
HATCHERY EVALUATION REPORT

Hagerman NFH - Summer Steelhead

September 1996

Integrated Hatchery Operations Team (IHOT)

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An Independent Audit Based on Integrated Hatchery Operations Team (IHOT) Performance Measures

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Executive Summary

This report presents the findings of the independent audit of the Hagerman National Fish Hatchery (NFH) - Summer Steelhead program. The hatchery is located in the lower Snake River basin in southern Idaho and is used for egg incubation, and rearing of Summer Steelhead.

The audit was conducted in 1996-1997 as part of a 2-year effort that will include 67 hatcheries and satellite facilities located on the Columbia and Snake River system in Idaho, Oregon, and Washington. The hatchery operating agencies include the U.S Fish and Wildlife Service, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife.

Background

The audit is being conducted as a requirement of the Northwest Power Planning Council (NPPC) "Strategy for Salmon" and the Columbia River Basin Fish and Wildlife Program. Under the audit, the hatcheries are evaluated against policies and related performance measures developed by the Integrated Hatchery Operations Team (IHOT). IHOT is a multi-agency group established by the NPPC to direct the development of new basinwide standards for managing and operating fish hatcheries. The Bonneville Power Administration (BPA) contracted with Montgomery Watson to act as an independent contractor for the audit.

IHOT has established five basic policies that cover: (1) hatchery coordination, (2) hatchery performance standards, (3) fish health, (4) ecological interaction, and (5) genetics. The audit focuses on all these policies, with the exception of hatchery coordination. These policies are set forth in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995)*. That document is the source for the performance measures that are the basis of this audit.

The Audit Process

The audit was based on the facility management's response to a 109-page questionnaire. This audit form was completed through a five-step process in which:

- Information was obtained from headquarters.
- The hatchery manager was asked to fill out and return the audit form.
- A 1-2 day site audit visit was conducted to inspect facilities, review hatchery records, discuss audit form responses, and develop remedial action plans.
- A compliance report was developed to document the compliance status of each performance measure. This report was then shared with the hatchery manager and IHOT representative.
- This hatchery evaluation report was written to document compliance with IHOT performance measures and develop cost estimates for remedial actions when needed.

Hagerman NFH - Summer Steelhead Results

The hatchery complex includes an administration building, two hatchery buildings, 102 raceways, several springs used for water supply, water supply intakes, a pumped water supply from Riley Creek for emergency use, a fish waste sedimentation system, four on-site residences, feed storage facilities and several garages and storage buildings.

The hatchery was in general compliance with most of the performance measures. In the area of program objectives, the hatchery needed to document its adult contribution. The audit found that the hatchery was not in compliance with the temperature criteria, water chemistry and contaminant monitoring criteria, alarm requirements, secondary screens criteria, feed handling protocols, sanitation protocols, and pathology-free water criteria, which are all facilities requirements. The hatchery did not have a density and loading criteria for early rearing, and was not in compliance with the acclimation requirements for lower Salmon River releases, transportation protocols, and fishery contribution study performance measure. In the compliance area for fish health policy, the hatchery did not meet the requirements for foot baths and sanitation protocols for equipment used to handle dead fish. The hatchery also did not have a Genetics Monitoring and Evaluation Program in place.

The specific areas in which the Hagerman NFH - Summer Steelhead program requires remedial actions based on the IHOT performance measures are listed below. These remedial actions are listed in alphabetical order without intent of ranking or otherwise assigning priority:

- Develop rearing and acclimation sites for lower Salmon River sites
- Develop an alarm log
- Develop density and loading criteria for early rearing and monitor loading and density for IHOT Operations Plan
- Develop disease-free water supply
- Develop genetics M&E plan for IHOT
- Develop smoltification monitoring plan
- Document adult contribution
- Document smolt-to-adult survival
- Follow IHOT criteria for tempering water temperature at release
- Follow IHOT disinfection protocols for vehicle cab
- Follow IHOT protocols for feed handling
- Follow IHOT sanitation procedures for foot baths
- Follow sanitation protocols for equipment used to collect dead fish
- Install flow alarms in incubation facility
- Install secondary screens in raceways
- Install temperature control system for chilling eggs and fry to reduce early growth
- Monitor oxygen concentration in transport tank
- Monitor TGP
- Perform required fishery contribution study
- Provide training to staff on operations plan
- Reduce temperature in feed hoppers and storage facilities
- Run additional analysis for contaminants when fish are present
- Run analysis for missing chemistry parameters

Non-compliance issues resulting from items beyond human control or Performance Measures not relevant to this hatchery (Type 1 in Table 3, Section 4 of this report) were not listed above.

Facility Description

Name:	Hagerman NFH
Stock/Species:	Summer Steelhead Rainbow trout
Operating Agency:	U.S. Fish & Wildlife Service
Funding Agency:	U.S. Fish & Wildlife Service
Location:	Located next to the Snake River in southern Idaho, approximately 5 miles southeast of the town of Hagerman.
Address:	Hagerman National Fish Hatchery U.S. Fish & Wildlife Service 3059-D National Fish Hatchery Road Hagerman, ID 83332
Hatchery Manager:	Mr. Byran Kenworthy
Phone:	(208) 837-4896
Fax:	(208) 837-6225
Purpose:	The hatchery was authorized in 1930 and began operating in 1933, Historically, production consisted of rearing rainbow trout for stocking waters in Idaho, Oregon and Nevada. In the late 1970's, trout production was reduced and the steelhead started. The hatchery was remodeled and expanded from 1982 to 1984 as part of the Lower Snake River Compensation Program (LSRCP) - a program to mitigate for fishery losses caused by four federal dams constructed on the lower Snake River. The goals of the hatchery is to produce summer steelhead to the Snake River Basin
Production Goal:	<p>Summer Steelhead</p> <p>1.53 million smolts for off-station release into the Salmon and Snake rivers</p> <p>Rainbow Trout</p> <p>Trout as needed for management of federal lands. Currently 100,000 are released into Duck Valley Reservoirs.</p>
Water Supply:	Water rights of 92.5 cfs from six major collecting structures. Water rights are currently under adjudication.

Facilities:

Adult Holding:	none
Incubation:	66 upwelling jars
Early Rearing:	46 starter tanks - 80 cf each 20 starter tanks - 93 cf each
Raceways:	102 raceways - 3100 cf each
Rearing Ponds:	none
Satellite Facilities:	none

Compliance Status

The hatchery audits are based on compliance with written IHOT performance measures. These performance measures are documented in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (referred to as *IHOT 1995* in this report).¹ The purpose of the performance measures is to implement new basinwide policies that provide regional guidelines for operating anadromous hatcheries in the Columbia Basin.

The audit focuses on performance measures for IHOT policies that cover (1) hatchery performance standards, (2) fish health, (3) ecological interaction, and (4) genetics. These performance measures are intended to guide hatchery operations once production is established. For that reason, the hatchery operations audit included broodstock collection, spawning, incubation of eggs, fish rearing and feeding, fish release, equipment maintenance and operations, and personnel training. Production priorities are beyond the scope of this audit.

Based on *IHOT 1995*, a detailed 109-page audit form was developed. The audit form divided the performance measures into six major sections along major program and technical criteria areas. Two additional sections (sections 1 and 8) include general information and expenditure information needed for the Hatchery Evaluation Report and blank forms for additional comments:

Section 1	Performance Measures for General Information and Expenditure Information (PMs General 1-2)
Section 2	Performance Measures for Program Objectives (PMs 1-4)
Section 3	Performance Measures for Facility Requirements (PMs 5-15)
Section 4	Performance Measures for Hatchery Practices (PMs 16-25)
Section 5	Performance Measures for Fish Health Policy (PMs 26-34)
Section 6	Performance Measures for Ecological Interactions (PMs 35-38)
Section 7	Performance Measures for Genetics Policy (PMs 39-43)
Section 8	Blank Forms for Additional Comments

Several performance measures are repeated in various sections of the audit. These performance measures overlap in *IHOT 1995* and were retained to allow individuals interested in specific portions of the audit (such as Genetics or Fish Health) to determine the compliance status of all performance measures for a given topic in one location. A repeated performance measure is indicated by light gray shading.

The Hatchery Audit Process

The hatchery audit will be conducted over a 2-year period that concludes in 1997. At each hatchery, a five-step process was used to complete the overall hatchery audit. This process consisted of research and on-site visits. The site visit was conducted on September 9, 1996.

¹Integrated Hatchery Operations Team (IHOT) 1995. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*, Bonneville Power Administration, Portland, Oregon.

The following is the five-step audit process:

1. Information was obtained from headquarters.
2. The hatchery manager was asked to fill out and return the **Audit Form**.
3. A 1-2 day site audit visit was conducted at each hatchery. During that visit an audit team inspected facilities, reviewed hatchery records, discussed audit form responses, and developed remedial action plans when appropriate.
4. During the site visit, the compliance status of each performance measure was discussed with the hatchery manager and IHOT representative. A portion of the Hatchery Evaluation Report was sent to the hatchery manager following the audit visit as a **Compliance Report**. That Compliance Report is Table 2 of this report.
5. The information from steps 1-4 was used to prepare a draft **Hatchery Evaluation Report**. This draft report was submitted to the operating agencies for review of the information used to determine compliance. Based on review and comments, a final Hatchery Evaluation Report was developed. The final report documents the compliance of a particular hatchery with the IHOT performance measures and presents cost estimates to correct any deficiencies.

Compliance Status of Hagerman NFH - Summer Steelhead

The following table includes information on life-stages that are held on this facility for some portion of their rearing cycle (Table 1). For multi-facility programs, summary cost and contribution data is presented at the facility where rearing occurs. For the compliance status relating to performance measures that do not occur at this hatchery, please refer to the Hatchery Evaluation Reports for the hatcheries and stocks listed in Table 1. A check mark (✓) indicates that the specific life-stage is held at this facility.

This section documents the compliance status of the Hagerman NFH - Summer Steelhead program. Each performance measure is presented in a table taken from the audit form (Table 2). The compliance status is identified by the following categories:

- **N/A** (not applicable)
- **Yes** (in compliance)
- **?** (unknown; generally due to unavailability of information to determine compliance)
- **No** (not in compliance).

Remedial actions are suggested for performance measures not in compliance. These remedial actions are grouped into categories and listed in Section 4 of this report, where the cost of the required remedial actions is also presented.

Table 1 Summary Program Information for Hagerman NFH - Summer Steelhead

Component	Location of Adult Holding, Spawning, Incubation, and Rearing					
	Sawtooth Hatchery	Pahsimeroi Hatchery	Oxbow Hatchery	Hagerman NFH		
Adult Collection ¹	✓	✓	✓			
Adult Holding	✓	✓	✓			
Spawning	✓	✓	✓			
Fertilization	✓	✓	✓			
Incubation	✓	✓	✓			
green-to-eyed	✓	✓	✓			
eyed-to-hatch				✓		
Rearing				✓		
fry				✓		
fingerlings				✓		
smolts				✓		
Acclimation/release	✓	✓	✓			

¹ Adult collection where adults are available and in order of Sawtooth, Pahsimeroi, and Oxbow hatcheries.

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
the hatchery programs outlined in a subbasin management plan?		✓			Columbia Basin System Planning Production Plan and the Columbia Basin Fish and Wildlife Program, 1987, Columbia Basin System Planning-Production Plan, Salmon River Basin, Sept 1, 1990; IDFG Anadromous Fish Management Plan-1992-1996; IDFG Fisheries Management Plan 1996 - 2000; LSRCP.	
<p>Is hatchery operating under a current hatchery operational plan?</p> <p>Is it understood by staff?</p> <p>Is it being followed?</p>		✓		✓	IHOT Operations Plan and Hatchery Evaluation Team 5-yr plan, Facility O&M. Annual production meetings set production numbers for the year	Provide training to staff on operations plan
<p>Is hatchery monitoring and evaluation plan in place?</p> <p>Do you have a written monitoring and evaluation plan?</p>		✓			Lower Snake River Compensation Program 5-Year Evaluation Plan	
<p>Is adult contribution to fisheries, spawning grounds, and hatchery</p>			✓		Adult information is not available to the hatchery in a consistent form	Document adult contribution
<p>Is adult pre-spawning survival as compared with established goal</p>	✓					
<p>Is adult take as compared with established hatchery goal</p>	✓					
<p>Is adult run-egg to eyed-egg survival as compared with established goal</p>	✓					
<p>Is adult run-egg to fry survival as compared with established goal</p>		✓			In compliance 4 out of last 4 years	
<p>Is adult run-egg to smolt survival as compared with established goal</p>		✓			In compliance 4 out of last 4 years	
<p>Is adult run-egg to production as compared with established goal</p>		✓			In compliance 4 out of last 4 years	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Percent survival (smolt to adult) as compared with published goal				✓	Hatchery does not have ready access to adult contribution data	Document smolt-to-adult survival
Number of eggs, fry, fingerlings, smolts, and/or adults meet basinwide needs	✓					

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Temperature Does your water temperature meet the criteria for spawning? Does your water temperature meet the criteria for incubation? Does your water temperature meet the criteria for rearing?	✓				Review of records Spring water is a constant temperature and no temperature control systems are present	Install temperature control system for chilling eggs and fry to reduce early growth
Dissolved gases Is the oxygen level near saturation? Is the dissolved nitrogen level less than saturation?		✓			Review of records/Discussion Hatchery does not measure because it has not been a problem.	Monitor TGP
Chemistry Ammonia (un-ionized) Carbon Dioxide Chlorine pH Copper Hydrogen Sulfide Iron Zinc		✓			Review of records/Discussion No data No data Review of records No data No data Review of records No data	Run analysis Run analysis Run analysis Run analysis Run analysis
Turbidity Does your turbidity meet the criteria?		✓			Review of records/Discussion	
Alkalinity and hardness Does your alkalinity and hardness meet the criteria?		✓			Review of records/Discussion	
Nitrite Does your nitrite meet the criteria?		✓			Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Alarm Systems						
Do the following areas have alarms?						
Intake		✓		✓	Inspection of facilities/ Discussion	
Large rearing ponds and adult holding ponds		✓			Inspection of facilities/ Discussion	
Raceway headboxes and rearing ponds				✓	Inspection of facilities/ Discussion	
Incubation facilities	✓				Inspection of facilities/ Discussion	Install flow alarms in incubation
Quarantine areas and facilities	✓				No treatment system/Discussion	
Water treatment systems				✓	No treatment system/Discussion	
Security				✓	Discussion	Install security alarms
Are there outside systems and buzzers in on-site residences?		✓				Install outside alarms and buzzer in residence
Are water flow alarms checked daily?		✓			Discussion	
Are all other alarms checked weekly?					Discussion	
Is there a log of alarms for emergencies, tests, and maintenance requirements?				✓	Discussion.	Develop an alarm log
Are telephone pagers used?				✓	Discussion. Has not been a problem with on-site personnel	Install telephone pages
Adult holding facilities						
Do you meet the adult holding criteria?	✓					
Incubation facilities						
Type 1: Upwelling Jar Do you have an adequate number of units for the overall program?		✓			Inspection of facilities/Discussion	
Type 2: _____ Do you have an adequate number of units for the overall program?	✓				Inspection of facilities/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ring facilities Type 1: Tanks- Hatchery I Do you have an adequate number of units for the overall program? Type 2: Tanks- Hatchery II Do you have an adequate number of units for the overall program? Type 3: Raceways - STT Do you have an adequate number of units for the overall program?			✓		Inspection of facilities/Discussion	
			✓		Inspection of facilities/Discussion	
		✓			Inspection of facilities/Discussion	
rearing facilities Do you meet the approach velocity criteria: Are the fish screens regularly cleaned? Are rearing containers double screened for fish that should not be released to adjacent water?		✓			Inspection of facilities/Discussion	
		✓				
				✓	Loss are an asset to local sport fisherman	Install secondary screens in raceways
predator control facilities Are your predation control facilities effective?		✓			The current facilities are effective but need repair	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Feed storage facilities and quality control						
Does the storage of dry/semi-moist/moist foods (dry<12%; semi-moist 12-20%; moist >20% moisture) follow food manufacturer's recommendations?		✓			Discussion	
Does a regional quality control officer oversee production procedures and monitor:		✓			Discussion	
Verification by feed manufacturer that ingredients meet specifications?		✓			Discussion	
Ensure feed does not contain unwanted drugs or other additives?		✓			Discussion	
Analyze ingredients contained in the final food product to ensure that feed specifications have been met?		✓			Discussion	
Are the foods stored and handled according to the following criteria?						
Moist pellets should not exceed 10 °F at point of delivery.		✓			Discussion	
Moist pellets should be removed from freezer just prior to feeding.		✓			Discussion	
Do not leave buckets of feed or feed containers outside exposed to light or heat.				✓	feed is measured out for the day and left at the end of the raceways	Follow IHOT protocols for feed handling
Open bags of feed should be fed within one to two days except when feeding small groups of fish.		✓			Discussion	
Automatic feeder hoppers and bulk storage facilities should be insulated against excessive temperatures (80°F and above).				✓	Bulk storage facilities are not used in summer	Reduce temperature in feed hoppers and storage facilities
Release facilities						
Do the release facilities ensure that fish are not subjected to adverse conditions?	✓				Acclimation and release done at Sawtooth Fish Hatchery by IDFG	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>ution abatement facilities</p> <p>Do the pollution abatement facilities meet all federal and state regulations (or good engineering practice)?</p> <p>Are pollution abatement facilities operated correctly?</p>		<p>✓</p> <p>✓</p>			<p>Inspection of facilities/Discussion</p> <p>Discussion</p>	
<p>nsportation facilities</p> <p>Are the transport systems adequate to meet IHOT performance measures for transportation practices?</p>		<p>✓</p>			<p>Fish culturist drive trucks</p>	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Broodstock selection practices						
Is the donor selection process document attached?	✓				Existing program; does not apply	
Was the donor selection outline followed in selecting the hatchery broodstock?	✓				Existing program; does not apply	
to PM #40 in Genetics						
Spawning practices						
Were the appropriate number of spawners, male/female ratios, and fertilization protocols used?	✓				Spawning occurs at other hatcheries	
to PM #42 in Genetics Section						
Incubation practices						
Are specific incubation standards listed in the hatchery operations plan?		✓			Not in IHOT Operations Plan but in hatchery plan	
Are incubation practices written?		✓			Review of plan	
Incubation Type 1: Upwelling Jars (See PM #8) Do you meet the loading and flow criteria?		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
rearing practices						
Are specific rearing standards listed in the hatchery operations plan?		✓			In hatchery Operations Plan. Not in IHOT	
Are rearing practices written?		✓			Review of rearing standards	
Rearing Unit Type 1: Tanks - Hatch I (see PM #9) Do you meet the density and DI criteria? Do you meet the Loading and FI criteria?			✓ ✓		Review of records/Discussion Review of records/Discussion	Develop density and loading criteria for early rearing for IHOT Operations Plan; monitor loading
Rearing Unit Type 2: Tanks - Hatch II (see PM #9) Do you meet the density and DI criteria? Do you meet the Loading and FI criteria?			✓ ✓		Review of records/Discussion Review of records/Discussion	Develop density and loading criteria for early rearing for IHOT Operations Plan; monitor loading
Rearing Unit Type 3: Raceways (see PM #9) Do you meet the density and DI criteria? Do you meet the Loading and FI criteria?		✓ ✓			Review of records/Discussion Review of records/Discussion	
smolt quality						
Do you produce a high quality smolt?		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Health management practices						
Are the monthly hatchery monitoring visits being conducted? (PM #26)		✓			Review of records/Discussion	
Are the annual broodstock inspections being conducted? (PM #27)		✓			Review of records/Discussion	
Is there pathogen-free water and are the sanitation procedures being followed? (PM #28)				✓	Review of records/Discussion	Follow IHOT sanitation procedures; develop disease-free water supply
Are the following water quality parameters within criteria? (PM #5a-5h)						
Water temperature				✓	Review of records/Discussion	Install temperature control system for chilling eggs and fry to reduce early growth
Dissolved gases			✓		Review of records/Discussion	Monitor TGP
Chemistry			✓		Review of records/Discussion	Run analysis for missing parameters
Turbidity		✓			Review of records/Discussion	
Alkalinity and hardness		✓			Review of records/Discussion	
Nitrite		✓			Review of records/Discussion	
Contaminants		✓			Review of records/Discussion	
Are rearing standards being followed? (PM #19)				✓	Review of records/Discussion	Run analysis for missing parameters
Are egg and fish transfer/release requirements met? (PM #31)		✓			Review of records/Discussion	Develop density and loading criteria for early rearing
Do hatchery performance meet requirements defined in the regional hatchery policies and in basin and hatchery plans for the following areas?						
Percent smoltification						
Do you measure percent smoltification?				✓	Specific guidance has not been provided to hatchery on required measures	Develop smoltification monitoring program
Do you have a smoltification goal?		✓			Goal is 100%	
Did you meet the smoltification criteria?			✓			

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Rearing density (prior to release) Did you meet the rearing density criteria just prior to release?		✓			Review of records/Discussion	
Disease condition (at release) Did you meet all disease regulations just prior to release?		✓				
Release number (at release) Did you meet the release number goal?		✓				
Release size (at release) Did you meet the size goal?		✓				
Release date (at release) Did you meet the release date goal?		✓				
Release location (at release) Did you release the fish at the specified location?		✓				
Rearing and acclimation (at release) Lower Snake River Are the fish reared in the subbasin? Are the fish acclimated in the subbasin? Lower Salmon River Are the fish reared in the subbasin? Are the fish acclimated in the subbasin?		✓ ✓		✓ ✓		Develop rearing and acclimation sites for Lower Salmon River sites
Release strategy appropriate for the program?		✓				

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
nsportation facilities						
Do transportation equipment and personnel receive disinfection before and after use?		✓			Fish transported by Hagerman Hatchery/Discussion	
Is the fish tank interior disinfected using a solution of 200 ppm active chlorine for 30 minutes minimum or formaldehyde gas generation method (relative humidity of 60% for 2 hrs)?		✓			"	
Is the exterior of the fish transport vehicle disinfected using high pressure steam (115-130°C), high temperature acid, or with 200 ppm chlorine for 30 minutes?		✓			"	
Is the fish transport vehicle (cab) disinfected using 600 ppm quaternary ammonia compounds (1.5 ml of 50% stock solution/liter water)?				✓	"	Follow IHOT disinfection protocols for vehicle cab.
Is other equipment disinfected including fish pumps, nets, egg sorters, waders, boots, rain gear, hoses and other equipment using one of the following solutions? 200 ppm chlorine for 30 minutes 600 ppm quaternary ammonia compound for 30 minutes 200 ppm iodophor solution for 10 minutes		✓			"	
Do personnel wear protective garments when handling fish eggs or cultural water?						
Do the fish transport truck/chassis and tank/unit receive an inspection and service prior to the release season?		✓			Discussion	
Is a daily service inspection completed before starting up and leaving for the day?		✓				
Does the fish transport unit receive an inspection prior to loading?		✓			Discussion	
		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>nsportation facilities</p> <p>Does a pre-loading inspection covering tank water level, pumps or aerators, oxygen injection system settings, displacement gauge, and truck loading/hauling density tables checked and reviewed occur prior to loading the fish in the transport unit?</p> <p>Do hauling criteria include checking the fish 45 minutes to 1 hour after loading?</p> <p>When fish are active and systems are functioning properly, is the oxygen concentration reduced and maintained at approximately 8 ppm?</p> <p>Is water temperature in the transportation unit maintained within the 42-48 °F range?</p> <p>Do fish releasing procedures include the following criteria?</p> <p>Releasing the fish at the correct release site or into the correct water body.</p> <p>Tempering or the difference between the liberation tank and the target water body should not exceed 10°F.</p> <p>The liberation hose should be angled so that fish gently hit the water. Using a tripod is a method of ensuring the hose will stay at the proper angle.</p>		<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>		<p>✓</p> <p>✓</p> <p>✓</p>	<p>Don't monitor; personnel think it is supersaturated</p> <p>Discussion</p> <p>Discussion</p> <p>No water tempering done at release</p> <p>Discussion</p>	<p>Monitor oxygen concentration in transport tank</p> <p>Follow IHOT criteria for tempering water temperature at release</p>

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>Evaluation practices</p> <p>Has the hatchery conducted fishery contribution studies to:</p> <p>Determine the requirements for evaluating and improving management programs?</p> <p>Develop guidelines that define the geographical area and identify component stocks (hatchery and/or wild) that comprise the management unit?</p> <p>Develop guidelines that define if the proper stocks of fish are currently being used?</p> <p>Determine which management units contribute to a specific fishery and the time periods of those contributions?</p> <p>Determine the relative contributions of the various management units to a specific fishery over the different time periods?</p>				<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>		Perform required fishery contribution study
<p>Training practices</p> <p>Does the hatchery have a training schedule for its staff?</p> <p>Does each staff member have a personal training plan approved by a supervisor and reviewed annually?</p> <p>Does the hatchery routinely exchange training details between other hatcheries and agencies?</p> <p>Does the hatchery encourage and reward off-duty training of staff?</p> <p>Does the hatchery conduct monthly staff meetings?</p>		<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>			Hatchery has daily staff meetings	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>monthly hatchery monitoring visits being conducted by a qualified fish health specialist as described below?</p> <p>Conduct visit at least monthly</p> <p>Monitoring conducted by qualified fish health specialist</p> <p>Examine a representative sample of healthy and moribund fish from each lot.</p> <p>Review fish culture practices with hatchery manager.</p> <p>Report finding and results of necropsies on standard form.</p> <p>Recommend appropriate drug or chemical treatment.</p> <p>Summarize fish health status or stock prior to release or transfer to another facility.</p>		<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>			<p>Review of records/Discussion</p>	
<p>all of the functions of the hatchery yearly monitoring visits being completed as described below?</p> <p>usually examine each broodstock for the presence of detectable viral pathogens.</p> <p>usually screen each salmon broodstock for the presence of <i>Aeromonas salmonicida</i>.</p> <p>conduct inspection by or under the supervision of qualified health specialist.</p>	<p>✓</p> <p>✓</p> <p>✓</p>			<p>No broodstock on station</p> <p>See above</p> <p>See above</p>		

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>Are there any sources of pathogen-free water, especially for incubation and early rearing?</p> <p>Are the hatchery sanitation procedures understood and being followed as described below?</p> <p>Disinfect/water harden eggs in iodophor?</p> <p>Are foot baths containing disinfectant placed at the incubation facility's entrance and exit?</p> <p>Is equipment and rain gear utilized in broodstock handling or spawning sanitized prior to its use elsewhere in the hatchery?</p> <p>Is equipment used to collect dead fish sanitized prior to its use in another pond and/or lot of fish?</p> <p>Is equipment, including vehicles used to transfer fish between facilities, disinfected prior to use with any other fish lots or at any other location?</p> <p>Are rearing vessels sanitized after fish are removed and prior to introducing a new fish lot or stock?</p> <p>Are dead fish properly disposed of?</p>				<p>✓</p> <p></p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>	<p>None available, Open spring collection ditches</p> <p>Discussion</p> <p>Inspection of facilities/Discussion</p> <p>Discussion; only done during disease outbreaks</p> <p>Inspection of facilities/Discussion</p> <p>Inspection of facilities/Discussion</p>	<p>Develop pathogen-free water supply for incubation and early rearing</p> <p>Install foot baths</p> <p>Follow sanitation protocols for equipment used to collect dead fish</p>

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>water quality parameters being followed?</p> <p>Are the following water quality parameters within criteria? (PM #5a-5h)</p> <p>Water temperature Dissolved gases Chemistry Turbidity Alkalinity and hardness Nitrite Contaminants</p> <p>to PM #21</p>		✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓	<p>Review of records/Discussion Review of records/Discussion Review of records/Discussion Review of records/Discussion Review of records/Discussion Review of records/Discussion</p>	<p>Chill water Monitor TGP Run analysis for missing parameters</p> <p>Run analysis for missing parameters</p>
<p>incubation and rearing standards being followed?</p> <p>Are the incubation practices being following the IHOT incubation criteria? (PM #18)</p> <p>Are the rearing practices following the IHOT criteria? (see PM #19)</p> <p>to rearing practices PM #18-PM #19</p>		✓		✓	<p>Review of records/Discussion Review of records/Discussion</p>	<p>Develop density and loading criteria for early rearing for IHOT Operations Plan</p>
<p>egg and fish transfer/release requirements met?</p>		✓			<p>Discussion</p>	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>Is the hatchery's program outlined in a subbasin management plan?</p> <p>to subbasin plan PM # 1</p>		✓			Columbia Basin System Planning Production Plan and the Columbia Basin Fish and Wildlife Program, 1987, Columbia Basin System Planning-Production Plan, Salmon River Basin, Sept 1, 1990; IDFG Anadromous Fish Management Plan-1992-1996; IDFG Fisheries Management Plan 1996 - 2000; LSRCP.	
<p>Is the hatchery operating under a current hatchery operational plan?</p> <p>to operational plan PM # 2</p>		✓			IHOT Operations Plan and Hatchery Evaluation Team 5-yr plan, Facility O&M. Annual production meetings sets production numbers for the year	
<p>Is hatchery monitoring and evaluation plan in place?</p> <p>to hatchery monitoring and evaluation plan PM # 3</p>		✓			Lower Snake River Compensation Program Five-Year Evaluation Plan	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>Does the hatchery program meet requirements established in the regional hatchery policies and basin planning documents in the following areas: species, stock, broodstock collection location, broodstock numbers, broodstock collection strategy, spawning and egg-take protocols?</p> <p>Does the hatchery program meet the requirements for the following?</p> <p>Species protocols (PM #4a)</p> <p>Stock protocols (PM #4a)</p> <p>Broodstock collection location protocols (PM #41)</p> <p>Broodstock numbers protocols (PM #42)</p> <p>Broodstock collection strategy protocols (PM #41)</p> <p>Spawning protocols (PM #42)</p> <p>Egg-take protocols (PM #42)</p>		<p>✓</p> <p>✓</p>			<p>Review of records/Discussion</p>	<p>Spawning and egg take at other hatcheries</p>

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>Do the hatchery's performance meet requirements defined in the regional hatchery policies and in basin and hatchery plans for the following areas: percent smoltification, rearing density, disease condition, and the number, size date(s), and location of release?</p> <p>Percent smoltification (PM #22a1)</p> <p>Rearing density (PM #22a2)</p> <p>Disease condition (PM #22a3)</p> <p>Number at release (PM #22a4)</p> <p>Size at release (PM #22a5)</p> <p>Date of release (PM #22a6)</p> <p>Location of release (PM #22a7)</p>					<p>Review of records/Discussion</p>	<p>Develop smoltification goal and monitoring plan</p> <p>Develop criteria for density and loading for early rearing for IHOT Operations Plan</p>
<p>Are fish reared in the subbasin or acclimated in the basin?</p> <p>tooth NFH</p> <p>Lower Salmon River</p> <p>PM #22b</p>		<p>✓</p>		<p>✓</p>	<p>Discussion</p> <p>Discussion</p>	<p>Construct rearing facilities and acclimation ponds for Lower Salmon River sites</p>
<p>Is the release strategy appropriate for the program?</p> <p>PM #22c</p>			<p>✓</p>		<p>Discussion</p>	<p>See PM #22c</p>

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>new programs, has a broodstock collection plan developed?</p> <p>Is the broodstock collection plan written?</p> <p>For a non-captive broodstock program:</p> <p>Was an unbiased, representative sample collected?</p> <p>Was the recommended number of broodstock collected?</p> <p>For a captive broodstock program:</p> <p>Were captive brood progeny excluded as donors for propagating the next generation of the captive broodstock program?</p> <p>Were full-sib crosses avoided?</p> <p>Is the broodstock collection plan understood and being followed by staff?</p>	<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>				<p>Existing Program; does not apply</p> <p>Existing Program; does not apply</p> <p>Existing Program; does not apply</p>	
<p>a new program, was the donor selection outlined in selecting the hatchery broodstock?</p> <p>Is a donor selection plan written?</p> <p>Was the donor selection outline followed in selecting the broodstock?</p> <p>Was the target stock recommended in the donor selection process actually used?</p>	<p>✓</p> <p>✓</p> <p>✓</p>				<p>Existing Program; does not apply</p> <p>Existing Program; does not apply</p> <p>Existing Program; does not apply</p>	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>existing programs, were the broodstock collection cedures followed?</p> <p>Is the broodstock collection plan written?</p> <p>Does the broodstock collection plan follow the guideline:</p> <p> Was an unbiased, representative sample collected?</p> <p> Was the recommended number of broodstock collected?</p> <p> Were the broodstock collection procedures in hatchery operation plan understood and followed?</p> <p> Were the broodstock collection procedures in hatchery operation plan understood and followed?</p>	<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>				<p>No adults are collected at this facility</p>	
<p>s the appropriate number of spawners, male/female os, and fertilization protocols used?</p> <p>Are the spawning protocols written?</p> <p>Are daily or weekly spawning logs available?</p> <p>Was the appropriate number of spawners used?</p> <p>Did you attempt to spawn all collected broodstock and randomize mating with respect to age class, and other traits?</p> <p>Was the sex-ratio within the limits given in the performance standards?</p> <p>Were the fertilization protocols followed?</p> <p>If the hatchery needed to reduce the number of eggs retained, was this done by representative sampling of each male/female cross?</p>	<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>					

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>Is there a genetics monitoring and evaluation program in place?</p> <p>Is a genetics monitoring and evaluation program available?</p> <p>Does the plan address the following elements listed in IHOT:</p> <p>Does the program have elements needed to meet evaluation goals 1-4?</p> <p>Has a qualified geneticist reviewed and endorsed the program (goal 5)?</p> <p>Will the program collect the data and maintain the records needed to evaluate compliance on an ongoing basis (goal 5)?</p> <p>Is the program understood and followed by staff?</p>				<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>	No plan	Develop genetics M&E plan for IHOT.

Remedial Actions

Based on the compliance status for each performance measure, remedial actions were developed. The required remedial actions are organized into five categories. The types of categories range across a spectrum from those actions that are beyond human control, to those that require a change in agency policy or procedures, to those that involve a significant capital cost to put in place. The following are the five types of remedial actions identified under phase 1 of the audit:

The Five Types of Remedial Actions

Type	Description
1	Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery
2	Remedial actions requiring changes in agency policies or procedures
3	Remedial actions requiring changes in monitoring coverage or interval
4	Remedial actions requiring significant capital expenditures
5	Remedial actions that may require significant capital expenditures but are not clearly definable at this time

Remedial Actions at Hagerman NFH - Summer Steelhead

This section presents the corrective actions required to bring the Hagerman NFH - Summer Steelhead program into compliance with the IHOT performance measures. The remedial actions suggested here are just that, suggestions developed by the Montgomery Watson Audit Team. For some non-compliance areas, other remedial actions could be proposed. The required remedial actions are cross-referenced to each IHOT performance measure that was not in compliance. Where appropriate, the costs associated with the remedial actions are also presented (Table 3).

The cost estimates presented in this section are based on professional experience from similar projects. In most cases, only a lump-sum figure is presented and detailed take-off lists have not been prepared. The cost estimates are essentially order of magnitude estimates ($\pm 40\%$).

More importantly, the suggested remedial activities may also present several levels of action. Optional actions have been listed for several problems. These optional actions are desirable for either operational or safety considerations.

Table 3. Remedial Actions Required at Hagerman NFH - Summer Steelhead

Remedial Action Required	Cost	PMS¹
Type 1 - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery		
Type 2 - Remedial actions requiring changes in agency policies or procedures		
Provide training to staff on operations plan	----	2
Document adult contribution	----	4a
Document smolt-to-adult survival	----	4h
Install security alarms	----	6
Install outside alarms and buzzers in residences	----	6
Follow IHOT protocols for feed handling	----	12
Develop density and loading criteria for early rearing and monitor loading and density for IHOT Operations Plan	----	19
Follow IHOT sanitation procedures for foot baths	----	21,28
Develop smoltification monitoring plan	----	22a1
Follow IHOT disinfection protocols for vehicle cab	----	23
Follow IHOT criteria for tempering water temperature at release	----	23
Perform required fishery contribution study	----	24
Follow sanitation protocols for equipment used to collect dead fish	----	28
Develop genetics M&E plan for IHOT	----	43
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Monitor TGP	----	5b
Run analysis for missing chemistry parameters	----	5c
Run additional analysis for contaminants when fish are present	----	5g
Monitor oxygen concentration in transport tank	----	23

¹ PMS are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 in Section 3 in numerical order.

Remedial Action Required	Cost	PMs¹
Type 4 - Remedial actions requiring significant capital expenditures		
Install temperature control system for chilling eggs and fry to reduce early growth 1,400 tons of chiller capacity	\$500,000 to \$700,000	5a
Install flow alarms in incubation facility	\$3,000	6
Develop an alarm log	\$1,000	6
Install secondary screens in raceways	\$21,000	10
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Reduce temperature in feed hoppers and storage facilities	----	12
Develop disease-free water supply	----	21,28
Develop rearing and acclimation sites for lower Salmon River sites	----	22b

¹ PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.

Hatchery Contribution to Fisheries, Spawning Grounds, and Hatcheries

This section presents the audit findings for the Hagerman NFH - Summer Steelhead program contribution of adult fish to fisheries, local fisheries, spawning grounds, and hatcheries. Data is reported by broodyear. A broodyear refers to the adult contribution from the eggs produced from a single group of spawning adults. For some species, this may include fish caught as 2-, 3-, 4-, 5-, and 6-year old fish. Because of the return distribution and data processing delays, the complete adult contribution for a given broodyear may not be available until 4 to 5 years after the fish have been released from the hatchery.

**Table 4. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries:
Hagerman NFH - Summer Steelhead**

Year	Fisheries ¹ (Broodyear)	Spawning Grounds ¹ (Broodyear)	Hatchery ¹ (Broodyear)	Smolt to Adult Survival (percent)
1981				
1982				
1983				
1984				
1985				
1986	3,208	24	111	0.33
1987	2,167	20	132	0.14
1988	575	--	52	0.056
1989	5,975	--	0	0.48
1990	7,378	--	0	0.51
1991				
1992				

¹ Data obtained from Missing Production Groups Annual Report or from the Regional Mark Information System database.

Annual Operating Expenditures

The level and detail of annual operating expenditures varies widely depending on hatchery, operating agency, and funding source. When provided, expenditures were presented in terms of personnel costs, operating costs (power, feed, supplies), capital costs, indirect costs charged to the Federal government, third-party costs, and other costs. These cost components were summed to determine a total hatchery annual cost. Based on discussion with the hatchery manager, the percent of total hatchery costs allocated to a given program was estimated. The total hatchery costs and the percent of hatchery costs allocated to a given program were used to compute the cost of a given program. Table 5 shows the annual operating expenses for the overall Hagerman NFH - Summer Steelhead. For programs where adult collection, spawning, incubation, and rearing may occur at more than one facility, the cost breakdown for the hatchery component that occurs at each hatchery is presented in separate tables (Tables 5a and 5b).

Table 5. Annual Operating Expenses: Hagerman NFH - Summer Steelhead

Hatchery	1994	1995	1996
1. Hagerman	\$548,497	\$667,088	\$717,000
2. Sawtooth, Pahsimeroi, or Oxbow	No information provided	No information provided	No information provided
3.			
4.			
5.			
Total Program Costs	\$548,497	\$667,088	\$717,000

The total expenditures for the Hagerman NFH are presented in Table 6 by program. The detailed breakdown of program expenditures at this hatchery is presented in separate tables (Tables 6a and 6b).

Table 6. Annual Operating Expenses - Hagerman NFH

Program	1994	1995	1996
1. Summer Steelhead	\$548,497	\$667,088	\$717,000
2. Rainbow Trout	\$77,636	\$0	\$0
3.			
4.			
5.			
Total Hatchery Costs	\$626,133	\$667,088	\$717,000

**Table 5a. Annual Operating Expenses: Hagerman NFH - Summer Steelhead
Expenditure Occurring at Hagerman NFH**

Component	1994	1995	1996
Personnel Costs	\$362,055	\$417,015	\$290,366
Operational Costs	\$225,790	\$218,765	\$226,134
Capital Costs	\$15,060	\$11,643	\$200,500
Indirect Costs	\$11,655	\$19,665	\$9,000
Lumped Hatchery Costs ¹			
Lumped Third Party Costs	\$8,732		
Total Hatchery Costs	\$623,292	\$667,088	\$717,000
Source of Funds			
LSRCP			
Program Production (#)	1,857,198	1,335,816	1,461,071
Total Production (#)	2,121,441	1,335,816	1,461,071
Program as Percent of Total	88%	100%	100%
Program Costs	\$548,497	\$667,088	\$717,000

¹ When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

**Table 5b. Annual Operating Expenses: Hagerman NFH - Summer Steelhead
Expenditure Occurring at Sawtooth, Pahsimeroi, or Oxbow Hatcheries**

Component	1994	1995	1996
Personnel Costs	No information provided	No information provided	No information provided
Operational Costs	No information provided	No information provided	No information provided
Capital Costs	No information provided	No information provided	No information provided
Indirect Costs	No information provided	No information provided	No information provided
Lumped Hatchery Costs ¹	No information provided	No information provided	No information provided
Lumped Third Party Costs	No information provided	No information provided	No information provided
Total Hatchery Costs	No information provided	No information provided	No information provided
Source of Funds	No information provided	No information provided	No information provided
Program Production (lb)	No information provided	No information provided	No information provided
Total Production (lb)	No information provided	No information provided	No information provided
Program as Percent of Total	No information provided	No information provided	No information provided
Program Costs	No information provided	No information provided	No information provided

¹ When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

**Table 6a. Annual Operating Expenses: Summer Steelhead
Expenditure Occurring at Hagerman NFH**

Component	1994	1995	1996
Personnel Costs	\$362,055	\$417,015	\$290,366
Operational Costs	\$225,790	\$218,765	\$226,134
Capital Costs	\$15,060	\$11,643	\$200,500
Indirect Costs	\$11,655	\$19,665	\$9,000
Lumped Hatchery Costs ¹			
Lumped Third Party Costs	\$8,732		
Total Hatchery Costs	\$623,292	\$667,088	\$717,000
Source of Funds			
Program Production (#)	1,857,198	1,335,816	1,461,071
Total Production (#)	2,121,441	1,335,816	1,461,071
Program as Percent of Total	88%	100%	100%
Program Costs	\$548,497	\$667,088	\$717,000

¹ When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

**Table 6b. Annual Operating Expenses: Rainbow Trout
Expenditure Occurring at Hagerman NFH**

Component	1994	1995	1996
Personnel Costs	\$362,055	\$417,015	\$290,366
Operational Costs	\$225,790	\$218,765	\$226,134
Capital Costs	\$15,060	\$11,643	\$200,500
Indirect Costs	\$11,655	\$19,665	\$9,000
Lumped Hatchery Costs ¹			
Lumped Third Party Costs	\$8,732		
Total Hatchery Costs	\$623,292	\$667,088	\$717,000
Source of Funds			
Program Production (#)	264,243	0	0
Total Production (#)	2,121,441	1,335,816	1,461,071
Program as Percent of Total	88%	100%	0%
Program Costs	\$548,497	\$0	\$0

¹ When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.