HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Hagerman National Fish Hatchery
Species or Hatchery Stock:	B-run Summer Steelhead
Agency/Operator:	USFWS
Watershed and Region:	Clearwater River
Date Submitted:	
Date Last Updated:	September 20, 2002

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Hagerman National Fish Hatchery

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

B-run Summer Steelhead (*Oncorhynchus mykiss*)
Listed as part of the ESU, but not essential for recovery.

1.3) Responsible organization and individuals

Hatchery Operations Lead Contact

Name (and title):	Bryan Kenworthy, Manager
Agency or Tribe:	U. S. Fish and Wildlife Service, Hagerman National Fish Hatchery
Address:	3059-D National Fish Hatchery Road
Telephone:	(208) 837-4896
Fax:	(208) 837-6225
Email:	bryan_kenworthy@fws.gov

Hatchery Evaluations Lead Contact

Name (and title):	Howard Burge - Project Leader
Agency or Tribe:	U. S. Fish and Wildlife Service, Idaho Fisheries Resource Office
Address:	P.O. Box 18, 4147 Ahsahka Rd., Ahsahka, ID 83520
Telephone:	(208) 476-7242
Fax:	(208) 476-7228
Email:	howard_burge@fws.gov

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

Lower Snake River Compensation Plan program provides the funding for steelhead production.

Idaho Department of Fish and Game – Co-manager
Nez Perce Tribe – Co-manager

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

The Hagerman steelhead program is 100% funded by the Lower Snake River Compensation Program. The Lower Snake River Compensation Plan program has a direct funding agreement with BPA.

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

Hagerman National Fish Hatchery is located in the Snake River Basin, Idaho, 3 miles south and 2 miles east of the town of Hagerman Idaho. It is on Riley Creek, a tributary to the Snake River at river mile 583.35. The USGS Hydrologic Unit Code is 170421206 (Hagerman).

1.6) Type of program.

Off-site releases in the Clearwater River – Integrated recovery program

1.7) Purpose (Goal) of program.

The purpose of the Clearwater River program is to reintroduce and rebuild a natural run of steelhead in tributaries to the South Fork Clearwater River.

1.8) Justification for the program.

Integrated Recovery Program
Smolt releases of un-clipped yearling steelhead are made into tributaries of the South Fork Clearwater River. Adults returning from those releases will not be available to down river sport fisheries and therefore should return at a higher rate to the tributaries to spawn naturally.

1.9) List of program "Performance Standards".

See Section 1.10

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

Benefits Performance Standards	Performance Indicators	Monitoring and Evaluation
1) Emulate life history characteristics of wild "B" run steelhead.	Age composition, body size, sex ratio, juvenile emigration timing, adult run timing, and spawn timing of natural and hatchery fish are similar over generations.	Evaluate age composition, body size, sex ratio, and adult return timing of natural and hatchery steelhead.
2) Re-introduction of steelhead into the SF Clearwater basin.	Increase in redd counts and natural production.	Conduct annual redd surveys and juvenile surveys.

Benefits **Performance Standards**	**Performance Indicators**	**Monitoring and Evaluation**
3) Surplus hatchery steelhead available for outplanting in underseeded habitat in the SF Clearwater basin.	An average of 550 female steelhead are needed to meet Dworshak's broodstock and another 650 females to meet other programs needs. Additional fish will be outplanted in underseeded habitat.	Adults will be selected for outplanting in SF Clearwater basin at time of collection at the hatchery. Juvenile monitoring will evaluate the contribution of these steelhead to natural production in the Clearwater basin.
4) Maximize survival of hatchery steelhead at all life stages using disease control and disease prevention techniques.	Hatchery operations comply with USFWS Fish Health Policy and Implementation Guidelines as well as the Integrated Hatchery Operation Team's fish policy.	Juvenile fish health will be monitored on at least a monthly basis in order to detect potential disease problems. A fish health specialist will examine affected fish and make recommendations on remedial or preventative measures.
5) Release healthy, functional smolts from Hagerman NFH.	Annually releases up to ~200,000 marked smolts from Hagerman NFH.	Three to six weeks prior to release or transfer, fish health specialists will give 60 fish from each lot a health exam.
6) Juvenile releases from Hagerman NFH survive and return to the river in sufficient numbers to rebuild the natural run.	The adult production goal from the ~200,000 smolts released from Hagerman NFH (plus IDFG releases) should provide a sufficient return to rebuild the natural run.	Smolt to adult survival rates will be estimated for each brood year. Juvenile surveys conducted by IDFG and the Nez Perce Tribe will estimate natural production.
7) Fulfill legal/policy obligations of fall harvest/production agreement.	Release of ~200,000 un-clipped steelhead in SF Clearwater tributaries.	Monitor emigration of PIT tagged smolts. Assess dorsal fin quality of smolts to evaluate adult returns of un-clipped hatchery fish as identified by dorsal erosion.

Risks **Performance Standards**	**Performance Indicators**	**Monitoring and Evaluation**
1) Hatchery operations comply with ESA respsonsibilities.	Hatchery conducts Section 7 consultations and completes an HGMP.	Refer to M&E Section in this document.
2) Avoid disease transfer from hatchery to wild fish and vice versa.	Hatchery operations comply with USFWS Fish Health Policy and Implementation Guidelines as well as the Integrated Hatchery Operation Team's fish policy.	Juvenile fish health will be monitored on at least a monthly basis in order to detect potential disease problems. A fish health specialist will examine affected fish and make recommendations on remedial or preventative measures.
3) Minimize potential negative ecological interactions.	No change in ecological parameters.	Evaluate potential negative ecological interactions.
4) Assess genetic impacts among hatchery vs. wild where interaction exists	No change in genetic diversity of wild population.	Compare genetic profile of natural fish in the SF Clearwater River to genetic profile of hatchery population.

5) Minimize straying of hatchery fish to areas outside of the basin.	Stray rate of Hagerman released steelhead is below 5% of the receiving population.	Monitor stray rate of hatchery population by tracking a sub-sample of returning adults.
6) Juvenile hatchery releases minimize interactions with wild fish species.	Juveniles will be fully smolted at release to also increase emigration rate.	Fish will be given a smolt quality assessment by fish health specialists to determine smolt quality.

1.10.1) "Performance Indicators" addressing benefits.

See Section 1.10

1.10.2) "Performance Indicators" addressing risks.

See Section 1.10

1.11) Expected size of program.

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

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

Broodstock for this program is collected at Dworshak NFH at the confluence of the North Fork and main stem Clearwater rivers. Dworshak NFH aims for a 1 to 1 male to female spawning ratio. However, the sex ratio of the collected broodstock is typically 1 or 2 males to 3 females. The total number of females needed to spawn in order to fill Dworshak's steelhead program is ~550. To meet all programs supplied with steelhead eggs about 1,200 females are needed, this includes eggs for LSRCP programs including Hagerman NFH, Clearwater State, and Magic Valley. To meet all programs, about 4,000 fish total are collected to account for the male to female ratio and pre-spawning mortality.

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

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		

Life Stage	Release Location	Annual Release Level
Fry		
Fingerling		
Yearling	SF Clearwater River tributaries	200,000
Adult	S.F. Clearwater Tributaries	Variable (550-2,200) Nez Perce Tribe program

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

Clearwater River Program

Release Year	Smolts Released [1]	Estimated Adult Escapement	Estimated Adult Return to Lower Granite
2000	N/A	N/A	N/A
2001	176,629	N/A	1,234
2002	179,954	N/A	1,258

[1] Number of smolts that were transported from Hagerman.

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

Began in 2001

1.14) Expected duration of program.

Duration is unknown, because it is currently operating under annual management plans.

1.15) Watersheds targeted by program.

Program is designed to return adults primarily to Clearwater River tributaries.

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

The program is designed to reintroduce and rebuild lost steelhead production in the Clearwater River. Steelhead are believed extinct in the South Fork Clearwater due to Harpster Dam. At this time, there are no alternative actions being considered.

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

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

The NMFS 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin: Incidental take of Listed Salmon and Steelhead from Federal and Non-Federal hatchery programs that collect, rear, and release unlisted fish species, prepared pursuant to section 7(a)(2) of the Endangered Species Act of 1973

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

No wild/natural, ESA-listed steelhead adults or juveniles are collected or directly affected as part of the Hagerman B-run steelhead program described in this HGMP.

The following information on the present status of wild/natural B-run steelhead was taken from the Draft Clearwater Subbasin Summary for the Clearwater subbasin of the Mountain Snake Province (NPPC 2001).

Summer run steelhead in the Clearwater subbasin are listed as threatened under the ESA. Both A-run and B-run steelhead exist in the Clearwater subbasin and are included in the Snake River ESU of steelhead (Busby et al. 1996). A-run steelhead occupy the lower Clearwater, including the Middle Fork Clearwater and Lower South Fork Clearwater rivers and tributaries (Kiefer et al. 1992). B-run steelhead occupy the Lochsa, Selway, and upper South Fork Clearwater rivers, and were extirpated by Dworshak Dam on the North Fork Clearwater River (Kiefer et al. 1992). B-run steelhead have been documented from only two subbasins in the Columbia River system, the Clearwater and Salmon (NPT and IDFG 1990). A-run steelhead from the Clearwater subbasin have typically spent one year in saltwater environments; B-run steelhead will have spent 1-3 years in saltwater environments before returning to spawn, with over 90 percent having spent two years (W. Miller, USFWS, personal communication, March 5, 2001). Due to differing lengths of ocean residence, differentiation of the two forms of Clearwater steelhead can be based on size with B-run fish averaging 75-100 mm larger than A-run fish (CBFWA 1991). In addition, B run steelhead enter the Columbia River later in the year than A run and benefit from the extra ocean time to rear, resulting in a 2 ocean A-run fish being smaller than a 2 ocean B-run fish (W. Miller, USFWS, personal communication, April 20, 2001).

Steelhead ascend the Columbia River between May and October, and generally arrive at the mouth of the Clearwater River in the fall (September-November). Adult steelhead remain in the large pools of the main stem Clearwater or Snake Rivers or in Lower Granite Reservoir through the winter. This timing is different than before the Snake River dams were built, when the majority of the fish arrived to Lewiston dam in March-May (Whitt 1954). Spawning of B-run steelhead in the Clearwater subbasin occurs from mid-March through early June, with emergence during June and July. A-run steelhead spawn from February through early May, with emergence from mid-April through May (NPT and IDFG 1990). The majority of juveniles rear for two years in freshwater with subsequent outmigration from March through May.

The only remaining steelhead runs in the Clearwater subbasin with limited or no hatchery influence occur in the Lochsa and Selway River systems (B-run) and lower Clearwater River tributaries (A-run; Busby et al. 1996; IDFG 2001). Steelhead in other portions of the subbasin have been heavily influenced by hatchery stocking, with the majority originating from Dworshak NFH (NPT and IDFG 1990). Steelhead production at Dworshak NFH is made up entirely of B-run steelhead.

Steelhead are widely distributed throughout the Clearwater subbasin, using at least a portion of all accessible watersheds. Excluding areas blocked by Dworshak Dam, sub watersheds (6th code HUCs) currently not being used by steelhead are typically singular, scattered, and associated with low order tributaries. Clusters of 6th code HUCs are not currently used by steelhead in Orofino and Jim Ford Creeks (Lolo/Middle Fork AU) where a passage barrier exists in the lower main stem of each creek (Johnson 1985; Clearwater Soil and Water Conservation District 1993), and the headwaters of the White Sands Creek drainage (Lochsa AU). The relatively contiguous distribution of steelhead throughout the subbasin suggests a potentially high degree of connectivity exists.

Status and distribution of A-run steelhead in lower Clearwater River tributary streams was described by Kucera et al. (1983), Fuller et al. (1984), and Johnson (1985). No adult steelhead abundance estimates are available for tributaries in lower Clearwater AU, although an experimental weir was operated on weekdays in Big Canyon Creek in 1995 (USFWS and NPT 1997). Quantification over time of B-run adult steelhead escapement to individual tributaries or spawning aggregates is limited to four locations in the Clearwater River subbasin where adult weirs are operated; Clear Creek (Middle Fork Clearwater River), Fish Creek (Lochsa River), Red River and Crooked River (South Fork Clearwater). Adult steelhead abundance information in the Selway River system is comprised of angler survey data collected during the 1950s, catch in the Selway Falls fish ladder during the mid 1990s, and steelhead caught and radio-tagged below Selway Falls in 1998. Unfavorable environmental/stream conditions during the spawning season preclude conducting accurate spawning ground surveys for steelhead in the Clearwater subbasin.

Wild A-run steelhead within the Clearwater subbasin occur only in the lower main stem tributaries (Rich et al. 1992), South Fork Clearwater tributaries up to Butcher Creek, and Maggie Creek in the Middle Fork Clearwater (NPT and IDFG 1990). No hatchery outplanting of A-run steelhead has occurred within the Clearwater subbasin, and interbreeding of A-run and hatchery produced B-run steelhead is thought to be minimal due to differences in spawn timing (USFWS and NPT 1997). Habitat problems in A-run streams include high soil erosion rates, high bedload movement rates, altered channel morphology and riparian areas, variable streamflows with severely limited late summer flows, and high summer temperatures in lower tributary reaches (Kucera and Johnson 1986; NPT and IDFG 1990).

Steelhead status is present–depressed throughout the majority of their range in the Clearwater subbasin. Designations of present–strong for steelhead are only noted in Fish and Hungery Creeks (Lochsa AU), the lower portions of Meadow Creek (Lower Selway AU), and portions of Moose and Bear Creeks. The Lochsa and Selway River systems have been identified as refugia areas for steelhead (Thompson 1999) based on location, accessibility, habitat quality, and number of roadless tributaries.

According to the IDFG's parr monitoring database, steelhead parr densities in the Clearwater subbasin averaged approximately 27% of the estimated carrying capacity between 1985 and 1997 (Idaho Department of Fish and Game 1999). Monitoring surveys included in the database indicate the highest relative densities of steelhead in the Lower Selway, Lower Clearwater, and Lochsa AUs where the average percentages of carrying capacity were 46, 38, and 38%, respectively. Lesser percentages of estimated carrying capacity are being realized in the Upper Selway (12%), Lolo/Middle Fork (23%), and South Fork (25%) AUs.

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

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

N/A

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

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Snake River summer steelhead
Snake River 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").*

Snake River Summer Steelhead
We are not aware of established critical or viable population thresholds for Snake River Steelhead.

Snake River Fall Chinook Salmon
The Proposed Recovery Plan for Snake River Salmon (NMFS 1995) does not

specifically suggest critical or viable population thresholds for fall chinook salmon. For the purposes of this HGMP, we are assuming a critical threshhold of 300 to 400 spawners, which is referred to as a threshold escapement level in BRWG (1994) and Connor (1994). In addition, we are assuming a viable population threshold of 2500 spawners as indicated at 35% of the spawner capacity estimate.

Snake River Fall Chinook Salmon have been on an increasing trend in the past few years. Estimated escapement levels for 1999 were 905 adult and 817 jack fall chinook above Lower Granite Dam. These escapement levels are well above the critical thresholds, but still below the viable population threshold assumed above.

- 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) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

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. *(Include estimates of juvenile habitat seeding relative to capacity or natural fish densities, if available).*

Number of fall chinook salmon redds counted in the Snake River and tributaries between Lower Granite and Hells Canyon dams, 1989-2001. An empty cell indicates no searches were conducted in the corresponding river and year. Some of the data is broken down into method, and river mile (RM) sections.

River (method or RM)	‘89	‘90	‘91	‘92	‘93	‘94	‘95	‘96	‘97	‘98	‘99	‘00	‘01	
Snake (helicopter)[a]	58	37	41	47	60	53	41	71	49	135	273	255	535	
Snake (underwater video)[b]			5	0	67	14	30	42	9	50	100	91	175	
Clearwater (RM 0-41)	10	4	4	25	36	30	20	66	58	78	179	165	290	
Clearwater (RM 41-74)				1	0	0	0	0	0	0	2	7	16	
M.F. Clearwater (RM 74-98)						0	0	0	0	0	0	0	0	
N. F. Clearwater				0	0	7	0	2	14	0	1	0	1	
S. F. Clearwater				0	0	0	0	1	0	0	2	1	5	
Grande Ronde	0	1	0	5	49	15	18	20	55	24	13	8	197	

Imnaha	1	3	4	3	4	0	4	3	3	13	9	9	38	
Salmon				1	3	1	2	1	1	3	0	0	22	
Selway						0	0	0	0	0	0	0	0	
Potlatch													24	
Totals	69	45	54	82	219	120	115	206	189	303	579	536	1303	

[a] The targeted search area was the entire reach from the head of Lower Granite Reservoir to Hells Canyon Dam.
[b] The targeted search areas were discrete sites composed mainly of 1-6 in. bottom substrates in water over 10 ft. deep. The number of sites searched varied.

2.2.3) 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

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.

The steelhead program has the potential to affect listed steelhead, spring and fall Chinook salmon in several ways: 1) predation; 2) competition; 3) adverse behavioral interactions; 4) disease transmission; 5) alteration of the gene pool; (6) harvest and/or (7) facility operation and maintenance.

Predation - The level of predation by hatchery released steelhead smolts on wild/natural salmonids is unknown. However, several factors suggest that predation by Dworshak 'B" steelhead smolts on wild/natural salmonid fry and smolts is probably non-existent or not significant.

Assuming similar emigration rates as PIT-tagged Dworshak hatchery smolts in 1991 and 1992 (37 km/day) (Bigelow, personal comm.) we estimate travel time to the IDFG smolt trap at the head of Lower Granite Reservoir to average about 7 days. Based on the rapid emigration time through the free-flowing Clearwater River, any predation on listed salmon or steelhead juveniles should be minimal.

Though small steelhead may feed on fish (Horner 1978 in IDFG 1992; Hillman and Mullan 1998), 250mm TL appears to be the lower threshold size that has the greatest propensity to be piscivorous (Beauchamp 1990; IDFG 1992).

Competition - Studies to date indicate that yearling steelhead do feed as they emigrate through the Columbia River system (Giorgi 1991) although the relation between steelhead that reside for extended periods of time and those that actively migrate have not been conducted.

Hagerman steelhead are released as smolts (220 mm target size at release). Competition between hatchery released smolts and wild salmonids is minimized due to the rapid emigration time in free flowing river sections (see section on predation above). Steelhead that are not ready to smolt and residualize in Clearwater tributaries present potential for conflict. These fish could directly compete with natural steelhead for food, rearing space, and/or preferred habitats. Bigelow (1997) found that smaller fish (<180 mm FL) were much more likely to residulize than medium (180-200 mm) or larger fish (>200 mm). While we don't know if competition from residuals is a threat, we do know that these smaller fish do not emigrate at the same rate as the medium and large size groups. Bigelow also saw a decrease in the number of hatchery fish found in streams as the summer progressed. We are evaluating constantly various fish culture practices in our attempt to produce a more viable smolt.

Behavior - There are limited data describing adverse behavioral effects of hatchery steelhead releases on wild/natural salmonid populations. Hillman and Mullan (1989) reported that larger, hatchery-released fingerling chinook salmon apparently "pulled" smaller wild/natural chinook salmon with them as they drifted downstream, resulting in predation on the smaller fish by other salmonids. Time and method of release, size at release, and feeding and handling regimes of steelhead smolts before release have all been modified over the last several years to prepare juvenile steelhead for smoltification. Reducing the time a smolt spends in the river and main stem migration corridor will also reduce the potential for adverse interactions with listed steelhead and fall chinook salmon.

Disease - Steelhead reared at Hagerman NFH have had furunculosus problems in recent years and we are currently evaluating treatments. While we strictly adhere to all Integrated Hatchery Operations Team guidelines concerning the release of fish undergoing a disease epizootic, the potential still exists for horizontal transmission of diseases from steelhead released from Hagerman NFH. However, Stewart and Bjornn (1990) stated that there was little evidence to suggest that horizontal transmission of disease from hatchery to wild fish is widespread, although little research has been done in this area. The authors concluded that the full impact of disease on wild fish from hatchery fish is probably underestimated. It is common knowledge that pathogens and diseases occur in natural fish populations and that stresses can cause them to exhibit themselves. As mentioned, hatchery fish could potentially induce stresses on natural populations through predation, competition, or adverse interactions.

Genetics - Beginning in 1973, and consistently since 1981, juvenile B-run Steelhead have been outplanted in various locations in the South Fork and Middle Fork Clearwater rivers. These outplants were primarily to spread out returning fish for the sport fishery. Dworshak B-run steelhead is an acceptable stock for the rebuilding of the SF Clearwater steelhead run.

Adult steelhead that are above broodstock needs at Dworshak are generally provided to the Nez Perce Tribe for outplanting into SF Clearwater tributaries. The exceptions to this are if it is early in the season adults are sometimes released in the South Fork to provide additional opportunities for harvest, killed and donated for tribal subsistance, or if unsuitable for release or human consumption then they will be used to feed captive bears and eagles or stream enrichment.

Harvest - Idaho Department of Fish and Game administers the sport harvest within the State (this impact is addressed further in their HGMP), and the Nez Perce Tribe administers the Tribal fishery for returning steelhead. Because there is no designated season on listed salmonids any captures would be incidental to the targeted hatchery steelhead. Since there is a requirement for only barb less hooks to be used during steelhead season and all wild steelhead and fall Chinook captured are required to be released unharmed we believe there is minimal negative impacts to listed salmonids.

Facility operation and maintenance – For information on operation and maintenance of the ladder at Dworshak NFH for trapping returning adult steelhead please refer to the Dworshak NFH steelhead HGMP. Operations at Hagerman including water intake and discharge, in hatchery incubation and rearing phases, and general maintenance and construction are all offsite from any anadromus streams.

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

N/A – Please refer to the Dworshak B steelhead HGMP

- 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).

Please refer to the Dworshak B steelhead HGMP

- 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.

Please refer to the Dworshak B steelhead HGMP

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.

There is currently no ESU-wide hatchery plan for Snake River steelhead. The Hagerman Steelhead production program is consistent with the following policy excerpts from the

NPPC Artificial Production Review:

10 The manner and use of artificial production is considered in the context of the environment in which it is used.

20 Artificial production is implemented within an adaptive management design that includes evaluation programs to determine benefits and address scientific uncertainties.

30 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.

40 The hatchery is authorized and managed as a mitigation facility for lost steelhead production resulting from the four Lower Snake River dams.

50 Risk management strategies are implemented to reduce adverse effects on wild steelhead and fall chinook salmon.

60 Legal mandates and obligations for fish protection, mitigation and enhancement are addressed.

Deviations from APR policies:

10 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.

_ Because of limited facilities, rearing space, and water supply, steelhead must be reared under a 1-year program. Smolts are released at 1-year of age. This deviates from wild/natural populations which produce smolts from 1-3 years of age.

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 steelhead production program at Hagerman NFH is 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.

The steelhead production program at Hagerman NFH also comes under the jurisdiction of U.S. v Oregon. The Columbia River Fishery Management Plan (CRFMP) was mandated by U.S. v Oregon as an agreement between state, tribal, and federal fishery agencies on harvest and production issues in the basin. Since the CRFMP expired in 1988 interim annual harvest and production agreements direct steelhead releases.

3.3) Relationship to harvest objectives.

This program is a result of fall harvest agreements between the tribes, states and federal parties. In 1998 the ESA issue and conservation of wild steelhead was a primary factor for NMFS recommending a 5-7% harvest rate of wild B run steelhead. The tribes stated that this was far too low given that the Columbia River Fish Management Plan allowed 32% harvest rate on wild B run steelhead. Consequently the first proposed agreement between the Federal parties and tribes included a 20% incidental harvest rate on wild B steelhead. The states strongly objected and as a result of Court action a Biological Opinion was developed by NMFS and jeopardy was concluded. A Reasonable and Prudent Alternative recommended an incidental harvest rate on wild B steelhead of 15% for tribal mainstem fall season fisheries and 2% for non-tribal mainstem fisheries.

As a result, the 1998 fall harvest settlement negotiations and court action between the tribes, WA, OR, ID, NMFS, and FWS included a one year provision (but also included in subsequent agreements) for releasing of un-clipped hatchery steelhead. While the Zone 6 (Bonneville to McNary dam) fall harvest is primarily for fall chinook salmon, that season may be limited by the number of wild steelhead taken incidentally, rather than the number of fall chinook taken. The tribes reasoned that if they agreed to limit their take on wild B run steelhead to 15%, that also reduced their take on hatchery B steelhead. The tribes wanted assurance that these unharvested hatchery Bs and their progeny would contribute to the rebuilding of natural runs, rather than just allowing them to be taken in the sport harvest. Therefore, the tribes requested a number of steelhead smolts be released with their adipose fins intact (un-clipped) to allow more returning adults to reach natural production areas and contribute to natural spawning. The un-clipped fish would be released, if caught, in the sport fishery as adults. The basic theory is: these steelhead, stocked into production areas, will imprint on these areas, then the adults will return to these areas to spawn naturally and increase natural production, thus beginning the rebuilding process.

For additional information on steelhead harvest or harvest management planning please refer to the Idaho Department of Fish and Game, Clearwater B-run steelhead HGMP.

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.

See relation to wild steelhead harvest in 3.3 above. Since the steelhead released for this program are un-clipped they cannot be legally taken in a sport or commercial fishery. However, they can be taken in tribal fisheries such as Zone 6 or terminal fisheries.

3.4) Relationship to habitat protection and recovery strategies.

The release of un-clipped hatchery steelhead is basically trying supplementation to help rebuild and recover steelhead in the SF Clearwater River. There are numerous theories on how to rebuild depleted populations and supplementation is one strategy, but there are risks. The SF Clearwater was looked upon as a good location to try supplementation with minimal risks since the original steelhead run was believed to have been extirpated by Harpster Dam.

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 the South Fork and main stem Clearwater River. Program fish likely provide some forage for bull trout in those areas. 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 summer steelhead, spring Chinook, summer Chinook, and fall Chinook salmon. Program fish may interact with these species during emigration 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 "candidate" 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.

The Hagerman NFH water supply consists of a number of springs emanating from the

Snake River Plain Aquifer (tributary to Riley Creek, Tributary to the Snake River). Although the Fish and Wildlife Service has claimed water rights in the amount of approximately 90 cfs to these springs, flows have diminished over the last 50 years to the point that approximately 68 to 72 cfs are currently available for steelhead production. Continued ground water development of the Snake River Plain Aquifer will further diminish spring flow to the hatchery.

Of the total flow available, however, rights to 18 cfs are junior to other users. Calls for water by the senior water rights holders, particularly during March and April when the hatchery is at maximum smolt production, could reduce flow up to 18 cfs. An agreement was put into place for hatchery use of the water with the provision that a pump-back system would be installed which would return the water to the users immediately after it was used by the hatchery. The pump-back system was installed in 2001.

A limiting factor that precludes the incubation of green eggs is the 59^{o} F water temperature.

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.

No listed fish are in the springs above the hatchery intake. The hatchery effluent is treated in accordance with a NPDES permit issued by EPA.

SECTION 5. FACILITIES

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

Incubation of eyed eggs is accomplished using up-welling jar incubators
Fingerlings are reared in the hatchery building in fiberglass linear tanks.
Smolts are reared in 10'x100' concrete raceways.

5.1) Broodstock collection facilities (or methods).

Eggs are provided from steelhead collected at Dworshak NFH, on the Clearwater River. Please see the Dworshak NFH 'B' run steelhead HGMP.

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

Smolts are transported from Hagerman NFH in 5,000 gallon tankers specifically designed by the COE for this purpose.

5.3) Broodstock holding and spawning facilities.

No broodstock are captured or held on site (see above)

5.4) Incubation facilities.

Eyed eggs are incubated in up-welling jar incubators.

5.5) Rearing facilities.

Fingerlings are reared in fiberglass linear tanks in the hatchery building.
Smolts are reared in concrete 10X100 raceways outside.

5.6) Acclimation/release facilities.

Smolts released directly into tributaries of the main stem and South Fork Clearwater rivers.

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

No operational difficulties have led to significant mortalities.

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.

The hatchery will be staffed full-time. Call back alarms are used to ensure adequate water flow to rearing units.

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.

Broodstock for the Dworshak NFH B-Run steelhead program was originally obtained by collecting natural spawners returning to the North Fork Clearwater River. This is the only source of broodstock that has ever been used.

6.2) Supporting information.

6.2.1) History.

Broodstock for the Dworshak NFH B-Run steelhead program was originally obtained by collecting wild fish returning to the North Fork Clearwater River. Broodstock collection was initiated in 1969, several years before Dworshak Dam was completely closed.

There have been no purposeful or inadvertent selection applied that has changed characteristics of the founding broodstock. There have been claims that Dworshak NFH has changed the spawn timing of hatchery propagated steelhead. This belief is based on differences between the current hatchery spawning time and spawn timing of natural populations in the Lochsa River. However, the Service believes that the change in spawn timing is environmentally linked to the closing of Dworshak Dam. Water released from the reservoir throughout the winter is much warmer than what historically was observed in the free flowing North Fork Clearwater River. Since Dworshak NFH has spawned greater than 1,000 steelhead annually since the programs inception it is unlikely that there has been any loss of genetic material from the original North Fork Clearwater 'B' run steelhead.

6.2.2) Annual size.

There are currently no wild/natural fish that are used for broodstock.

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

Broodstock for the Dworshak NFH 'B' run steelhead program was originally obtained by collecting wild fish returning to the North Fork Clearwater River. Natural populations are no longer used for broodstock, nor are they incorporated into the broodstock at any time. Naturally produced adults enter the hatchery at times during broodstock collection, these are returned to the river to continue their migration to hopefully spawn naturally in tributaries upriver of the hatchery.

6.2.4) Genetic or ecological differences.

Integrated Recovery Program

There appear to be differences between the natural populations that occur in the South Fork Clearwater River and fish outplanted there from Dworshak NFH. S.F. Clearwater Releases were traditionally started as an extension of the Dworshak NFH Isolated Harvest Program, but is now moving toward a re-introduction strategy to boost natural production in the basin. This program change is the result of interim management agreements between the co-managers and is allowed because of the belief that wild steelhead stocks in the S.F. Clearwater were extirpated by Harpster Dam. However, it should be noted that recent genetic samples from Johns Creek, a S. F. Clearwater tributary, does not show any particular genetic affinity to Dworshak Hatchery fish, and is more similar to samples from Gedney and Moose creeks in the Selway River (Waples, in litt. 1998). Waples also suggested that the Johns Creek sample may reflect a historical genetic profile for that part of the S.F. Clearwater River.

6.2.5) Reasons for choosing.

The broodstock was selected as suitable for re-introduction in the South Fork Clearwater. Since this stock has been released in the South Fork for over 20 years, any genetic "damage" that could occur should have already happened, thus minimizing any future risks.

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.

All wild/natural steelhead (unmarked and with good quality dorsal fins) that stray into the hatchery facility are not used for broodstock, and are returned to the mainstem Clearwater River to continue their migration. Unclipped fish with dorsal erosion are classified as supplementation fish and depending upon their arrival time at Dworshak NFH are either used for broodstock or outplanted.

SECTION 7. BROODSTOCK COLLECTION

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

Adults only.

7.2) Collection or sampling design.

Broodstock are collected passively using a ladder that enters the hatchery from the North Fork Clearwater River. Adults for this program are collected in late spring usually mid-March through April, near the end of the run.

7.3) Identity.

There are sometimes wild/natural adults that enter the hatchery. Natural fish are identified by the presence of an adipose fin, since hatchery-reared fish have been marked by the removal of the adipose fin. All natural fish are returned to the Mainstem Clearwater River to continue their migration. However, fish released as a part of this settlement agreement with the tribes are unclipped, which makes it necessary to scan all unclipped to detect blank-wire tagged fish for broodstock collection. All unclipped, non-wire tagged steelhead will be released to continue their migration.

7.4) Proposed number to be collected:

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

Broodstock for this program is collected at Dworshak NFH at the confluence of the North Fork and main stem Clearwater rivers. Dworshak NFH aims for a 1 to 1 male to female spawning ratio. However, the sex ratio of the collected broodstock is typically 1 or 2 males to 3 females. The total number of females needed to spawn in order to fill Dworshak's steelhead program is ~550. To meet all programs supplied with steelhead eggs about 1,200 females are needed, this includes eggs for LSRCP programs including Hagerman NFH, Clearwater State, and Magic Valley. To meet all programs, about 4,000 fish total are collected to account for the male to female ratio and pre-spawning mortality.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1991-2002), or for most recent years available:

See Dworshak NFH B-run steelhead HGMP

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1991					
1992					
1993					
1994					
1995					
1996					
1997					
1998					
1999					
2000					
2001					
2002					

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

Excess broodstock is handled in several ways, depending on the level of excess. First option is to outplant excess steelhead into Main Stem and South Fork Clearwater river tributaries for natural production. If the tributaries are inaccessible and it is early in the season, adults are released to augment sport harvest. When fish have to be culled, it is normally done by selecting those fish that are coded-wire tagged. This ensures recovery of the tags for evaluation purposes.

7.6) Fish transportation and holding methods.

Wild/natural fish that are incidentally captured during broodstock collection are typically held in fish transportation tanks or tubs with running water until they are released in the main stem Clearwater River. The fish may be held up to an hour before transported to the release site.

7.7) Describe fish health maintenance and sanitation procedures applied.

At Dworshak NFH formalin treatment is applied to broodstock, as needed, for fungus.

7.8) Disposition of carcasses.

If carcasses are in good condition, they are commonly given to the food bank or to the Nez Perce Tribe for distribution to needy families. If the carcasses are unsuitable for human consumption they are given to the wildlife programs at either the U of I or WSU to feed eagles or bears and finally, as a last resort, carcasses are taken to the landfill for disposal.

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.

Listed fish are not collected for broodstock use.

SECTION 8. MATING

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

8.1) Selection method.

Randomly from ripe fish on a certain day, fish collected over the past week are used first, then if more are needed, ripe fish from previous weeks are selected. For this re-introduction program, the spawners from later egg takes are preferred (takes 10 and later, out of 14 takes).

8.2) Males.

No backup males used, fish are spawned randomly on a certain day. Jacks are used as they are randomly taken on the spawning rack. Repeat spawners are used as needed when the number of males returning during steelhead spawning is extremely low.

8.3) Fertilization.

Adults are crowded from a fish trap at the end of the fish ladder into a crowding channel, moved into a channel basket, and placed into an anesthetic bin. Steelhead adults are anesthetized with carbon dioxide at a rate of 400 to 1000 mg/l solution buffered with 8 to 10 pounds of sodium bicarbonate. Although carbon dioxide is more stressful on the fish than MS-222, carcasses anesthetized with CO^2 can be used for human consumption. Spinal columns of ripe females are severed using a pneumatic knife. The females are then placed on a table for 1-20 minutes for blood drainage. The ventral side is then cut open using a spawning knife and eggs are collected in disinfected colanders. After ovarian fluid is drained, the eggs are poured into a clean bucket.

Milt from ripe males is stripped into Styrofoam cups and a one-percent saline solution is added to assist in milt motility. The milt solution is poured onto the eggs and swirled for more complete fertilization. After sufficient time has elapsed for fertilization to take place (one to two minutes), the eggs are rinsed of sperm, blood, and other organic matter.

After rinsing, eggs are placed in Heath incubator trays at approximately 6,650 eggs per tray (1 female) for steelhead and 3,500 for chinook. In the tray is a 75 mg/l iodophor solution buffered with sodium bicarbonate. Eggs are maintained in this solution for approximately 30 minutes as a precaution against horizontal disease transmission. The egg trays are then pushed into the incubator, flushing the iodine. Water flow rate was approximately five gallons/minute and incubation temperature averages 54^{o} F.

Although a 1:1 ratio is attempted in steelhead spawning, the final male:female ratio is usually closer to 1:3 due to the lack of males being trapped at the hatchery.

8.4) **Cryopreserved gametes**.

We have collected sperm for cryopreservations experiments and as part of research projects in the past, but it is not used as a part of our regular production program. We do not depend on cryopreservation of sperm to meet our production needs. The Nez Perce Tribe has collected sperm from Dworshak ‘B’ run steelhead for cryopreservation since 1999.

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.

Listed fish are not used in the mating scheme.

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.

Survival of Dworshak Steelhead eggs reared at Hagerman NFH. ***Data listed below is for A-run steelhead, we would expect B-run survival to be similar.***

Brood Year	# Eggs Taken	% Survival Green to Eyed	% Survival Eyed to Nursery Tanking*
1999			97.21
1998			98.19
1997			97.23
1996			97.88
1995			97.50
1994			95.67
1993			96.82
1992			97.31
1991			98.29
1990			97.77
1989			n/a
1988			n/a

% Eye-up is enumerated eye-up (after green culls).
* Hatching success in %.

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

Usually no extra eggs are taken except to make up for typical losses from one stage to the next. Extra adult returns are currently outplanted for supplementation or sport harvest.

9.1.3) Loading densities applied during incubation.

Incubators are stocked 20,000 to 40,000 eyed eggs per jar.

9.1.4) Incubation conditions.

Eggs are monitored daily. Spring water is a constant 59^{o} F.

9.1.5) Ponding.

The eggs are generally shipped to Hagerman NFH at 390 - 430 temperature units (TU's). They generally hatch at approximately 530 TU's. Depending on TU's, eggs are ready to hatch within a few days after being placed in incubation jars. When all eggs are hatched sac fry are poured from incubators into the respective rearing tank. Feeding begins when 80% of fry have achieved swim-up.

9.1.6) Fish health maintenance and monitoring.

No Formalin is used at this hatchery.

Before initial feeding, unhatched eggs or dead hatchlings on the bottom of the tank are removed using a mort-picker. Mortality is noted and inventory is adjusted accordingly.

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

No listed fish are reared at this hatchery.

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..

<u>Data listed below is for A-run steelhead, we would expect B-run survival to be similar.</u>

	Targets	BY 1997
Average eyed egg to hatch survival	97-98%	97%
Indoor-nursery rearing survival	97%	96%
Survival of fish during 8 month outdoor rearing period	95-97%	96%
Average overall survival to smolt (Table 1)	90-92%	87%

Brood Year	% Survival fry to fingerling	% Survival fingerling to smolt
1999	94	88
1998	91	100
1997	94	96
1996	93	99
1995	93	100
1994	89	96
1993	98	97
1992	90	92
1991	92	94

1990	92	93
1989	n/a	n/a
1988	n/a	n/a
Ave	92.6	95.5

Production of A-run steelhead smolts at Hagerman NFH, Idaho. Percent survival pertains to survival on station at Hagerman NFH (eyed-egg to release). *We would expect B-run survival to be similar.*

Brood Year	Smolts produced*	Weight (lbs)**	Percent survival
1989	1,478,830	299,425	n/a
1990	1,439,266	339,520	83
1991	1,436,909	325,550	80
1992	1,453,058	314,255	81
1993	1,487,842	308,520	92
1994	1,519,168	329,405	91
1995	1,151,544	243,182	95
1996	1,329,226	255,750	90
1997	1,158,658	247,194	87
1998	1,032,407	233,292	89

*data from Idaho FRO database
**data from Hagerman NFH files

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

Carrying capacity (not to exceed):

Hatchery Tanks	Density index		0.8
	Flow index		1.0
Raceways	Density index		0.2
	Flow index *		
		fish size < 80 fpp	0.8
		fish size ≥ 80 and≤ 15 fpp	1.0
		fish size > 15 fpp	1.2

*Due to serial reuse of water in the steelhead raceways, flow index for an individual pond when all three banks of raceways are in use should not exceed 33% of the total system flow index (i.e., 0.33 x 1.2 = 0.4) or 50% if two banks are in use (i.e., 0.5 x 1.2 = 0.6. Above density and flow index criteria are not exceed during the rearing

9.2.3) Fish rearing conditions

Oxygen and ammonia are monitored during periods of peak loading. Water temperature remains constant 59° F.

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

Because of constant 59°F water temperature, growth rate of steelhead is programmed to meet the target size of 180-250 mm in total length (Proposed Recovery Plan for Snake River Salmon, NMFS 1995)

Steelhead grow anywhere from .8 to 1 inch per month

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

Not 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*).

The following is excerpted from the Hagerman NFH Standard Operating Procedure: Hatchery Feeding: Start feeding approximately at 80 % swim-up. Feeding should be light for several days until fry are feeding aggressively. A fine mesh sifter is used for feeding Starter. When the fish are on 1/32" or larger, sifter is no longer used.

Fish are fed to satiation with the minimum amount of 5% body weight per day. During initial feeding, feed change, and outbreak of disease, the amounts will have to be adjusted.

Feed Types Feed Size Fish Size (No./Lb) Frequency of Feeding

Nursery Feeding (*Semi*-Moist Feeds):

Start of feeding to 1000 8 - 10 times per day

1/32" 1000 - 500 8 times per day

3/64" 500 - 200 8 times per day

Possibly go to 800 with Starter?

Raceway Feeding

When fish are starting on dry feed, #3, reduce the daily percent body weight to feed (DPBWF) to 3.7%. DPBWF will be adjusted as they grow. Once they are placed on demand feeders, feeding will be programmed per the hatchery constant method. We think that delaying when they go on the programmed feeding results in less severe "sore back" conditions in the fall.

Feed Types Feed Size Fish Size (No./Lb) Frequency of Feeding

Dry Feeds #3 200 - 80 6 times per day

#4 80 - 40 6 times per day

3/32" (2.5 mm) 40 - 20 4 times per day

1/8" (3.5 mm) 20 - 10 Demand Feeder

5/32" < 10 Demand Feeder

When fish are on 1/8" demand feeders can be used. Demand feeders have to be adjusted and clumps of feed removed for proper operation. The feeders are tapped several times a day to train the fish initially.

Feed fed to fish smaller than 40 fish per pound is purchased open market and is the vendors top quality salmon diet with 45 % protein or greater. The Hagerman Steelhead Contract diet is used for the remainder of the rearing cycle. This calls for a floating feed having no less than 45% protein, 15% fat, and no more than 5 % fiber, and no more than 15 % ash. Furthermore, 52% of the protein must be from fishmeal.

Feed conversion is approximately 1.1

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

Fish health monitoring is periodically conducted by the Idaho Fish Health Center. Fish samples are sent Fed-Ex on an as needed basis.

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

Not monitorred.

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

We do not use any of the NATURES rearing techniques nor do we try to use any kind of natural rearing methods. All of our production rearing is basically standard hatchery practices and methods.

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.

No listed fish are reared at this hatchery.

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	200,000	4.5	Late-April	SF Clearwater R.

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

Stream, river, or watercourse: Newsome Creek - 17060305
American River - 17060305

Release point: Newsome Creek - 522.224.120.084 or 950 total RK
American River - 522.224.120.101 or 967 total RK

Major watershed: South Fork Clearwater River

Basin or Region: Snake River basin

Our smolt production goals for Clearwater Stock are:

Number	Tag	Release Method	Release Site
100,000		Direct Release	Newsome Creek
100,000		Direct Release	American River

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

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1991								
1992								

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1993								
1994								
1995								
1996								
1997								
1998								
1999								
2000								
2001							176,629	4.7 ffp
2002							179.954	4.3 ffp
Average							178,291	4.5 ffp

*Database at Idaho FRO, Box 18, Ahsahka, ID 83520

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

2001 – April 27 to May 7
2002 – April 30 to May 15

Release dates are chosen by the general time we release steelhead from Dworshak NFH and the fine tuned with hatchery logistics and road access (ie. snow removal). Fish are hauled from Hagerman NFH and released directly into the streams from the transport truck.

10.5) Fish transportation procedures, if applicable.

Fish are transported in tankers specifically constructed for this purpose. IHOT procedures for density, water temperatures, and oxygenation are adhered to for fish distribution. The transport time from Hagerman to release points is approximately 8 hours.

10.6) Acclimation procedures

No acclimation, direct stream releases only.

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

These steelhead are released un-clipped and un-marked per the 1998 to 2002 Fall Harvest Agreements, which all parties; 4 treaty Tribes, ID, WA, OR, FWS, and NMFS signed.

Identification of adults will be accomplished by dorsal erosion, no additional money was provided for marking of these supplementation fish. IDFG is PIT tagging minimal numbers, ~1,200, for juvenile emigration timing.

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

At this time egg and fish numbers are carefully controlled to avoid instances of excess fish.

10.9) Fish health certification procedures applied pre-release.

Standard Fish and Wildlife Service Policy is followed.

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

Not applicable, all water is gravity feed spring flow.

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.

Time and size at release criteria defined in the NMFS BI-OP will be adhered to.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

Currently there is no money available for the monitoring and evaluation of this supplementation program. However, all the parties have agreed that it is an important part of the program and have committed to pursuing funding and other resources to accomplish the M&E.

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

Refer to Section 1.10 for a description of how each "Performance Indicator" will be monitored and evaluated.

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

Currently there is no money available for the monitoring and evaluation of this supplementation program. However, all the parties have agreed that it is an important part of the program and have committed to pursuing funding and other resources to accomplish the M&E.

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.

N/A

SECTION 12. RESEARCH

Currently there is no money available for the monitoring and evaluation of this supplementation program. However, all the parties have agreed that it is an important part of the program and have committed to pursuing funding and other resources to accomplish the M&E.

12.1) Objective or purpose.

12.2) Cooperating and funding agencies.

12.3) Principle investigator or project supervisor and staff.

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

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

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

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

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

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).

12.10) Alternative methods to achieve project objectives.

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

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.

SECTION 13. ATTACHMENTS AND CITATIONS

References

Hatchery databases used to provide data are maintained by the Idaho Fishery Resource Office located at P.O. Box 18, Ahsahka, ID 83544 and Hagerman NFH, located at 3059-D National Fish Hatchery Road, Hagerman, ID 83332.

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SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief.

Name, Title, and Signature of Applicant:

Certified by_____________________________ Date:_____________

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

Listed species affected: ______________ ESU/Population: ______________ Activity: ______________				
Location of hatchery activity: ______________ Dates of activity: ______________ Hatchery program operator: ______________				
	Annual Take of Listed Fish By Life Stage *(<u>Number of Fish</u>)*			
Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)				
Other Take (specify) h)				

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

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

ADDENDUM A. PROGRAM EFFECTS ON OTHER (AQUATIC OR TERRESTRIAL) ESA-LISTED POPULATIONS. (Anadromous salmonid effects are addressed in Section 2)

15.1) List all ESA permits or authorizations for USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species associated with the hatchery program.

Biological Opinion for the operation of the Lower Snake River Compensation Plan Program (File # 1024.0000, 1-4-99-F-2), April 8, 1999.

15.2) Describe USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species and habitat that may be affected by hatchery program.

The potential for the Dworshak spring Chinook salmon program to affect USFWS ESA-listed or proposed terrestrial species are minimal. Any impacts to listed birds or mammals are more likely to be beneficial by providing additional food rather than introducing detrimental impacts. Negative impacts to any listed plants would only occur during offsite releases with a truck potentially driving over a plant. However, since the trucks only utilize well-established pullouts or ramps to avoid getting stuck in soft soil, this possibility is negligible. The only listed aquatic species to occur in the project area are bull trout and they are addressed in the analysis below.

Bull trout

Bull trout were first described as *Salmo spectabilis* by Girard in 1856 from a specimen collected on the lower Columbia River, and subsequently described as *Salmo confluentus* and *Salvelinus malma* (Cavender 1978). Bull trout and Dolly Varden (*Salvelinus malma*) were previously considered a single species (Cavender 1978; Bond 1992). Cavender (1978) presented morphometric, meristic, osteological, and distributional evidence to document specific distinctions between Dolly Varden and bull trout. Bull trout and Dolly Varden were formally recognized as separate species by the American Fisheries Society in 1980 (Robins et al. 1980). Although bull trout and Dolly Varden co-occur in several northwestern Washington river drainages, there is little evidence of introgression (Haas and McPhail 1991) and the two species appear to be maintaining distinct genomes (Leary et al. 1993; Williams et al. 1995; Kanda et al. 1997; Spruell and Allendorf 1997).

Bull trout exhibit resident and migratory life-history strategies through much of the current range (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear from one to four years before migrating to either a lake (adfluvial), river (fluvial), or in certain coastal areas, to saltwater (anadromous) where maturity is reached (Fraley and Shepard 1989; Goetz 1989). Resident and migratory forms may be found together and it is suspected that individual bull trout give rise to offspring exhibiting either resident or migratory behavior (Rieman and McIntyre 1993).

Bull trout spawn from August through November (McPhail and Murray 1979; Pratt 1992). Hatching may occur in winter or early spring, but alevins may stay in the gravel for an extended period after yolk absorption (McPhail and Murray 1979). Growth, maturation, and longevity vary with environment. First spawning is often noted after age four, with individuals living 10 or more years (Rieman and McIntyre 1993).

Bull trout have more specific habitat requirements compared to other salmonids (Rieman and McIntyre 1993). Habitat components that appear to influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrates, and migratory corridors (Oliver 1979; Pratt 1984, 1992; Fraley and Shepard 1989; Goetz 1989; Hoelscher and Bjornn 1989; Sedell and Everest 1991; Howell and Buchanan 1992; Rieman and McIntyre 1993, 1995; Rich 1996; Watson and Hillman 1997). Substrate composition has repeatedly been correlated with the occurrence and abundance of juvenile bull trout (Dambacher et al. 1992; Rieman and McIntyre 1993) and spawning site selection by adults (Graham et al. 1982; McPhail and Murray 1979). Fine sediments can hinder survival of eggs during incubation, reduce success of fry emergence, and limit access to substrate interstices important as cover during rearing and overwintering (Goetz 1994; Jakober 1995).

In the Clearwater Basin there are known subpopulations of bull trout in the South Fork Clearwater rivers where Hagerman steelhead are released. While little is known of the status or trends of these subpopulations, we do know that migratory forms do exist. Their use of the main stem Clearwater River is seasonal, as summer water temperatures exceed those preferred by bull trout. As with many subpopulations elsewhere, the suppressing factors impacting these include habitat degradation, loss of prey species, passage barriers, hybridization and competition with exotics, and harvest (Clearwater Basin Bull Trout Technical Advisory Team, 1998). Dworshak Dam is a factor isolating the North Fork Clearwater River subpopulation from other subpopulations in the basin. Bull trout that are entrained from Dworshak Dam or migrate from other Clearwater Basin subpopulations cannot contribute to the North Fork subpopulation.

Bull trout are known to occur in the tailrace below Dworshak Dam and in the North Fork near the hatchery water intake. The Service believes most, if not all bull trout residing in the North Fork Clearwater River below Dworshak Dam are the result of entrainment through the dam from Dworshak Reservoir. This is based on: 1) the proximity of the tailrace to known spawning subpopulations (the closest being those in the Selway River, at least 92 rkm upstream from the mouth of the North Fork), 2) documented entrainment of kokanee and other reservoir fishes, and 3) the ocurrance of adult migrant sized bull trout in the area during periods when these fish would be expected to be on their spawning grounds. The Service does not believe that the North Fork Clearwater River below Dworshak Dam provides suitable spawning habitat for natural production of bull trout. We also assume that the frequency of bull trout entrainment likely mirrors that of other salmonids such as kokanee. The highest entrainment rates of kokanee at Dworshak Dam occurred in 1996 and 1997, and were associated with the flood releases of those years. These same years are associated with the highest incidental catches of bull trout in the hatchery adult trap (n = 5, 4 of these during ladder operation for spring Chinook salmon) and fish sampling in the tailrace (n = 12) (Roseberg, USFWS, unpublished data, Bigelow, USFWS, personal communication, 2000; Cochnauer and Putnam, 1997; Connor, USFWS, personal communication, 2000).

It is unlikely that migratory bull trout from subpopulations in the South Fork Clearwater, Selway, or Lochsa rivers would be residing in the main stem Clearwater River from late June into July due to increasing water temperatures. The mean daily water temperature recorded at Peck, Idaho from the last week in June to the first week in July increases from 11.3 to 14.2^{o}C. Because researchers have found peak upstream movement to coincide with maximum water temperatures of 10 to 12^{o}C (McPhail and Murray, 1979; Elle et al. 1994), the Service believes any overwintering bull trout that use the area from the Lochsa, Selway, or South Fork Clearwater rivers would have already left the main stem on their spawning migrations before the onset of summer flow augmentation.

15.3) <u>Analyze effects.</u>

The Hagerman steelhead program has the potential to affect listed bull trout in several ways: 1) predation; 2) competition; 3) adverse behavioral interactions; 4) disease transmission; 5) harvest and/or (6) facility operation and maintenance.

<u>Predation</u> - The level of predation by hatchery released steelhead smolts on bull trout is unknown. However, several factors suggest that predation by Hagerman steelhead smolts on bull trout juveniles is probably non-existent or not significant.

Most bull trout found in the rivers below release points are sub-adults and above the size that would be suitable prey for steelhead smolts. Also most of the bull trout in the rivers at that time of year would more likely be preying upon steelhead smolts than the other way around.

Additionally, assuming similar emigration rates as PIT-tagged Dworshak hatchery smolts in 1991 and 1992 (37 km/day) (Bigelow, personal comm.) we estimate travel time to the IDFG smolt trap at the head of Lower Granite Reservoir to average about 7 days. Based on the rapid emigration time through the lower Clearwater River, any predation on bull trout juveniles should be minimal in the free-flowing river sections.

<u>Competition</u> - Studies to date indicate that yearling steelhead do feed as they emigrate through the Columbia River system (Giorgi 1991) although the relation between steelhead that reside for extended periods of time and those that actively migrate have not been conducted.

Hagerman NFH steelhead are released as smolts (220 mm target size at release). Competition between hatchery released smolts and bull trout is minimized due to the rapid emigration time in free flowing river sections (see section on predation above). Steelhead that are not ready to smolt and residualize in Lower Clearwater tributaries present potential for conflict. These fish could directly compete with natural steelhead for food, rearing space, and/or preferred habitats. Bigelow (1997) found that smaller fish (<180 mm FL) were much more likely to residulize than medium (180-200 mm) or larger fish (>200 mm). While we don't know if competition from residuals is a threat, we do know that these smaller fish do not emigrate at the same rate as the medium and large size groups. Bigelow also saw a decrease in the number of hatchery fish found in streams as the summer progressed. We are evaluating various fish culture practices in our attempt to produce a more viable smolt. Again, because of the fact that many of the bull trout in the rivers at that time would likely be preying upon steelhead smolts, residualization of steelhead smolts could be beneficial to bull trout.

Behavior - There are no data describing adverse behavioral effects of hatchery steelhead releases on bull trout populations and only limited data on effects on natural salmonid population. Hillman and Mullan (1989) reported that larger, hatchery-released fingerling chinook salmon apparently "pulled" smaller wild/natural chinook salmon with them as they drifted downstream, resulting in predation on the smaller fish by other salmonids. As mentioned above, several steps have been taken at Hagerman NFH to produce functional smolts and minimize the time spent emigrating in the river. Time and method of release, size at release, and feeding and handling regimes of steelhead smolts before release have all been modified to prepare juvenile steelhead for smoltification. Reducing the time a smolt spends in the river and main stem migration corridor will also reduce the potential for adverse interactions with listed bull trout.

Disease - Steelhead reared at Hagerman NFH have had furunculosus problems in recent years and we are currently evaluating treatments. While we strictly adhere to all Integrated Hatchery Operations Team guidelines concerning the release of fish undergoing a disease epizootic, the potential still exists for horizontal transmission of diseases from steelhead released from Hagerman NFH to wild fish. However, Stewart and Bjornn (1990) stated that there was little evidence to suggest that horizontal transmission of disease from hatchery to wild fish is widespread, although little research has been done in this area. The authors concluded that the full impact of disease on wild fish from hatchery fish is probably underestimated. It is common knowledge that pathogens and diseases occur in natural fish populations and that stresses can cause them to exhibit themselves. As mentioned, hatchery fish could potentially induce stresses on natural populations through predation, competition, or adverse interactions.

Harvest - Idaho Department of Fish and Game administers the sport harvest within the State, and the Nez Perce Tribe administers the Tribal fishery for returning steelhead. Because there is no season on bull trout any captures would be incidental to the targeted steelhead. Since there is a requirement for only barb less hooks to be used during steelhead season and all bull trout captured are required to be released unharmed we believe there is minimal negative impacts to bull trout.

Facility operation and maintenance – For operation and maintenance including operation of the ladder for trapping returning adult steelhead please refer to the Dworshak steelhead HGMP since broodstock are collected there.

All other maintenance or construction activities that could have an impact on water quality or quantity or could possibly impact bull trout would be consulted on as they arise. All required state and Federal permits would be obtained prior to any work being initiated. None are currently planned at this time.

Offsite releases have the potential to disturb individual bull trout through the physical act of placing a discharge hose in the stream to release adult or juvenile steelhead. This potential for disturbance should be minimal and short term and the benefit of releasing additional forage should far outweigh any potential harm to an individual bull trout in the local area.

Overall, we believe that the release of steelhead should not be detrimental to bull trout and that actually there are potential benefits from the release of juvenile steelhead. Juvenile steelhead would increase the forage base and should benefit bull trout in areas downstream of release points. The biggest potential for harm would come from possible disease transfer and our strict adherence to IHOT guidelines and not releasing fish undergoing a disease epizootic should minimize those concerns.

15.4 Actions taken to minimize potential effects.

Adult collection
Since broodstock are collected at Dworshak NFH, please refer to the Dworshak NFH B-run steelhead HGMP.

Juvenile releases
For offsite release of steelhead smolts, the release sites are primarily in habitats that would typically be used by bull trout as migration corridors or possibly winter holding areas for adults and sub-adults. Additionally, we strive to release viable smolts ready to emigrate as quickly as possible. We also attempt to release on an increasing hydrograph to aid in the emigration. Also to reduce the potential to transmit disease to wild fish we strictly adhere to all Integrated Hatchery Operation Team guidelines for fish releases and do not release fish undergoing an disease epizootic.

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