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# **HATCHERY EVALUATION REPORT**

**McCall Hatchery - Summer Chinook**

**September 1996**

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**Integrated Hatchery Operations Team (IHOT)**

# **HATCHERY EVALUATION REPORT**

## **McCall Hatchery - Summer Chinook**

### **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 McCall Hatchery - Summer Chinook program. The hatchery is located within the city limits of McCall, Idaho on the North Fork Payette River, approximately 0.25 miles downstream from Payette Lake. The hatchery is used for adult collection, incubation, and rearing of summer chinook.

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.

## McCall Hatchery - Summer Chinook Results

The McCall facility includes two ponds for rearing, 14 indoor rearing tanks, and incubation facilities. The South Fork Salmon Satellite includes two adult holding ponds and a covered spawning area. McCall Hatchery was constructed in 1979 by the U.S. Army Corps of Engineers as part of the Lower Snake River Compensation Plan (LSRCP) - a program to mitigate for anadromous fishery losses caused by the construction of the four hydroelectric dams on the lower Snake River.

The McCall Hatchery was in general compliance with most of the performance measures. In the area of program objectives, the hatchery was not meeting its adult return goal, and needed to reduce its pre-spawning mortality. The audit found that the hatchery was not in compliance with the screen approach criteria, turbidity criteria, water chemistry and contaminant monitoring requirements, alkalinity and hardness criteria, early rearing facilities, and pathology-free water for early rearing criteria, which are all facilities requirements. The hatchery did not have a smoltification goal or monitoring program, annual training schedule. In the compliance area for fish health policy, the hatchery did not have foot baths in the incubation facilities. The hatchery did not have an approved Genetics Monitoring and Evaluation Program in place.

The specific areas in which the McCall Hatchery - Summer Chinook 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:

- Consider pre-filtration of incubation water to reduce sediment problem
- Develop annual training schedule for staff
- Develop pathogen-free water supply for early rearing
- Develop smoltification goal and monitoring program
- Develop specific incubation and rearing standards for IHOT Operations Plan
- Document adult contribution
- Increase alkalinity and hardness
- Install additional early rearing vats on southside of hatchery building
- install foot baths in incubation facilities
- Modify intake to meet current approach criteria
- Monitor DO during hauling
- Obtain approval of genetics monitoring and evaluation plan
- Perform IHOT QA/QC feed tests
- Reduce pre-spawning mortality
- Review IHOT transport water temperature criteria
- Review IHOT broodstock collection and spawning protocols as they relate to IDFG policy and practices.
- Run analysis for contaminants
- Run analysis for missing water chemistry parameters
- Run analysis for turbidity
- Use second set of screens

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

<b>Name:</b>	McCall Hatchery
<b>Stock/Species:</b>	Summer Chinook
<b>Operating Agency:</b>	Idaho Department of Fish and Game
<b>Funding Agency:</b>	Lower Snake River Compensation Program (LSRCP)
<b>Location:</b>	Located within the city limits of McCall, Idaho on the North Fork Payette River, approximately 0.25 miles downstream from Payette Lake.
<b>Address:</b>	McCall Hatchery Idaho Department of Fish and Game P.O. Box 1021 McCall, ID 83638
<b>Hatchery Manager:</b>	Mr. Gene McPherson
<b>Phone:</b>	(208) 634-2690
<b>Fax:</b>	(208) 634-3492
<b>Purpose:</b>	McCall Hatchery was constructed in 1979 by the U.S. Army Corps of Engineers as part of the Lower Snake River Compensation Plan (LSRCP) - a program to mitigate for anadromous fishery losses caused by the construction of the four hydroelectric dams on the lower Snake River. The LSRCP mitigation goal is to return 8,000 summer chinook above Lower Granite Dam.
<b>Production Goal:</b>	<b>Summer Chinook</b>  Produce 1.0 million smolts (50,000 lb) for release in the South Fork Salmon River.  Provide surplus summer chinook eggs/ or fish to other hatcheries in the state.
<b>Water Supply:</b>	Water is supplied to the hatchery from Payette Lake through two inlets, one at the lake surface and the other at a depth of 50 feet. This permits some control over water temperature throughout the year. Water flow to the hatchery is 8,977 gpm. The satellite facilities use 8,977 gpm of gravity flow water from the South Fork of the Salmon River.

**Facilities:**

Adult Holding:	none at hatchery
Incubation:	23 stacks of 8 tray vertical tray incubators
Early Rearing:	14 indoor rearing tanks - 320 cf each
Raceways:	none
Rearing Ponds:	2 rearing ponds - 23,814 cf each
Satellite Facilities:	South Fork Salmon Satellite
	2 adult holding ponds and spawning area

## 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).<sup>1</sup> 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 this Hatchery Evaluation Report and blank forms for additional comments. The following is the basic structure of the IHOT audit form:

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 form. 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 shaded text.

### 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 onsite visits. The site visit at the McCall Hatchery was conducted on September 16, 1996.

<sup>1</sup>Integrated 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. 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 McCall Hatchery - Summer Chinook**

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 McCall Hatchery - Summer Chinook 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 McCall Hatchery - Summer Chinook**

Component	Location of Adult Holding, Spawning, Incubation, and Rearing					
	South Fork Salmon Satellite	McCall Hatchery				
Adult Collection	✓					
Adult Holding	✓					
Spawning	✓					
Fertilization	✓					
Incubation						
green-to-eyed		✓				
eyed-to-hatch		✓				
Rearing						
fry		✓				
fingerlings		✓				
smolts		✓				
Acclimation/release	✓ <sup>(a)</sup>					

(a) All direct stream release

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, Lower Snake River Management Plan, and NMFS Section 7 (ESA)	
<p>ie hatchery operating under a current hatchery rational plan?</p> <p>Is it understood by staff?</p> <p>Is it being followed?</p>		<p>✓</p> <p>✓</p> <p>✓</p>			IHOT Operations Plan and Facility O&M plan submitted with August 26, 1996 update.	
<p>hatchery monitoring and evaluation plan in place?</p> <p>Do you have a written monitoring and evaluation plan?</p>		<p>✓</p> <p>✓</p>			Hatchery Monitoring and Evaluation Plan	
<p>ilt contribution to fisheries, spawning grounds, and chery</p>			✓		Data provided for South Fork Salmon River. There is no chinook fishery in Idaho. Hatchery gets no information from ocean fishery or lower river fisheries.	Document adult contribution
<p>ilt pre-spawning survival as compared with blished goal</p>				✓	In compliance 3 out of last 5 years . Chemical treatment now done	Reduce pre-spawning mortality
<p>-take as compared with established hatchery goal</p>				✓	In compliance 2 out of last 5 years	Improve adult returns
<p>en-egg to eyed-egg survival as compared with blished goal</p>		✓			In compliance 5 out of last 5 years	
<p>d-egg to fry survival as compared with established l</p>		✓			In compliance 5 out of last 5 years	
<p>to smolt survival as compared with established goal</p>		✓			In compliance 5 out of last 5 years	
<p>duction as compared with established goal</p>				✓	In compliance 2 out of last 5 years	Improve adult returns
<p>cent survival (smolt to adult) as compared with blished goal</p>				✓	In compliance 0 out of last 5 years	Improve adult returns

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Number of eggs, fry, fingerlings, smolts, and/or adults meet basinwide needs	✓				Data provided.	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Temperature</b>						
Does your water temperature meet the criteria for spawning?		✓			Review of records/Discussion	
Does your water temperature meet the criteria for incubation?				✓	Temperatures are within criteria for the first half of the cycle but too low later portion of cycle.	Low temperatures mimics natural cycles. Review IHOT temperature criteria
Does your water temperature meet the criteria for rearing?		✓				
<b>Dissolved gases</b>						
Is the oxygen level near saturation?		✓			Discussion.	
Is the dissolved nitrogen level less than saturation?		✓			Measured with saturometer	
<b>Chemistry</b>						
Ammonia (un-ionized)		✓			Review of records/Discussion	
Carbon Dioxide				✓	No Data	Run analysis
Chlorine				✓	No Data	Run analysis
pH		✓			Review of records/Discussion	
Copper		✓			Review of records/Discussion	
Hydrogen Sulfide				✓	No Data	Run analysis
Iron		✓			Review of records/Discussion	
Zinc		✓			Review of records/Discussion	
<b>Turbidity</b>						
Does your turbidity meet the criteria?				✓	High turbidity occurs from wind on the lake. Based on visual observations; no data.	Run analysis
<b>Alkalinity and hardness</b>						
Does your alkalinity and hardness meet the criteria?				✓	Surface water supply is very soft. Has not been a problem under current operation.	Increase alkalinity and hardness
<b>Nitrite</b>						
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		
<b>Contaminants</b>  Aldrin Endrin Dieldrin Heptachlor Chlordane Methoxychlor Lindane Malathion Guthion			✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓		No Data No Data No Data No Data No Data No Data No Data No Data No Data	Run analysis for contaminants
<b>Biogens</b>  What portions of the hatchery have disease-free water?  Adult holding Incubation Early rearing Rearing Others	✓	✓		✓ ✓ ✓	Discussion Have UV sterilizers for incubation Discussion Discussion	



Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>rearing facilities</b></p> <p>Type 1: <u>Starting Vats</u> Do you have an adequate number of units for the overall program?</p> <p>Type 2: <u>Ponds</u> Do you have an adequate number of units for the overall program?</p> <p>Type 3: <u>N/A</u> Do you have an adequate number of units for the overall program?</p>				<p>✓</p> <p>✓</p> <p>✓</p>	<p>Need more vats for isolation capability during full production</p> <p>Inspection of facilities/Discussion</p>	<p>Install additional rearing space with enclosure on southside of hatchery building</p>
<p><b>screening facilities</b></p> <p>Do you meet the approach velocity criteria:</p> <p>Are the fish screens regularly cleaned?</p> <p>Does the screen mesh (opening) meet screen opening criteria?</p> <p>Are rearing containers double screened for fish that should not be released to adjacent water?</p>		<p>✓</p> <p>✓</p>		<p>✓</p> <p>✓</p> <p>✓</p>	<p>41.3 sf of screen for 20 cfs gives a 0.48 fps approach velocity.</p> <p>Not double screened</p>	<p>Modify intake to meet current approach velocity criteria</p> <p>Install second set of screens</p>
<p><b>predator control facilities</b></p> <p>Are your predation control facilities effective?</p>		<p>✓</p>			<p>No predation problems</p>	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>d storage facilities and quality control</b>						
Does the storage of dry/semi-moist/moist foods (dry<12%; semi-moist 12-20%; moist >20% moisture) follow food manufacturer's recommendations?		✓			Reviewed manufacturers recommendations	
Does a regional quality control officer oversee production procedures and monitor:						
Verification by feed manufacturer that ingredients meet specifications?				✓	No regular testing done. If bad feed is suspected they send it back	Perform IHOT QA/QC feed tests
Ensure feed does not contain unwanted drugs or other additives?				✓	Discussion	Perform IHOT QA/QC feed tests
Analyze ingredients contained in the final food product to ensure that feed specifications have been met?				✓	Discussion	Perform IHOT QA/QC feed tests
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.		✓			Discussion	
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).	✓				Automatic feeders are installed but not used. Feeders meet the criteria.	
<b>ease facilities</b>						
Do the release facilities ensure that fish are not subjected to adverse conditions?		✓			Discussed facility and operation.	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>ution abatement facilities</b></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>		✓			Pond cleaning waste and flow all go through the same pond. All test OK.	
<p><b>nsportation facilities</b></p> <p>Are the transport systems adequate to meet IHOT performance measures for transportation practices?</p>		✓			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		
<b>Broodstock selection practices</b>						
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						
<b>Spawning practices</b>						
Were the appropriate number of spawners, male/female ratios, and fertilization protocols used?		✓			Review of records/Discussion. Spawning at S. Fork Salmon satellite facility	
to PM #42 in Genetics Section						
<b>Incubation practices</b>						
Are specific incubation standards listed in the hatchery operations plan?		✓			Not in IHOT Operations Plan but in hatchery plan	Develop specific incubation standards for IHOT Operations Plan
Are incubation practices written?		✓			Review of plan	
Incubation Type 1: <u>Trays</u> (See PM #8) Do you meet the loading and flow criteria?		✓			Review of records/Discussion	
Incubation Type 2: <u>N / A</u> (See PM #8) Do you meet the loading and flow 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		
<b>Rearing practices</b>						
Are specific rearing standards listed in the hatchery operations plan?		✓			Not in IHOT Operations Plan but in hatchery Operations Plan	Develop specific rearing standards for IHOT Operations Plan
Are rearing practices written?		✓			Review of rearing standards	
Rearing Unit Type 1: Vats (see PM #9)						
Do you meet the density and DI criteria?		✓			Review of records/Discussion	
Do you meet the Loading and FI criteria?		✓			Review of records/Discussion	
Rearing Unit Type 2: Ponds (see PM #9)						
Do you meet the density and DI criteria?		✓			Review of records/Discussion	
Do you meet the Loading and FI criteria?		✓			Review of records/Discussion	
Rearing Unit Type 3: N / A (see PM #9)						
Do you meet the density and DI criteria?	✓				Review of records/Discussion	
Do you meet the Loading and FI criteria?	✓				Review of records/Discussion	
<b>Smolt quality</b>						
Do you produce a high quality smolt?		✓			Fish in good condition at release; good fat, fins, silvery starting to shed scales	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Health management practices</b>						
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)				✓		
Are the following water quality parameters within criteria? (PM #5a-5h)						
Water temperature				✓	Review of records/Discussion	Review IHOT temperature criteria
Dissolved gases		✓			Review of records/Discussion	
Chemistry		✓			Review of records/Discussion	Run analysis for missing parameters
Turbidity			✓		Review of records/Discussion	Run analysis for turbidity
Alkalinity and hardness			✓		Review of records/Discussion	
Nitrite		✓			Review of records/Discussion	
Contaminants		✓	✓		Review of records/Discussion	Increase alkalinity and hardness
Are rearing standards being followed? (PM #19)		✓			Review of records/Discussion	
Are egg and fish transfer/release requirements met? (PM #31)		✓			Review of records/Discussion	Run analysis for contaminants
<b>Do hatchery performance meet requirements defined in the regional hatchery policies and in basin and hatchery plans for the following areas?</b>						
<b>Percent smoltification</b>						
Do you measure percent smoltification?		✓			Visual observation. No formal tests.	Develop smoltification goal and monitoring program
Do you have a smoltification goal?				✓	No goal found	
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		
<b>ring density (prior to release)</b>  Did you meet the rearing density criteria just prior to release?		✓			Discussion	
<b>ease condition (at release)</b>  Did you meet all disease regulations just prior to release?		✓			Pathologist conducts pre-release assessment.	
<b>nber (at release)</b>  Did you meet the release number goal?				✓	Eggs not available	Improve adult returns
<b>at release</b>  Did you meet the size goal?		✓			Review of records/Discussion.	
<b>es of release</b>  Did you meet the release date goal?		✓			Release first week of new moon in release period. NMFS controls release date also.	
<b>ation of release</b>  Did you release the fish at the specified location?		✓			Review of records/Discussion	
<b>fish reared in the subbasin or acclimated in the basin?</b>  Are the fish reared in the subbasin?  Are the fish acclimated in the subbasin?		✓ ✓			Discussion Discussion	
<b>ie release strategy appropriate for the program?</b>		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>nsportation facilities</b>						
Do transportation equipment and personnel receive disinfection before and after use?		✓			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)?		✓			Discussion	
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?		✓			Discussion	
Is the fish transport vehicle (cab) disinfected using 600 ppm quaternary ammonia compounds (1.5 ml of 50% stock solution/liter water)?		✓			Discussion	
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		✓			Discussion	
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?		✓			Discussion	
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		
<b>nsportation facilities</b>						
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?		✓			Discussion	
Do hauling criteria include checking the fish 45 minutes to 1 hour after loading?		✓			Discussion	
When fish are active and systems are functioning properly, is the oxygen concentration reduced and maintained at approximately 8 ppm?				✓	Not measured	Monitor DO during hauling
Is water temperature in the transportation unit maintained within the 42-48 °F range?				✓	Matches receiving water Discussion	Review IHOT transport water temperature criteria
Do fish releasing procedures include the following criteria?					Discussion	
Releasing the fish at the correct release site or into the correct water body.		✓			Discussion	
Tempering or the difference between the liberation tank and the target water body should not exceed 10°F.		✓				
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.		✓				

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Evaluation practices</b>						
Has the hatchery conducted fishery contribution studies to:						
Determine the requirements for evaluating and improving management programs?		✓			Discussion. See also PM #4a.	
Develop guidelines that define the geographical area and identify component stocks (hatchery and/or wild) that comprise the management unit?		✓			Discussion	
Develop guidelines that define if the proper stocks of fish are currently being used?		✓			Discussion	
Determine which management units contribute to a specific fishery and the time periods of those contributions?		✓			Discussion	
Determine the relative contributions of the various management units to a specific fishery over the different time periods?		✓			Discussion	
<b>Training practices</b>						
Does the hatchery have a training schedule for its staff?				✓	Review of records/Discussion	Develop annual training schedule for staff
Does each staff member have a personal training plan approved by a supervisor and reviewed annually?		✓			Review of records/Discussion	
Does the hatchery routinely exchange training details between other hatcheries and agencies?		✓			Review of records/Discussion	
Does the hatchery encourage and reward off-duty training of staff?		✓			Review of records/Discussion	
Does the hatchery conduct monthly staff meetings?		✓			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		
<p><b>monthly hatchery monitoring visits being conducted by a qualified fish health specialist as described below?</b></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><b>all of the functions of the hatchery yearly monitoring visits being completed as described below?</b></p> <p>usually examine each broodstock for the presence of portable 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>Review of records/Discussion</p> <p>Review of records/Discussion</p> <p>Review of records/Discussion</p>	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>Are hatchery sanitation procedures followed as described?</b></p> <p>Are there any sources of pathogen-free water, especially for incubation and early rearing?</p> <p>Are the hatchery sanitation procedures understood and 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>✓</p> <p>✓</p>	<p>Yes for incubation; no for early rearing</p> <p>Inspection of facilities/Discussion.</p> <p>Inspection of facilities/Discussion</p>	<p>Develop pathogen-free water supply for early rearing</p> <p>Install foot baths in incubation facilities</p>

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>water quality parameters being followed?</b></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>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>	<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>	<p>✓</p>	<p>Review of records/Discussion  Review of records/Discussion</p>	<p>Review IHOT temperature criteria  Run analysis for missing parameters  Run analysis for turbidity  Increase alkalinity and hardness  Run analysis for contaminants</p>
<p><b>incubation and rearing standards being followed?</b></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>✓</p> <p>✓</p>			<p>Review of records/Discussion  Review of records/Discussion</p>	
<p><b>egg and fish transfer/release requirements met?</b></p>		<p>✓</p>			<p>Smolt and egg transfers between hatchery and satellite.</p>	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>Is the hatchery's program outlined in a subbasin management plan?</b></p> <p>Refer to subbasin plan PM # 1</p>		✓			Columbia Basin System Planning Production Plan, Lower Snake River Management Plan, and NMFS Section 7 (ESA)	
<p><b>Is the hatchery operating under a current hatchery operational plan?</b></p> <p>Refer to operational plan PM # 2</p>		✓			IHOT Operations Plan and Facility O&M plan submitted with August 26, 1996 update.	
<p><b>Is a hatchery monitoring and evaluation plan in place?</b></p> <p>Refer to hatchery monitoring and evaluation plan PM # 3</p>		✓			Hatchery Monitoring and Evaluation Plan	
<p><b>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?</b></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>Review of records/Discussion</p>	<p>Improve adult returns</p> <p>Improve adult returns</p>

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance	
	N/A	Yes	?	No			
<b>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?</b>							
Percent smoltification (PM #22a1)				✓	No goal found	Develop smoltification goal and monitoring program	
Rearing density (PM #22a2)		✓			Review of records/Discussion		
Disease condition (PM #22a3)		✓			Review of records/Discussion		
Number at release (PM #22a4)				✓	Review of records/Discussion		Improve adult survival
Size at release (PM #22a5)		✓			Review of records/Discussion		
Date of release (PM #22a6)		✓			Review of records/Discussion		
Location of release (PM #22a7)		✓			Review of records/Discussion		
<b>Are fish reared in the subbasin or acclimated in the basin?</b>		✓			Discussion		
PM #22b							
<b>Is the release strategy appropriate for the program?</b>		✓			Discussion		
PM #22c							

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>new programs, has a broodstock collection plan developed?</b></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>Existing Program; does not apply</p>	
<p><b>a new program, was the donor selection outline followed in selecting the hatchery broodstock?</b></p> <p>Is a donor selection plan written?</p> <p>Was the donor selection outline followed in the 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><b>existing programs, were the broodstock collection cedures followed?</b></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>✓</p> <p>✓</p> <p>✓</p>		<p>✓</p>	<p>Review broodstock collection plan</p> <p>Small numbers but everything collected</p> <p>Not enough fish; use split random crosses</p> <p>Discussion</p>	<p>Review IHOT Broodstock collection procedures as they relate to IDFG policy and practices</p>

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>s the appropriate number of spawners, male/female os, and fertilization protocols used?</b></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>		<p></p> <p>✓</p> <p></p> <p></p> <p></p> <p></p>	<p>Review spawning protocols</p> <p>Review of records</p> <p>Split random cross because of low numbers</p> <p>Review of records</p> <p>Discussion</p> <p>Discussion</p> <p>Discussion</p> <p>Discussion</p>	<p>Review IHOT spawning procedures as they relate to IDFg policy and practices</p>

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>Is there a genetics monitoring and evaluation program in place?</b></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>	<p>Discussion</p> <p>Discussion</p> <p>Discussion</p> <p>Discussion</p>	<p>Obtain approval of genetics monitoring and evaluation plan</p>

## 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 McCall Hatchery - Summer Chinook

This section presents the corrective actions required to bring the McCall Hatchery - Summer Chinook program into compliance with 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 McCall Hatchery - Summer Chinook**

<b>Remedial Action Required</b>	<b>Cost</b>	<b>PMS<sup>1</sup></b>
<b>Type 1 - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery</b>		
Improve adult returns	----	4c, 4g, 4h, 22a4,
Review IHOT incubation temperature criteria	----	5a
Install flow alarms at intake and security alarm	----	6
<b>Type 2 - Remedial actions requiring changes in agency policies or procedures</b>		
Document adult contribution	----	4a
Consider pre-filtration of incubation water to reduce sediment problem.	----	8
Use second set of screens	----	10
Perform IHOT QA/QC feed tests	----	12
Develop specific incubation and rearing standards for IHOT Operations Plan	----	18, 19
Develop smoltification goal and monitoring program	----	22a1
Monitor DO during hauling	----	23
Review IHOT transport water temperature criteria	----	23
Develop annual training schedule for staff	----	25
install foot baths in incubation facilities	----	28
Review IHOT broodstock collection and spawning protocols as they relate to IDFG policy and practices	----	41,42
Obtain approval of genetics monitoring and evaluation plan	----	43
<b>Type 3 - Remedial actions requiring changes in monitoring coverage or interval</b>		
Run analysis for missing water chemistry parameters	----	5c
Run analysis for turbidity	----	5d
Run analysis for contaminants	----	5g

<sup>1</sup> 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.

Remedial Action Required	Cost	PMS <sup>1</sup>
<b>Type 4</b> - Remedial actions requiring significant capital expenditures		
Install additional early rearing vats on southside of hatchery building		9
4 vats at \$7,500	\$30,000	
1,024 sf @ \$100/sf	\$105,00	
Modify intake to meet current approach criteria	\$200,000	10
<b>Type 5</b> - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Reduce pre-spawning mortality	----	4b
Increase alkalinity and hardness	----	5e
Develop pathogen-free water supply for early rearing	----	28

<sup>1</sup> 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 McCall Hatchery - Summer Chinook 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:  
McCall Hatchery - Summer Chinook**

Year	Fisheries <sup>1</sup> (Broodyear)	Spawning Grounds <sup>1</sup> (Broodyear)	Hatchery <sup>1</sup> (Broodyear)	Total Combined Contribution <sup>2</sup> (Broodyear)	Smolt to Adult Survival (percent)
1981					
1982					
1983					
1984					
1985					
1986					
1987					
1988	--- <sup>3</sup>	850	1543		0.030
1989	---	237	701		0.26
1990	---	318	651		0.022
1991					
1992					

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

<sup>2</sup> Total combined adult contribution; presented when it is not possible to subdivide the contribution into fisheries, spawning grounds, and hatchery contributions.

<sup>3</sup> There is no chinook fisheries in Idaho; no information received on ocean fisheries or from Oregon or Washington

## 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 McCall Hatchery - Summer Chinook program. For programs that occur at more than one facility (as shown on Table 1 in Section 3 of this report), the cost breakdown for the component(s) at each facility is presented in a separate table (Table 5a).

**Table 5. Annual Operating Expenses: McCall Hatchery - Summer Chinook**

Hatchery	1993	1994	1995
1. McCall Hatchery	\$324,121	\$473,662	\$419,467
2.			
3.			
4.			
5.			
<b>Total Program Costs</b>	<b>\$324,121</b>	<b>\$473,662</b>	<b>\$419,467</b>

The total expenditures for the McCall Hatchery are presented in Table 6 by program. The detailed breakdown of program expenditures at this hatchery is presented in a separate table (Table 6a).

**Table 6. Annual Operating Expenses - McCall Hatchery**

Program	1993	1994	1995
1. Summer Chinook	\$324,121	\$473,662	\$419,467
2. West Slope Cutthroat	?	?	?
3. Catchable Rainbow Trout	?	?	?
4.			
5.			
<b>Total Hatchery Costs</b>	<b>\$324,121</b>	<b>\$473,662</b>	<b>\$419,467</b>

**Table 5a. Annual Operating Expenses: McCall Hatchery - Summer Chinook  
Expenditure Occurring at McCall Hatchery**

<b>Component</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>
Personnel Costs	\$122,155	\$135,900	\$129,095
Operational Costs	\$140,715	\$192,145	\$170,627
Capital Costs	\$1,092	\$86,381	\$83,500
Indirect Costs	\$60,159	\$59,236	\$36,245
Lumped Hatchery Costs <sup>1</sup>			
Lumped Third-Party Costs			
<b>Total Hatchery Costs</b>	<b>\$324,121</b>	<b>\$473,662</b>	<b>\$419,467</b>
<b>Source of Funds</b>			
LSRCP	<b>100%</b>	<b>100%</b>	<b>100%</b>
Program Production (lb)			
Total Production (lb)			
Program as Percent of Total	<b>100%</b>	<b>100%</b>	<b>100%</b>
<b>Program Costs</b>	<b>\$324,121</b>	<b>\$473,662</b>	<b>\$419,467</b>

<sup>1</sup> 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. Detailed Expenditures at McCall Hatchery by Program**

**Summer Chinook**

<b>Component</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>
Personnel Costs	\$122,155	\$135,900	\$129,095
Operational Costs	\$140,715	\$192,145	\$170,627
Capital Costs	\$1,092	\$86,381	\$83,500
Indirect Costs	\$60,159	\$59,236	\$36,245
Lumped Hatchery Costs <sup>1</sup>			
Lumped Third-Party Costs			
<b>Total Hatchery Costs</b>	<b>\$324,121</b>	<b>\$473,662</b>	<b>\$419,467</b>
<b>Source of Funds</b>			
LSRCP	<b>100%</b>	<b>100%</b>	<b>100%</b>
Program Production (lb)			
Total Production (lb)			
Program as Percent of Total	<b>100%</b>	<b>100%</b>	<b>100%</b>
<b>Program Costs</b>	<b>\$324,121</b>	<b>\$473,662</b>	<b>\$419,467</b>

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