

# **HATCHERY EVALUATION REPORT**

**Beaver Creek Hatchery - Winter Steelhead**

**January 1997**

**Integrated Hatchery Operations Team (IHOT)**

## **HATCHERY EVALUATION REPORT**

### **Beaver Creek Hatchery - Winter Steelhead**

#### **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 Beaver Creek Hatchery - Winter Steelhead program. The hatchery is located on the Elochoman River about 10 miles upstream from the river mouth. The Elochoman River is a north bank tributary of the lower Columbia River, just downstream of Cathlamet, Washington. The hatchery is used for adult collection, incubation, and rearing of winter steelhead and sea-run cutthroat trout. It is also used for 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.

## **Beaver Creek Hatchery - Winter Steelhead Results**

The Beaver Creek facility includes 2 ponds for adult holding, 20 concrete raceways, 1 earthen rearing pond, 10 intermediate raceways, and incubation facilities. Beaver Creek Hatchery was authorized under the Mitchell Act and began operating in 1957 as part of the Columbia River Fisheries Development Program -- a program to mitigate for fishery losses caused by hydroelectric development in the Columbia River Basin.

The Beaver Creek Hatchery - Winter Steelhead program 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 improve the eyed-egg to smolt survival. The audit found that the hatchery was not in compliance with the water quality monitoring criteria, needed to increase the supply of disease-free water to early rearing, and needed more incubation, early rearing, and rearing facilities. The intake on Beaver Creek did not meet the approach or screen mesh criteria and needed to be replaced. The hatchery was direct releasing some smolts and needed to construct acclimation facilities for all releases. The hatchery needed to develop specific incubation and rearing criteria for the IHOT Operations Plan, a smoltification goal and monitoring program, and a specific broodstock collection plan. The hatchery was not meeting all of the food storage and transportation requirements. The hatchery did not have a Genetics Monitoring and Evaluation Program in place.

The specific areas in which the Beaver Creek Hatchery - Winter 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:

- Construct 10 more standard raceways
- Construct 2 more half stack vertical tray incubators
- Construct 40 more troughs and enlarge building
- Construct 6 more intermediate raceways
- Construct acclimation ponds for 4 release sites out of subbasin

- Construct new 20 cfs intake screen for Beaver Creek
- Develop alarm log
- Develop approved genetics M&E program
- Develop smoltification goal and monitor
- Develop specific broodstock collection plan
- Develop specific incubation and rearing standards for the IHOT Operations Plan
- Document release dates
- Evaluate release facilities to ensure that fish are not subjected to adverse conditions
- Follow IHOT criteria for water temperature in hauling units
- Follow IHOT QA/QC testing protocols for feed production monitoring
- Follow IHOT requirements for disinfection of exteriors and interiors of transport vehicles
- Follow IHOT requirements to check flow alarms daily
- Follow the IHOT criteria for incubation flow
- Improve eyed-egg to smolt survival
- Improve fry-to-smolt survival
- Install alarms for water treatment system
- Install security alarms
- Monitor and record DO and TGP
- Provide more disease-free water for early rearing
- Review program and water temperature criteria for rearing
- Review the need for insulation of automatic feeders and bulk storage facilities
- Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants

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:** Beaver Creek Hatchery

**Stock/Species:** Winter Steelhead  
Summer Steelhead  
Sea-run Cutthroat

**Operating Agency:** Washington Department of Fish and Wildlife

**Funding Agency:** Mitchell Act (NMFS)

**Location:** The hatchery is located on the Elochoman River about 10 miles upstream from the river mouth. The Elochoman River is a north bank tributary of the lower Columbia River, just downstream of Cathlamet, Washington.

**Address:** 28 Beaver Creek Road  
Cathlamet, WA 98612

**Hatchery Manager:** Dick Aksamit

**Phone:** (360) 795-3620

**Fax:** (360) 795-0827

**Purpose:** Beaver Creek Hatchery was authorized under the Mitchell Act and began operating in 1957 as part of the Columbia River Fisheries Development Program -- a program to mitigate for fishery losses caused by hydroelectric development in the Columbia River Basin.

**Production Goal:** **Winter Steelhead**  
  
Produce 260,000 smolts for on-station and off-station releases.

## Summer Steelhead

Produce 230,000 smolts for on-station and off-station releases.

## Sea-run Cutthroat

Produce 50,000 smolts for on-station and off-station releases.

### Water Supply:

Water rights total 16,013 gpm from three sources: Elochoman River, Beaver Creek, and a well. Beaver Creek is gravity flow while the other two sources are pumped. The Elochoman River is used in summer and fall while Beaver Creek water is used from mid-November through mid-May. Filtered well water (1 cfs) is used to incubate eggs and for early rearing.

### Facilities:

Adult Holding:	1 upper adult trap -138 cf
	1 lower adult trap - 126 cf
	2 adult holding raceways - 4,327 cf each
Incubation:	2 vertical tray incubators (16 trays)
	320 bucket incubators
	40 shallow troughs - 8 cf each
	20 shallow troughs - 5 cf each

Early Rearing:	10 intermediate raceways - 209 cf each
Raceways:	20 concrete raceways - 1,636 cf each
Rearing Ponds:	1 earth rearing pond - 217,800 cf
Satellite Facilities:	Gobar Pond
	1 earth pond - 243,000 cf

## 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).

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)                                  |

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

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 Beaver Creek Hatchery was conducted on November 19, 1996.

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 Beaver Creek Hatchery - Winter 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 Beaver Creek Hatchery - Winter 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 Beaver Creek Hatchery - Winter Steelhead**

Component	Location of Adult Holding, Spawning, Incubation, and Rearing					
	Beaver Creek Hatchery	Grays River Hatchery	Gobar Pond	Coweeman River Pond	Direct Stream Releases at several sites	
Adult Collection	4					
Adult Holding	4					
Spawning	4					
Fertilization	4					
Incubation						
green-to-eyed	4					
eyed-to-hatch	4					
Rearing						
fry	4	4				
fingerlings	4					
smolts	4					
Acclimation/release	4		4	4	4	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#1	Are the hatchery programs outlined in a subbasin management plan?		4			Columbia Basin System Planning Production Plan and Mitchell Act	
#2	Is the hatchery operating under a current hatchery operational plan?  Is it understood by staff?  Is it being followed?		4  4  4			IHOT Operations Plan and Beaver Creek Hatchery Operations Procedures	
#3	Is a hatchery monitoring and evaluation plan in place?  Do you have a written monitoring and evaluation plan?		4			100% of fish adipose clipped; evaluation done by Howard Fuss and Jim Byrne and reported in annual report	
#4a	Adult contribution to fisheries, spawning grounds, and hatchery		4			Review of records	
#4b	Adult pre-spawning survival as compared with established goal		4			Fish are returned to the river alive	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No		
#4c	<b>Egg-take as compared with established hatchery goal</b>		<b>4</b>			Review of records; in compliance 5 out of last 5 years	
#4d	<b>Green-egg to eyed-egg survival as compared with established goal</b>		<b>4</b>			Review of records; in compliance 5 out of last 5 years	
#4e	<b>Eyed-egg to fry survival as compared with established goal</b>				4	Review of records; in compliance 2 out of last 3 years	Provide more disease-free water for early rearing
#4f	<b>Fry to smolt survival as compared with established goal</b>				4	Review of records; in compliance 2 out of last 4 years	Improve fry-to-smolt survival and provide more disease-free water
#4g	<b>Production as compared with established goal</b>				4	Review of records; in compliance 5 out of last 6 years	Improve eyed-egg to smolt survival
#4h	<b>Percent survival (smolt to adult) as compared with established goal</b>				4	Review of records; in compliance 0 out of last 6 years	Improve adult returns
#4i	<b>Number of eggs, fry, fingerlings, smolts, and/or adults to meet basinwide needs</b>		<b>4</b>			Review of records/Discussion	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#5a	<b>Temperature</b>						
	Does your water temperature meet the criteria for spawning?		4			Data provided	
	Does your water temperature meet the criteria for incubation?		4			Data provided	
	Does your water temperature meet the criteria for rearing?				4	High summer temperatures to 72 °F	Review program and water temperature criteria for rearing
#5b	<b>Dissolved gases</b>						
	Is the oxygen level near saturation?			4		No data provided	Monitor DO and record
	Is the dissolved nitrogen level less than saturation?			4		No data provided	Monitor TGP and record
#5c	<b>Chemistry</b>						
	Ammonia (un-ionized)			4		No recent data	Run analysis
	Carbon Dioxide			4		No recent data	See above
	Chlorine			4		No recent data	See above
	pH			4		No recent data	See above
	Copper			4		No recent data	See above
	Hydrogen Sulfide			4		No recent data	See above
	Iron			4		No recent data	See above
Zinc			4		No recent data	See above	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No		
#5d	<b>Turbidity</b>						
	Does your turbidity meet the criteria?			<b>4</b>		Discussions/No data	Run analysis

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#5e	<b>Alkalinity and hardness</b>  Does your alkalinity and hardness meet the criteria?			4		No recent data	Run analysis
#5f	<b>Nitrite</b>  Does your nitrite meet the criteria?			4		No data	Run analysis
#5g	<b>Contaminants</b>  Aldrin Endrin Dieldrin Heptachlor Chlordane Methoxychlor Lindane Malathion Guthion			4 4 4 4 4 4 4 4 4		No data No data No data No data No data No data No data No data No data	Run analysis See above See above See above See above See above See above See above See above
#5h	<b>Pathogens</b>  What portions of the hatchery have disease-free water?  Adult holding Incubation		4		4	Use river water Wellwater	None

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No		
	Early rearing				4	Not enough for full program	Provide more disease-free water for early rearing
	Rearing				4	River water	None
	Others				4	River Water	None

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#6	<b>Alarm Systems</b>						
	Do the following areas have alarms?						
	Intake		4			Interview / Inspection of facilities	
	Large rearing ponds and adult holding ponds		4			Interview / Inspection of facilities	
	Raceway headboxes and rearing ponds		4			Interview / Inspection of facilities	
	Incubation facilities		4			Interview / Inspection of facilities	
	Quarantine areas and facilities	4				None	
	Water treatment systems				4	Interview / Inspection of facilities	Install alarms for water treatment system
	Security				4	Interview / Inspection of facilities	Install security alarms
	Are there outside systems and buzzers in onsite residences?				4	No buzzers in onsite residences but can hear outside buzzer from residence	None
	Are water flow alarms checked daily?				4	Interview / Inspection of facilities	Follow IHOT requirements to check flow alarms daily
	Are all other alarms checked weekly?		4			Interview / Inspection of facilities	
	Is there a log of alarms for emergencies, tests, and maintenance requirements?				4	Interview / Inspection of facilities	Develop alarm log
	Are telephone pagers used?		4			Interview / Inspection of facilities	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No		
#7	<b>Adult collection and holding facilities</b>						
	Do you meet the adult holding criteria?		<b>4</b>			Interview, provided data	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#8	<b>Incubation facilities</b>  Type 1: <u>Verticals</u> Do you have an adequate number of units for the overall program?				4	Interview	Install 2 more half stacks
	Type 2: <u>Shallow Troughs</u> Do you have an adequate number of units for the overall program?				4	Interview	Need additional 40 troughs and enlarge building
#9	<b>Rearing facilities</b>  Type 1: <u>Intermediate Raceways</u> Do you have an adequate number of units for the overall program?				4	Inspection of facilities/Discussion	Construct 6 more intermediate raceways
	Type 2: <u>Standard Raceways</u> Do you have an adequate number of units for the overall program?				4	Inspection of facilities/Discussion	Construct 10 more standard raceways
	Type 3: <u>Adult Ponds</u> Do you have an adequate number of units for the overall program?		4			Don't have ability to sort to smaller groups	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No		
	Type 4: <u>1-acre rearing ponds</u>		4			Interview / Inspection	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#10	<b>Screening facilities (Beaver Creek)</b>						
	Do you meet the approach velocity criteria?				4	Inspection	Construct new 20 cfs intake screen for Beaver Creek  See above
	Are the fish screens regularly cleaned?		4			Inspection, on a timer	
	Does the screen mesh meet screen opening criteria?				4	Inspection	
	Are rearing containers double screened for fish that should not be released to adjacent water?		4			Inspection	
#10	<b>Screening facilities (Elochoman)</b>						
	Do you meet the approach velocity criteria?		4			Inspection	
	Are the fish screens regularly cleaned?		4			Inspection, on a timer	
	Does the screen mesh meet screen opening criteria?		4			Inspection	
	Are rearing containers double screened for fish that should not be released to adjacent water?		4			Inspection	
#11	<b>Predator control facilities</b>						
	Are your predation control facilities effective?		4			Inspection	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#12	<p><b>Food storage facilities and quality control</b></p> <p>Does the storage of dry/semi-moist/moist foods (dry&lt;12%; semi-moist 12-20%; moist &gt;20% moisture) follow food manufacturer's recommendations?</p> <p>Does a regional quality control officer oversee production procedures and monitor:</p> <p>Verification by feed manufacturer that ingredients meet specifications?</p> <p>Ensure feed does not contain unwanted drugs or other additives?</p> <p>Analyze ingredients contained in the final food product to ensure that feed specifications have been met?</p> <p>Are the foods stored and handled according to the following criteria?</p>		4			<p>Interview / Inspection</p> <p>Discussion</p> <p>Discussion</p> <p>Discussion</p>	<p>Follow IHOT QA/QC testing protocols for feed production monitoring</p> <p>See above</p> <p>See above</p>

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No		
	Moist pellets should not exceed 10°F at point of delivery.		4			Interview / Inspection	
	Moist pellets should be removed from freezer just prior to feeding.		4			Interview / Inspection	
	Do not leave buckets of feed or feed containers outside exposed to light or heat.		4			Interview / Inspection	
	Open bags of feed should be fed within 1 to 2 days except when feeding small groups of fish.		4			Interview / Inspection	
	Automatic feeder hoppers and bulk storage facilities should be insulated against excessive temperatures (80°F and above).				4	Not thought to be a problem	Review the need for insulation of automatic feeders and bulk storage facilities

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#13	<p><b>Release facilities</b></p> <p>Do the release facilities ensure that fish are not subjected to adverse conditions?</p>			4		Can not observe fish after release	Evaluate release facilities to ensure that fish are not subjected to adverse conditions
#14	<p><b>Pollution 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>		4			Interview / Inspection	
#15	<p><b>Transportation facilities</b></p> <p>Are the transport systems adequate to meet IHOT performance measures for transportation practices?</p>		4			Interview / Inspection	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#16	<b>Broodstock selection practices</b>						
	Is the donor selection process document attached? (PM #40a)	4				Existing program; do not apply	
	Was the donor selection outline followed in selecting the hatchery broodstock? (PM #40b-c)	4				Existing program; do not apply	
#17	<b>Spawning practices</b>						
	Were the appropriate number of spawners, male/female ratios, and fertilization protocols used? (PM #42c-g)				4	Do not have enough males	Improve adult returns
#18	<b>Incubation practices</b>						
	Are specific incubation standards listed in the hatchery operations plan?				4	Review IHOT Operations Plan	Develop specific incubation standards for the IHOT Operations Plan
	Are incubation practices written?		4			Posted in incubation building	
	Incubation Type 1: <u>Vertical</u> (see PM #8)				4	Use only 3 gpm/stack	Follow IHOT criteria for incubation flow
	Do you meet the loading and flow criteria?						

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No		
	Incubation Type 2: <u>Troughs</u> (see PM #8) Do you meet the loading and flow criteria?				<b>4</b>	Discussion	See PM #8

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#19	<b>Rearing practices</b>						
	Are specific rearing standards listed in the hatchery operations plan?				4	Review IHOT Hatchery Operations Plan	Develop specific rearing standards for the IHOT Operations Plan
	Are rearing practices written?				4		
	Rearing Unit Type 1: <u>Intermediate</u> (see PM #9)						
	Do you meet the density and DI criteria?		4			Review of data	
	Do you meet the Loading and FI criteria?		4			Review of data	
	Rearing Unit Type 2: <u>Standard</u> (see PM #9)						
	Do you meet the density and DI criteria?				4	Review of data	Construct 10 additional standard raceways
	Do you meet the Loading and FI criteria?				4	Review of data	
	Rearing Unit Type 3: <u>Adult pond</u> (see PM #9)						
	Do you meet the density and DI criteria?				4	Review of data	Construct 10 additional standard raceways
	Do you meet the Loading and FI criteria?		4			Review of data	
	Rearing Unit Type 4: <u>1-acre pond</u>						
	Do you meet the density and DI criteria?		4			Review of data	
	Do you meet the Loading and FI criteria?				4	Review of data	Construct 10 additional standard raceways

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No	
#20	<b>Smolt quality</b>					
	Do you produce a high quality smolt?		<b>4</b>			Interview

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#21	<b>Fish health management practices</b>						
	Are the monthly hatchery monitoring visits being conducted? (PM #26)		4			Review of records at state lab by audit team pathologist	
	Are the annual broodstock inspections being conducted? (PM #27)		4			Review of records at state lab by audit team pathologist	
	Is there pathogen-free water and are the sanitation procedures being followed? (PM #28)				4	Discussion	Develop additional disease-free water for early rearing
	Are the following water quality parameters within criteria? (PM #5a-5g)						
	Water temperature				4	.	See PM #5a
	Dissolved gases			4			See PM #5b
	Chemistry			4			See PM #5c
Turbidity			4			See PM #5d	
Alkalinity and hardness			4			See PM #5e	
Nitrite			4			See PM #5f	
Contaminants			4			See PM #5g	
Are rearing standards being followed? (PM #19)					4	See PM #19	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No		
	Are egg and fish transfer/release requirements met? (PM #31)		4			Review of records at state lab by audit team pathologist .	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#22a	<b>Does hatchery performance meet requirements outlined in the regional hatchery policies and in subbasin and hatchery plans for the following areas?</b>						
#22a1	<b>Percent smoltification</b> Do you measure percent smoltification? Do you have a smoltification goal? Did you meet the smoltification criteria?			4	4	No criteria	Develop smoltification goal and monitor See above See above
#22a2	<b>Rearing density (prior to release)</b>  Did you meet the rearing density criteria just prior to release?		4			Data provided	
#22a3	<b>Disease condition (at release)</b>  Did you meet all disease regulations just prior to release?		4			Release when authorized by the state	
#22a4	<b>Number (at release)</b>  Did you meet the release number goal?		4			Data provided	
#22a5	<b>Size at release</b>  Did you meet the size goal?		4			Data provided	
#22a6	<b>Dates of release</b>						

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No		
	Did you meet the release date goal?			4		No data	Document release dates
#22a7	<b>Location of release</b>  Did you release the fish at the specified location?		4			Data provided	
#22b	<b>Are fish reared in the subbasin or acclimated in the subbasin?</b> Are the fish reared in the subbasin? Are the fish acclimated in the subbasin?		4		4	There are direct stream releases in Coweeman, Skamokawa, Gremany, Cold, Abernathy, and Cathlamet rivers	Construct acclimation ponds for all releases
#22c	<b>Is the release strategy appropriate for the program?</b>				4	No acclimation	See PM #22b

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#23	<b>Transportation facilities</b>						
	Do transportation equipment and personnel receive disinfection before and after use?		4			Interview	
	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)?		4			Interview	
	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?				4	Interview	Follow IHOT requirements for disinfection of exteriors and interiors of transport vehicles
	Is the fish transport vehicle (cab) disinfected using 600 ppm quaternary ammonia compounds (1.5 ml of 50% stock solution/liter water)?				4	Interview	See above
	Is other equipment disinfected including fish pumps, nets, egg sorters, waders, boots, rain gear, hoses and other equipment using one of the following solutions?		4			Interview	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

	N/A	Yes	?	No		
200 ppm chlorine for 30 minutes 600 ppm quaternary ammonia compound for 30 minutes 200 ppm iodophor solution for 10 minutes		4			Interview	
Do personnel wear protective garments when handling fish eggs or cultural water?		4			Interview	
Do the fish transport truck/chassis and tank/unit receive an inspection and service prior to the release season?		4			Interview	
Is a daily service inspection completed before starting up and leaving for the day?		4			Interview	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#23 (cont)	<b>Transportation facilities</b>						
	Does the fish transport unit receive an inspection prior to loading?		4			Interview	
	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 fish in the transport unit?		4			Interview	
	Do hauling criteria include checking the fish 45 minutes to 1 hour after loading?		4			Interview	
	When fish are active and systems are functioning properly, is the oxygen concentration reduced and maintained at approximately 8 ppm?		4			Interview	
	Is water temperature in the transportation unit maintained within the 42-48 °F range?				4	Use ambient water	Follow IHOT criteria for water temperature in hauling unit

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

	N/A	Yes	?	No		
Do fish releasing procedures include the following criteria?		4			Interview	
Releasing the fish at the correct release site or into the correct water body.		4			Interview	
Tempering or the difference between the liberation tank and the target water body should not exceed 10°F.		4			Interview	
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.		4			Interview	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#24	<p><b>Evaluation practices</b></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>		4			Interview	
			4			Interview	
			4			Interview	
			4			Interview	
			4			Interview	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#25	<b>Training practices</b>						
	Does the hatchery have a training schedule for its staff?		4			Interview	
	Does each staff member have a personal training plan approved by a supervisor and reviewed annually?		4			Interview	
	Does the hatchery routinely exchange training details between other hatcheries and agencies?		4			Interview	
	Does the hatchery encourage and reward off-duty training of staff?		4			Interview	
	Does the hatchery conduct monthly staff meetings?		4			Interview	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#26	<p><b>Are 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>		4			<p>Review of records at state lab by audit team pathologist</p> <p>Review of records at state lab by audit team pathologist</p> <p>Review of records at state lab by audit team pathologist</p> <p>Review of records at state lab by audit team pathologist</p> <p>Review of records at state lab by audit team pathologist</p> <p>Review of records at state lab by audit team pathologist</p> <p>Review of records at state lab by audit team pathologist</p>	
#27	<p><b>Are all of the functions of the hatchery yearly monitoring visits being completed as described below?</b></p>						

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No	
	Annually examine each broodstock for the presence of reportable viral pathogens.		4			Review of records at state lab by audit team pathologist
	Annually screen each salmon broodstock for the presence of <i>Renibacterium salmoninarum</i> .		4			Review of records at state lab by audit team pathologist
	Conduct inspection by or under the supervision of qualified fish health specialist.		4			Review of records at state lab by audit team pathologist

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#28	<p><b>Is the hatchery following accepted sanitation procedures?</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 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 its use in another pond and/or lot of fish?</p>				4	Interview	Develop additional disease-free water supply for early rearing
			4			Interview	
			4			Interview	
			4			Interview	
			4			Interview	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

	N/A	Yes	?	No		
Is equipment, including vehicles used to transfer fish between facilities, disinfected prior to use with any other fish lots or at any other location?		4			Interview	
Are rearing vessels sanitized after fish are removed and prior to introducing a new fish lot or stock?		4			Interview	
Are dead fish properly disposed of?		4			Interview	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#29	<b>Are water quality parameters being followed?</b>						
	Are the following water quality parameters within criteria? (PM #5a-5g)						
	Water temperature				4	Data provided	See PM #5a
	Dissolved gases			4		No data	See PM #5b
	Chemistry			4		No data	See PM #5c
	Turbidity			4		No data	See PM #5d
	Alkalinity and hardness			4		No data	See PM #5e
Nitrite			4		No data	See PM #5f	
Contaminants			4		No data	See PM #5g	
	Go to PM #21						
#30	<b>Are incubation and rearing standards being followed?</b>						
	Are the incubation practices following the IHOT incubation criteria? (PM #18)				4	Discussion	See PM #18
	Are the rearing practices following the IHOT criteria? (PM #19)				4	Discussion	See PM #19
	Go to rearing practices PM #18-PM #19						
#31	<b>Are egg and fish transfer/release requirements met?</b>		4			Interview	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#32	<p><b>Is the hatchery's program outlined in a subbasin management plan?</b></p> <p>Go to subbasin plan PM #1</p>		4			Columbia Basin System Planning Production Plan and Mitchell Act	
#33	<p><b>Is the hatchery operating under a current hatchery operational plan?</b></p> <p>Go to operational plan PM #2</p>		4			IHOT Operations Plan and Beaver Creek Hatchery Operations Procedures	
#34	<p><b>Is a hatchery monitoring and evaluation plan in place?</b></p> <p>Go to hatchery monitoring and evaluation plan PM #3</p>		4			100% of fish adipose clipped; evaluation done by Howard Fuss and Jim Byrne and reported in annual report	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#35	<p>Does the hatchery program meet requirements established in the regional hatchery policies and subbasin planning documents in the following areas: species, stock, broodstock collection location, broodstock numbers, broodstock collection strategy, and 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 #41b for existing program; PM #39b for new program )</p> <p>Broodstock numbers protocols (PM #42c)</p> <p>Broodstock collection strategy protocols (PM #41b-d for existing program; PM 39b-f for new program)</p>		4			Interview	
			4			Interview	
			4			Interview	
			4			Interview	
					4	Interview	See PM #41c

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No		
	Spawning protocols (PM #42d-e)				<b>4</b>	Interview	See PM #42c
	Egg-take protocols (PM #42f-g)		<b>4</b>			Interview	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#36	<p><b>Does the hatchery’s performance meet requirements outlined in the regional hatchery policies and in subbasin and hatchery plans for the following areas: percent smoltification, rearing density, disease condition, and the number, size date(s), and location of release?</b></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>						
					4	No criteria	See PM #22a1
			4			Data provided	
			4			Interview	
			4			Interview	
			4			Interview	
				4		No data	See PM #22a6
			4			Interview	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No		
#37	Are fish reared in the subbasin or acclimated in the subbasin?  See PM #22b				4	Interview	See PM #22b
#38	Is the release strategy appropriate for the program?  See PM #22c				4	Interview	See PM #22b

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#39	<b>For new programs, has a broodstock collection plan been developed?</b>						
#39a	Is the broodstock collection plan written?	4				Existing Program; does not apply	
	For a non-captive broodstock program:	4				Existing Program; does not apply	
#39b	Was an unbiased, representative sample collected?	4					
#39c	Was the recommended number of broodstock collected?	4				Existing Program; does not apply	
	For a captive broodstock program:						
#39d	Were captive brood progeny excluded as donors for propagating the next generation of the captive broodstock program?	4				Existing Program; does not apply	
#39e	Were full-sib crosses avoided?	4				Existing Program; does not apply	
#39f	Is the broodstock collection plan understood and being followed by staff?	4				Existing Program; does not apply	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

		N/A	Yes	?	No	
#40	<b>For a new program, was the donor selection outline followed in selecting the hatchery broodstock?</b>					
#40a	Is a donor selection plan written?	4				Existing Program; does not apply
#40b	Was the donor selection outline followed in selecting the broodstock?	4				Existing Program; does not apply
#40c	Was the target stock recommended in the donor selection process actually used?	4				Existing Program; does not apply

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#41	<b>For existing programs, were the broodstock collection procedures followed?</b>						
#41a	Is the broodstock collection plan written?				4	Provided general guidelines document	Develop specific broodstock collection plan
	Does the broodstock collection plan follow the guideline:						
#41b	Was an unbiased, representative sample collected?		4				
#41c	Was the recommended number of broodstock collected?				4		Improve adult returns
#41d	Were the broodstock collection procedures in hatchery operation plan understood and followed?		4				

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#42	<b>Was the appropriate number of spawners, male/female ratios, and fertilization protocols used?</b>						
#42a	Are the spawning protocols written?		4			Interview and Inspection	
#42b	Are daily or weekly spawning logs available?		4			Interview and Inspection	
#42c	Was the appropriate number of spawners used?		4			Interview and Inspection	
#42d	Did you attempt to spawn all collected broodstock and randomize mating with respect to age class, and other traits?		4			Interview and Inspection	
#42e	Was the sex-ratio within the limits given in the performance standards?				4	Do not have enough males	Improve adult returns
#42f	Were the fertilization protocols followed?		4			Interview and Inspection	
#42g	If the hatchery needed to reduce the number of eggs retained, was this done by representative sampling of each male/female cross?		4			Interview and Inspection	

**Table 2 Beaver Creek Hatchery - Winter Steelhead Compliance With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#43	<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>						
					4	Interview	Develop approved genetics M & E program
					4	Interview	See above
					4	Interview	See above
					4	Interview	See above
					4	Interview	See above

## 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 Beaver Creek Hatchery - Winter Steelhead

This section presents the corrective actions required to bring the Beaver Creek Hatchery - Winter Steelhead 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 Beaver Creek Hatchery - Winter  
Steelhead**

<b>Remedial Action Required</b>	<b>Cost</b>	<b>PMS<sup>1</sup></b>
<b>Type 1</b> - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery		
Improve adult returns	---	4h, 41, 42
<b>Type 2</b> - Remedial actions requiring changes in agency policies or procedures		
Review program and water temperature criteria for rearing	---	5a
Develop alarm log	---	6
Follow IHOT requirements to check flow alarms daily	---	6
Follow IHOT QA/QC testing protocols for feed production monitoring	---	12
Review the need for insulation of automatic feeders and bulk storage facilities	---	12
Develop specific incubation and rearing standards for the IHOT Operations Plan	---	18-19
Follow the IHOT criteria for incubation flow	---	18
Develop smoltification goal and monitor	---	22a1
Document release dates	---	22a6
Follow IHOT requirements for disinfection of exteriors and interiors of transport vehicles	---	23
Follow IHOT criteria for water temperature in hauling units	---	23
Develop specific broodstock collection plan	---	41
Develop approved genetics M&E program	---	43
<b>Type 3</b> - Remedial actions requiring changes in monitoring coverage or interval		
Monitor and record DO and TGP	---	5b
Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants	---	5c-5g

Remedial Action Required	Cost	PMS <sup>2</sup>
<b>Type 4 - Remedial actions requiring significant capital expenditures</b>		
Install alarms for water treatment system	\$5,000	6
Install security alarms	\$5,000	6
Construct 2 more half stack vertical tray incubators	\$2,000	8
Construct 40 more troughs and enlarge building	\$15,000	8
Construct 6 more intermediate raceways	\$40,000	9
Construct 10 more standard raceways	\$250,000	9, 19
Construct new 20 cfs intake screen for Beaver Creek	\$200,000	10
Construct acclimation ponds for 4 release sites out of subbasin	\$1,400,00	22b
	0	
<b>Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time</b>		
Provide more disease-free water for early rearing	---	4e, 5h, 28
Improve fry-to-smolt survival	---	4f
Improve eyed-egg to smolt survival	---	4g
Evaluate release facilities to ensure that fish are not subjected to adverse conditions	---	13

## Hatchery Contribution to Fisheries, Spawning Grounds, and Hatcheries

This section presents the audit findings for the Beaver Creek Hatchery - Winter 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:  
Beaver Creek Hatchery - Winter Steelhead**

Year	Fisheries  (Broodyear)	Spawning Grounds <sup>1</sup>  (Broodyear)	Hatchery <sup>1</sup>  (Broodyear)	Total Combined Contribution  (Broodyear)	Smolt to Adult Survival  (percent)
1981					
1982					

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

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

1983					
1984					
1985					
1986					
1987					
1988				1,469	1.38%
1989				1,930	2.58%
1990				1,770	1.99%
1991				1,615	2.12%
1992				1,153	2.01%

## 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 Beaver Creek Hatchery - Winter Steelhead 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 separate tables (Table 5a).

**Table 5. Annual Operating Expenses: Beaver Creek Hatchery - Winter Steelhead**

Hatchery	1994	1995	1996
1. Beaver Creek	\$181,652	\$345,632	\$182,172
2.			
3.			
4.			
5.			
<b>Total Program Costs</b>	<b>\$181,652</b>	<b>\$345,632</b>	<b>\$182,172</b>

The total expenditures for the Beaver Creek Hatchery are presented in Table 6 by program. The detailed breakdown of program expenditures at this hatchery are presented in separate tables (Tables 6a, 6b, and 6c).

**Table 6. Annual Operating Expenses - Beaver Creek Hatchery**

<b>Program</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
1. Winter Steelhead	<b>\$181,652</b>	<b>\$345,632</b>	<b>\$182,172</b>
2. Summer Steelhead	<b>\$109,474</b>	<b>\$135,265</b>	<b>\$131,826</b>
3. Sea-run cutthroat	<b>\$14,000</b>	<b>\$56,511</b>	<b>\$38,755</b>
4.			
5.			
<b>Total Hatchery Costs</b>	<b>\$360,000</b>	<b>\$546,642</b>	<b>\$375,717</b>

**Table 5a. Annual Operating Expenses: Beaver Creek Hatchery - Winter Steelhead**

**Expenditure Occurring at Beaver Creek Hatchery**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
Personnel Costs	\$172,800	\$179,700	\$157,668
Operational Costs	\$79,200	\$86,050	\$150,477
Capital Costs		\$167,000 (new generator)	
Indirect Costs	\$108,000	\$113,892	\$67,572
Lumped Hatchery Costs			
Lumped Third-Party Costs			
<b>Total Hatchery Costs</b>	<b>\$360,000</b>	<b>\$546,642</b>	<b>\$375,717</b>
<b>Source of Funds</b>			
NMFS	<b>100%</b>	<b>100%</b>	<b>100%</b>
Program Production (#)	357,694	199,333	384,545
Total Production (#)	708,882	315,260	793,098
Program as Percent of Total	50.5%	63.2%	48.5%
<b>Program Costs</b>	<b>\$181,652</b>	<b>\$345,632</b>	<b>\$182,172</b>

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 Beaver Creek Hatchery by Program**

**Winter Steelhead**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
Personnel Costs	\$172,800	\$179,700	\$157,668
Operational Costs	\$79,200	\$86,050	\$150,477
Capital Costs		\$167,000 (new generator)	
Indirect Costs	\$108,000	\$113,892	\$67,572
Lumped Hatchery Costs			
Lumped Third-Party Costs			
<b>Total Hatchery Costs</b>	<b>\$360,000</b>	<b>\$546,642</b>	<b>\$375,717</b>
<b>Source of Funds</b>			
NMFS	<b>100%</b>	<b>100%</b>	<b>100%</b>
Program Production (#)	357,694	199,333	384,545
Total Production (#)	708,882	315,260	793,098
Program as Percent of Total	50.5%	63.2%	48.5%
<b>Program Costs</b>	<b>\$181,652</b>	<b>\$345,632</b>	<b>\$182,172</b>

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. Detailed Expenditures at Beaver Creek Hatchery by Program**

**Summer Steelhead**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
Personnel Costs	\$172,800	\$179,700	\$157,668
Operational Costs	\$79,200	\$86,050	\$150,477
Capital Costs		\$167,000 (new generator)	
Indirect Costs	\$108,000	\$113,892	\$67,572
Lumped Hatchery Costs			
Lumped Third-Party Costs			
<b>Total Hatchery Costs</b>	<b>\$360,000</b>	<b>\$546,642</b>	<b>\$375,717</b>
<b>Source of Funds</b>			
NMFS	<b>100%</b>	<b>100%</b>	<b>100%</b>
Program Production (lb)	215,567	78,010	278,270
Total Production (lb)	708,882	315,260	793,098
Program as Percent of Total	30.4%	24.7%	35.1%
<b>Program Costs</b>	<b>\$109,474</b>	<b>\$135,265</b>	<b>\$131,826</b>

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



**Table 6c. Detailed Expenditures at Beaver Creek Hatchery by Program**

**Sea-run Cutthroat**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
Personnel Costs	\$172,800	\$179,700	\$157,668
Operational Costs	\$79,200	\$86,050	\$150,477
Capital Costs		\$167,000 (new generator)	
Indirect Costs	\$108,000	\$113,892	\$67,572
Lumped Hatchery Costs			
Lumped Third-Party Costs			
<b>Total Hatchery Costs</b>	<b>\$360,000</b>	<b>\$546,642</b>	<b>\$375,717</b>
<b>Source of Funds</b>			
NMFS	<b>100%</b>	<b>100%</b>	<b>100%</b>
Program Production (lb)	27,568	32,591	81,808
Total Production (lb)	708,882	315,260	793,098
Program as Percent of Total	3.9%	10.3%	10.3%
<b>Program Costs</b>	<b>\$14,000</b>	<b>\$56,511</b>	<b>\$38,755</b>

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

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.

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