or handled during brood stock collection.

SECTION 8. MATING

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

8.1) Selection method.

Females - The females are sorted twice per week and all ripe females are used for spawning each day.

Males - Males are randomly selected for spawning each spawning day. As each male is spawned it receives an opercle punch and is placed back into the holding pond. A male which is used for a second time (with opercle punch) will be used for spawning, killed, and then the carcass returned to the drainage if there are no BKD lesions. An effort will be made to use all returning fish for spawning during the spawning year. At least five to ten percent of the jacks will be used during the spawning process.

8.2) Males.

See 8.1.

8.3) Fertilization.

Spawning ratios of 1 male to 1 female will be used unless the broodstock population is less than 100 females. If the spawning population is less than 100 females, then eggs from each female are split into two equal groups. Each group is fertilized by a different male. One cup of well water will be added to each bucket and set aside for 30 seconds to one minute. The two buckets are then poured together and continue through the spawning process. When the broodstock population is 50 females to 25 females, the eggs from each female will be split into three equal groups and each group fertilized by a different male. One cup of well water will be added to each bucket and set aside for 30 seconds to one minute, then all three buckets are poured together. When the brood tock population is 25 females or less, the eggs from each female will be divided into four equal groups, each fertilized by a separate male. The process is completed as previously mentioned to finish the spawning process. During the entire spawning year, at least five to ten percent of the jacks will be used for spawning. An effort will be made to use all returning fish for spawning. If presented with an excess number of one sex, then gametes from individual parents may be subdivided and each part fertilized with gametes of different parents. No natural occurring fish are incorporated into the spawning operation.

8.4) Cryopreserved gametes.

No cryopreserved gametes are used in the programs.

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.

No natural-occurring fish are incorporated into the spawning operation.

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) <u>Incubation</u>:

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

9.1.2) Cause for and disposition of surplus egg takes.

9.1.3) Loading densities applied during incubation.

Each incubator tray is loaded with 10,000 eggs or less

9.1.4) Incubation conditions.

9.1.5) Ponding.

9.1.6) Fish health maintenance and monitoring.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

No listed fish are incubated.

9.2) <u>Rearing</u>:

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..

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

Early Rearing - Flow indices are held at 1.5 or less, density index at 0.3 or less.

Final Rearing - Flow index 1.5 or less, density index at 0.33 or less. The density and flow indices are the same for rearing chinook salmon and steelhead.

9.2.3) Fish rearing conditions

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.

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

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*).

During early rearing the chinook are fed starter and grower diets from the Bio-Oregon company. Fish are fed every hour during this stage by automatic feeders until the daily ration of feed is fed out. Feeding rate will range from 5% to 1.8% body weight per day. Average conversion for this life stage is 1.31.

During final rearing the chinook are fed the grower diet from Bio-Oregon company. The daily ration of feed is fed on the hour by pneumatic operated blower feeds throughout the day until the daily ration of feed is fed out. Feeding ranges from 2 to 1/8% body weight per day. Average conversion rate during this life stage is 1.2.

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

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

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

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

Listed fish are not propagated.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels.

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

10.2) Specific location(s) of proposed release(s).
Stream, river, or watercourse:
Release point:
Major watershed:
Basin or Region:

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

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Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988								
1989								
1990								
1991								
1992								
1993								
1994								
1995								
1996								
1997								
1998								
1999								
Average								

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

10.5) Fish transportation procedures, if applicable.

All fish reared at the Clearwater Hatchery are transported off station for release in the upper basin of the Clearwater drainage. Fish are loaded into transport trucks using a Magic Valley Heliarc fish pump. The loading densities for the transport trucks is ½ pound per gallon of water. The transport tanks are insulated to maintain temperature control. Each tank is fitted with oxygen stones and fresh flows agitator. Length of transport is approximately 2½ hours for transportation of chinook.

10.6) Acclimation procedures.

Chinook salmon are held for approximately two weeks in the acclimation ponds. The screens are removed to allow for volitional release for three to five days, at which time the dam boards are removed for a force release for the rest of the population.

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

All harvest mitigation fish are marked with an adipose fin clip. Supplementation releases are marked with a pectoral fin clip or CWT-no fin clip.

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

10.9) Fish health certification procedures applied pre-release.

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

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.

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.

Until the release year of 2000, all fish released from Clearwater Fish Hatchery received some type of mark, an adipose clip for harvest mitigation releases or a pectoral fin clip for supplementation releases. During release year 2000 a portion of the steelhead stocked for the Nez Perce Tribal supplementation program were not marked. In the spring of 2001 brood year 1999 unmarked chinook salmon smolts were released for the Nez Perce Tribal supplementation program.

Types of marks commonly used are adipose clip, right and left pectoral fin clip, coded wire tags, and blank coded wire with no fin clip. PIT tags are also used to mark a portion of the chinook salmon and steelhead releases.

These marks are used to evaluate smolt-to-adult returns, migration from release sites through the migration corridor to the ocean, and evaluation of rearing strategies and feeding regimes.

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

The hatchery monitoring and evaluation program is funded annually by the USFWS-Lower Snake River Compensation Plan.

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.

SECTION 12. RESEARCH

An extensive monitoring and evaluation program is conducted in the basin to document hatchery practices and evaluate the success of the hatchery programs at meeting LSRCP mitigation objectives and IDFG management objectives, and to monitor and evaluate the success of supplementation programs. The IDFG-LSRCP hatchery monitoring and evaluation program identifies hatchery rearing and release strategies that will allow the LSRCP program to meet its mitigation requirements and improve the survival of hatchery fish while avoiding negative impacts to natural (including listed) populations. In some cases, particularly in light of ESA requirements and Idaho Supplementation Study (ISS) plans, hatcheries may be used to enhance naturally reproducing populations.

To properly evaluate this compensation effort, adult returns to facilities, spawning areas, and fisheries that result from hatchery releases are documented. IDFG's LSRCP program requires the cooperative efforts of the Hatchery Evaluation Study, the Harvest Monitoring Project, and the Coded-Wire Tag Laboratory program. The Hatchery Evaluation Study will evaluate and provide oversight of certain hatchery operational practices, e.g., broodstock selection, size and number of fish reared, disease history, and time of release. Hatchery practices will be assessed in relation to their effects on adult returns. Recommendations for improvement of hatchery operations will be made. Continuous coordination between the Hatchery Evaluation Study and

IDFG's BPA-funded supplementation research project is required because these programs overlap in several areas including juvenile outplanting, broodstock collection, and spawning (mating) strategies. LSRCP hatchery production will play a substantial role in IDFG's supplementation research.

The Harvest Monitoring Project provides comprehensive harvest information, which is key to evaluating the success of the LSRCP in meeting adult return goals. Numbers of hatchery and wild/natural in the fishery and in overall returns to the project area in Idaho are estimated. Data on the timing and distribution of the marked hatchery and wild stocks in the fishery are also collected and analyzed to develop LSRCP harvest management plans. Harvest data provided by the Harvest Monitoring Project are coupled with hatchery return data to provide an estimate of returns from LSRCP releases. Coded-wire tags continue to be used extensively to evaluate fisheries contribution of representative groups of LSRCP production releases. However, most of these fish serve experimental purposes as well, i.e., for evaluation of hatchery-controlled variables such as size, time, and location of release, rearing densities, etc.

SECTION 13. ATTACHMENTS AND CITATIONS

BRWG (Biological Requirements Work Group). 1994 Analytical methods for determining requirements of listed Snake River salmon relative to survival and recovery. Progress Report, October 13, 1994. Available from: NMFS, Environmental and Technical Services Division, 525 N.E. Oregon St. Portland, OR 97232.

Connor, W. P. 1994. Letter from W. Connor, U.S. Fish and Wildlife Service, to C. Toole, National Marine Fisheries Service, Re: Biological Parameter Work Groups Program Report, Dec. 7, 1994. Available from: NMFS, Environmental and Technical Services Division, 525 N.E. Oregon St. Portland, OR 97232.

Table 1. Crooked River satellite facility releases and returns 1984 - present; based on Hatchery Evaluation Studies interpretation of length frequency data.

Brood Year	Females Spawned(rel.)	Eggs taken	Eggs/ female	Number released	Egg-Smolt Surv.(%) [a]	Emig. year [b]	Total BY Returns	% Return (k) (SAR) (Total Return)	Adult M:F	Total M:F	Return Year /	Total
1984				251,300		1986					1987	
1985				227,500		1987	4	0.00	1.0	1.0	1988 [c]	
1986				200,100		1988	28	0.01	2.5	2.5	1989	
1987				199,690 [d]		1989	22	0.01	1.5	1.8	1990	29
1988				300,400 [e]		1990	516	0.17	1.0	1.0	1991	20
				401,000 [g]								
1989	0 (44)	0		339,087		1991	112	0.03	1.1	1.3	1992	228
1990	0 (9)	0		320,386		1992	22	0.01	0.2	0.6	1993	402
1991	0 (5)	0		0		1993	1	N/A	N/A	N/A	1994	26
1992	0 (90)	0		273,666		1994					1995	6
1993	129 (75)	614,789	4,766	311,686	81.5	1995					1996	254
				199,255 [h]								
				216,280 [i]								
				226,222 [j]								
1994	10 (6)	44,406	4,441	37,071	83.5	1996					1997	
1995	0 (0)	0	0									

(a) - to estimate egg-to-smolt survival rates, assume that: eyed egg-smolt rate=75%, fry-to-smolt rate=85%, parr-to-smolt rate=90%, pre-smolt-to-smolt rate=95%

(b) - emigration year; same as release year for smolts

(c) - 157 adults from DNFH were outplanted in Crooked River

5 yr-old
>94

(d) - from Dworshak NFH

(e) - from Kooskia NFH

(f) - 2-Oc. fish count includes 5 males of unknown age/length

(g) - released as fry

(h) - released as pre-smolts

(i) - from Rapid River FH; released as pre-smolts

(j) - from Rapid River FH

(k) - SAR's and Prog:Par. ratios previous to BY 1991 are expressed as a maximum (include naturally produced fish returning to trap). Release groups (pre-smolts, parr, and/or fry) were not differentially marked from smolt releases; contribution from these releases was assumed to be zero.

(l) - includes female holding pond mortalities and females killed and not spawned (egg take for releases not designed to return to hatchery rack was excluded)

Table 2. Red River Fish Hatchery Releases and Returns 1979 - Present. Based on Hatchery Evaluation Studies interpretation of length frequency data..

Brood Year	Females Spawned(rel.)	Eggs taken	Eggs/ female	Number released		Egg-Smolt Surv.(%) a	Emig. year b	Total BY Returns	% Return (j) (SAR) (Total Return)	% Return (j) (SAR) (Excl. Jacks)	Adult M:F	Total M:F	Return Year /	Total
1976				33,600			1978						1979	
				350,000	c									
1977				200,000	d		1979						1980	
1978				225,000	d		1980						1981	0
1979				265,000	d		1981	138	0.052	0.052	0.9	0.9	1982	NA
1980				268,000	d		1982	109	0.041	0.041	0.7	0.7	1983	138
1981				0			1983	125			1.2	1.2	1984 e	111
1982				40,725			1984	2	0.005	0.000			1985	125
				260,000	d									
1983				80,000			1985	753	0.941	0.941	1.1	NA	1985	NA
1984	49 (11)			136,800			1986	228	0.167	0.141	0.9	1.2	1987	519
1985				148,100			1987	43	0.029	0.027	1.5	1.7	1988	394
				96,400	d									
1986				50,100			1988	52	0.104	0.092	2.3	2.5	1989	104
				233,100	d									
1987	78 (82)	312,800	4,010	291,200	g		1989	14	0.005	0.004	0.7	1.0	1990	53
1988	84 (75)	391,743	4,664	240,510		61.4	1990	73	0.030	0.030	1.7	1.7	1991	18
1989	31 (14)	136,400	4,400	460,875	h		1991	115	0.025	0.024	1.0	1.1	1992	39
1990	0 (12)	0		562,113			1992	20	0.004	0.003	0.9	1.0	1993	139
1991	3 (3)	15,200	5,067	6,000	LV d	37.5	1993						1994	31
1992	6 (10)	22,860	3,810	22,246	RV d	92.4	1994						1995	4
1993	23 (42)	99,908	4,344	79,747	LV d	75.8	1995						1996	0
				241,008	AD i									
1994	7 (5)	30,634	4,376	24,002	RV	78.4	1996							
1995	1 (1)	4,376	4,376											

(a) - to estimate egg-to-smolt survival rates, assume that: eyed egg-smolt rate=75%, fry-to-smolt rate=85%, parr-to-smolt rate=90%, pre-smolt-to-smolt rate=95%

(b) - emigration year; same as release year for smolts

(c) - parr release

(d) - presmolt release

(f) - egg take destroyed due to IHN, replaced with DNFH stock

(g) - DNFH stock

(h) - includes DNFH and KNFH stock (187,075 smolts)

(i) - Rapid River stock, released as pre-smolts

(j) - SAR's and Prog:Par. ratios previous to BY 1991 are expressed as a maximum (include naturally produced fish returning to trap). Release groups (pre-smolts, parr, and/or fry) were not differentially marked from smolt releases; contribution from these releases was assumed to be zero.

(k) - includes female holding pond mortalities and females killed and not spawned (egg take for releases not designed to return to hatchery rack was excluded)

Table 3. South Fork Clearwater (Crooked River and Red River satellite facilities) releases and returns 1994 - present; based on Hatchery length-frequency aging method. (Return totals after 1994 do not include unmarked fish)

Brood Year	Females Spawned	(rel.)	psm	Eggs taken		Eggs/ female	Number released			Egg-Smolt Surv.(%) [a]	Emig. year [b]	Total BY Returns	% Return (l) (SAR) (Total Return)	% Return (l) (SAR) (Excl. Jacks)	Adult M:F	Total M:F	Return Year /	Total
												17	N/A		1.8	1.8	1988 [c]	
												72	N/A		2.6	2.6	1989	
1987	78	(82)		312,800	[f]	4,010	490,890		[d]		1989	36	0.007	0.007	1.1	1.4	1990	82
1988	84	(75)		391,743		4,664	240,510			61.4	1990	586	0.108	0.108	1.1	1.1	1991	36
							300,400		[e]									
							401,000		[g]									
1989	31	(58)		136,400		4,400	799,962		[k]		1991	230	0.029	0.026	1.0	1.2	1992	267
1990	0	(21)		0			882,499				1992	42	0.005	0.004	0.5	0.8	1993	541
1991	3	(8)		15,200		5,067	6,000	LV	[h]	37.5	1993	4	0.067	0.050	N/A	N/A	1994	57
1992	6	(100)		22,860		3,810	273,666	AD			1994	280	0.102	0.099	1.6	1.7	1995	10
							22,246	RV	[h]	92.4		8	0.036	0.036				
1993	152	(117)		714,697		4,702	258,293	AD		62.6	1995	1,333	0.191	0.179	0.9	1.0	1996	282
							79,747	LV	[h]									
							199,255	RV	[h]									
							279,615	AD	[i]									
							457,288	AD	[j]									
1994	17	(11)		75,040		4,414	61,073	AD		81.4	1996	37	0.061	0.061			1997	1,121
1995	1	(1)		4,376		4,376					1997							
1996	83	(21)		286,761		3,455					1998							
1997	562	(97)		1,810,914		3,937			[n]		1999							
1998	84	(51)	[29]								2000							

(a) - to estimate egg-to-smolt survival rates, assume that: eyed egg-smolt rate=75%, fry-to-smolt rate=85%
parr-to-smolt rate=90%, pre-smolt-to-smolt rate=95%
(b) - emigration year; same as release year for smolts
(c) - 157 adults from DNFH were outplanted in Crooked River
(d) - from Dworshak NFH
(e) - from Kooskia NFH
(f) - 2-Oc. fish count includes 5 males of unknown age/length
(g) - released as fry
(h) - released as pre-smolts
(i) - from Rapid River FH
(j) - from Rapid River FH; released as pre-smolts
(k) - includes DNFH and KNFH stock (187,075 smolts)
(l) - SAR's and Prog:Par. ratios previous to BY 1991 are expressed as a maximum (include naturally produced fish returning to trap).
Release groups (pre-smolts, parr, and/or fry) were not differentially marked from smolt releases; contribution from these releases
was assumed to be zero.
(m) - includes female holding pond mortalities and females killed and not spawned (egg take for releases not designed to return to hatchery rack was excluded)
(n) - after culling

Table 4. Powell River satellite facility releases and returns 1984 - present; based on Hatchery Evaluation Studies. All data taken from hatchery run reports and brood year reports.

Brood Year	Females Spawned(rel psm			Eggs taken		Eggs/ female	Number released		Egg-Smolt Surv.(% [a]	Emig. year [b]	Total BY Returns	% Return (l (SAR) (Total Return)	% Return (l) (SAR) (Excl. Jacks)	Adult M:F	Total M:F	Return Year /	Total
1984							348,420			1986	16	0.005		3.0	3.0	1987	
1985							344,900			1987	131	0.038		2.0	2.0	1988	
1986							200,105			1988	194	0.097		1.5	1.9	1989	154
1987							303,299			1989	33	0.011		5.2	5.6	1990	179
1988							236,019	c		1990	569	0.142		1.1	1.1	1991	33
							53,287	d									
							314,480	e									
1989	0	(44)					180,764	d		1991	242	0.084		0.7	0.8	1992	270
							306,905	e									
1990	5	(55)		24,000		4,800	214,383	f	N/A	1992	37	0.011		0.5	0.9	1993	500
							358,372	g	N/A								
1991	2	(3)		9,000		4,500	7,752	h	N/A	1993	2	0.024		N/A	N/A	1994	86
							500	f	N/A		0						
1992	128	(0)		521,000		4,070	261,619	i	N/A	1994	250	0.096	0.091	1.8	2.0	1995	14
1993	207	(15)		936,572		4,525	290,953	j	N/A	1995	951	0.238	0.227			1996	181
							311,690	k									
1994	54	(0)		252,045		4,668	221,191		87.8	1996	232	0.105	0.104			1997	700
1995	1	(0)		5,259		5,259	3,549		67.5	1997	9	0.254	0.225			1998	488
1996	66	(0)	[4]	275,883		4,180	244,847		88.8	1998	119					1999	180
1997	292	(55)	[14]	948,387	n	4,272	330,555	o		1999						2000	
							304,600	p									
						(lv)	66,114	q									
						(rv)	162,119	q									
1998	226	(22)	[19]	897,993	n	4,726				2000							
1999	27	(2)	[4]	126,815		4,697											

(a) - to estimate egg-to-smolt survival rates, assume that: eyed egg-smolt rate=75%, fry-to-smolt rate=85%, parr-to-smolt rate=90%, pre-smolt-to-smolt rate=95%
(b) - emigration year; same as release year for smolts
(c) - released as smolts from DNFH into White Sands Cr.
(d) - released as smolts from KNFH
(e) - DNFH stock transferred to Powell Ponds and released as pre-smolts .
(f) - includes acclimated and direct releases from DNFH stock
(g) - released as pre-smolts from DNFH stock
(h) - released into Crooked Fork Cr.
(i) - Powell stock into Powell Ponds and Walton Cr.
(j) - acclimation study
(k) - released as pre-smolts
(l) - SAR's and Prog:Par. ratios previous to BY 1991 are expressed as a maximum (include naturally produced fish returning to trap). Release groups (pre-smolts, parr, and/or fry) were not differentially marked from smolt releases; contribution from these releases was converted to smolt equivalents using a factor of 0.35 for pre-smolts, 0.25 for parr and 0.10 for fry releases.
(m) - includes female holding pond mortalities and females killed and not spawned (egg take for releases not designed to return to hatchery rack was excluded)
(n) - after culling
(o) - ad-clipped pre-smolts
(p) - ad-clipped parr
(q) - S. FK. Clearwarter stock released as pre-smolts into Walton Cr.