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EAGLE CREEK HATCHERY

A COMPILATION AND SUMMARY OF IHOT  
AUDITS FOR COHO AND WINTER  
STEELHEAD

JULY 1998

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**HATCHERY EVALUATION REPORT  
SUMMARY FOR**

**Eagle Creek NFH  
- Coho  
- Winter Steelhead**

**A Summarized Compilation of Independent Audits Based on  
Integrated Hatchery Operations Team (IHOT) Performance  
Measures**

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## Executive Summary

This report compiles a summary of the findings of two separate Hatchery Evaluation Reports for Coho and Winter Steelhead at Eagle Creek Hatchery. The original Hatchery Evaluation Reports, prepared by Montgomery Watson, presented each species and program separately and include the complete findings. Details on the audit compliance status for each species and program are included in the original reports. The Hatchery Evaluation Reports were based upon audits 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.

This report presents the findings of the independent audit of the Eagle Creek NFH - Coho program. The hatchery is located 40 miles east of Portland, Oregon along Eagle Creek, a tributary of the Clackamas River. The hatchery is operated by the US Fish and Wildlife Service and is used for adult collection, incubation, and rearing of coho and winter steelhead.

### 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) in January 1995. 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)*, which 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.

### **Eagle Creek NFH - Coho and Winter Steelhead Results**

The Eagle Creek facility includes 1 pond for adult holding, 75 concrete raceways, 10 starter tanks, and incubation facilities. Eagle Creek NFH was authorized under the Mitchell Act and currently operates as part of the Columbia River Fisheries Development Program - a program to provide for conservation of Columbia River fish resources. The goal of the hatchery is to help compensate for fish losses in the Columbia River Basin caused by mainstem dams.

#### **COHO**

The Eagle Creek NFH - Coho 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 develop a smolt-to-adult goal. The audit found that the hatchery was not in compliance with the screen mesh criteria, water quality monitoring requirements, alarm requirements, incubation facility requirements, acclimation requirements for out-basin releases, and pathology-free water criteria, which are all facilities requirements. The hatchery needed to develop specific incubation and rearing standards. The hatchery was not meeting the flow criteria for vertical tray incubators. The hatchery also was not meeting all the food storage, QC, and transportation requirements. In the compliance area for fish health policy, the hatchery did not have foot baths in the incubation facility. The hatchery also needed to develop a broodstock collection plan, spawning protocols, and a Genetics Monitoring and Evaluation Program.

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

- Develop approved genetics M&E plan
- Develop broodstock collection plan
- Develop exchange training details among other hatcheries and agencies
- Develop smolt-to-adult goal for IHOT Operations Plan
- Develop spawning protocols
- Develop specific incubation and rearing standards for IHOT Operations Plan
- Follow food manufacturer's storage recommendations
- Follow IHOT protocols for disinfection of personnel before and after use
- Follow IHOT protocols for disinfection of transport vehicle interiors and exteriors
- Follow IHOT protocols for regional QC of feed production
- Follow IHOT protocols for wearing protective garments when handling fish eggs or cultural water
- Follow IHOT requirements for checking of water alarms daily and other alarms weekly
- Follow IHOT requirements for not leaving feed or feed containers outside exposed to light or heat
- Install 10, 16-tray incubators
- Install alarms at intake, adult holding ponds and incubation
- Install foot baths in incubation facilities
- Install security alarms
- Install telephone pagers

- Insulate feed hoppers and bulk storage
- Measure temperature of moist pellets at delivery
- Monitor and record DO and TGP
- Provide 3 acclimation ponds for out-of-basin releases
- Provide new screens to meet IHOT mesh criteria
- Review and follow IHOT Operations Plan
- Review IHOT flow criteria for vertical tray incubators
- Review final rearing/release size/release time strategy for changes needed to meet smoltification criteria
- 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 were not listed above.

### **WINTER STEELHEAD**

The Eagle Creek NFH - 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 develop a written hatchery M&E plan, and document its adult contribution and smolt-to-adult survival. The hatchery needed to improve its fry-to-smolt survival. The audit also found that the hatchery was not in compliance with the screen mesh criteria, water quality monitoring requirements, alarm requirements, incubation facility requirements, and pathology-free water criteria, which are all facilities requirements. The hatchery needed to develop specific incubation and rearing standards. The hatchery was not meeting the flow criteria for vertical tray incubators. The hatchery was not meeting all the food storage and transportation requirements. In the compliance area for fish health policy, the hatchery did not have foot baths in the incubation facility. The hatchery needed to develop a broodstock collection plan, spawning protocols, and a Genetics Monitoring and Evaluation Program.

The specific areas in which the Eagle Creek NFH - 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:

- Conduct fish contribution studies
- Develop approved genetics M&E plan
- Develop broodstock collection plan
- Develop exchange training details among other hatcheries and agencies
- Develop spawning protocols
- Develop specific incubation and rearing standards for IHOT Operations Plan
- Develop written hatchery M&E plan
- Document adult contribution
- Document smolt-to-adult survival
- Follow food manufacturer's storage recommendations
- Follow IHOT protocols for disinfection of personnel before and after use
- Follow IHOT protocols for disinfection of transport vehicle interiors and exteriors
- Follow IHOT protocols for wearing protective garments when handling fish eggs or cultural water
- Follow IHOT requirements for checking of water alarms daily and other alarms weekly

- Follow IHOT requirements for not leaving feed or feed containers outside exposed to light or heat
- Improve fry-to-smolt survival
- Install 10, 16-tray incubators
- Install alarms at intake, adult holding ponds, incubation, and quarantine areas
- Install foot baths in incubation facilities
- Install security alarms
- Install telephone pagers
- Insulate feed hoppers and bulk storage
- Measure temperature of moist pellets at delivery
- Monitor and record DO and TGP
- Provide new screens to meet IHOT mesh criteria
- Review and follow IHOT Operations Plan
- Review IHOT flow criteria for vertical tray incubators
- 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 were not listed above.

## Facility Description

<b>Name:</b>	Eagle Creek National Fish Hatchery
<b>Stock/Species:</b>	Coho Winter Steelhead
<b>Operating Agency:</b>	U.S. Fish and Wildlife Service
<b>Funding Agency:</b>	Mitchell Act (NMFS)
<b>Location:</b>	The hatchery is located 40 miles east of Portland, Oregon along Eagle Creek, a tributary of the Clackamas River.
<b>Address:</b>	34288 SE Rainbow Road Estacada, OR 97023
<b>Hatchery Manager:</b>	Mr. Douglas Dysart
<b>Phone:</b>	(503) 630-6270
<b>Fax:</b>	(503) 630-7393
<b>Purpose:</b>	Eagle Creek NFH was authorized under the Mitchell Act and currently operates as part of the Columbia River Fisheries Development Program - a program to provide for conservation of Columbia River fish resources. The hatchery began operating in 1956. The goal of the hatchery is to help compensate for fish losses in the Columbia River Basin caused by mainstem dams.
<b>Production Goal:</b>	<b>Coho</b>  Produce 1 million smolts for on-station releases  Produce 1 million smolts for transfer to net pens in Youngs Bay  Produce 1 million fingerlings for transfer to the Yakama Indian Nation  <b>Winter Steelhead</b>  Produce 200,000 smolts for on-station releases  Produce 20,000 yearlings for transfer to net pens at Oregon City  Produce 70,000 fry for transfer to the Clackamas Hatchery



**Water Supply:**

Water rights total 116,730 gpm (260 cfs), almost all from Eagle Creek. A spring is used for incubation. Approximately 150 cfs of the water right is for power generation and is not used for fish.

**Facilities:**

Adult Holding:	1 concrete brood pond - 41,472 cf
Incubation:	43 full stacks of vertical tray incubators - 688 trays
Early Rearing:	10 starter tanks - 96 cf each
Raceways:	39 raceways - 1,600 cf each (lower series) 36 raceways - 1,600 cf each (upper series)
Rearing Ponds:	None
Satellite Facilities:	None

Section 3  
**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 Eagle Creek NFH – Coho and Winter Steelhead**

This section presents the corrective actions required to bring the Eagle Creek NFH - Coho and Winter Steelhead programs into compliance with IHOT performance measures. The remedial actions described here are suggestions developed by the Montgomery Watson Audit Team. The remedial actions and associated cost estimates have not been analyzed or prioritized by the respective operating agencies, fishery managers, or IHOT. There may be additional remedial actions, not included in this report, proposed by the respective operating agencies. 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 (Tables 3a and 3b).

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 ( $\pm 40\%$ ).

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 3a. Remedial Actions Required at Eagle Creek NFH - Coho**

<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	----	4c, 4g
<b>Type 2</b> - Remedial actions requiring changes in agency policies or procedures		
Review and follow IHOT Operations Plan	----	2
Develop smolt-to-adult goal for IHOT Operations Plan	----	4h
Follow IHOT requirements for checking of water alarms daily and other alarms weekly	----	6
Follow food manufacturer's storage recommendations	----	12
Follow IHOT requirements for regional QC oversight of feed production	----	12
Measure temperature of moist pellets at delivery	----	12
Follow IHOT requirements for not leaving feed or feed containers outside exposed to light or heat	----	12
Insulate feed hoppers and bulk storage	----	12
Develop specific incubation and rearing standards for IHOT Operations Plan	----	9, 19, 22a2
Review IHOT flow criteria for vertical tray incubators	----	18
Review final rearing/release size/release time strategy for changes needed to meet smoltification criteria	----	22a1
Follow IHOT protocols for disinfection of personnel before and after use	----	23
Follow IHOT protocols for disinfection of transport vehicle interiors and exteriors	----	23
Follow IHOT protocols for wearing protective garments when handling fish eggs or cultural water	----	23
Develop exchange training details among other hatcheries and agencies	----	25
Install foot baths in incubation facilities	----	28
Develop broodstock collection plan	----	41
Develop spawning protocols	----	42
Develop approved genetics M&E plan	----	43

<sup>1</sup> PMs are performance measures that were extracted from the IHOT 1995 report.

<b>Remedial Action Required</b>	<b>Cost</b>	<b>PMS<sup>1</sup></b>
<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
<b>Type 4</b> - Remedial actions requiring significant capital expenditures		
Install alarms at intake, adult holding ponds, and bation	\$3,000	6
Install telephone pagers	\$5,000	6
Install security alarms	\$10,000	6
Install 10, 16-tray incubators	\$20,000	8
Provide new screens to meet IHOT mesh criteria	\$8,000	10
Provide acclimation ponds for 3 out-of-basin releases	\$3.0 million	22b
<b>Type 5</b> - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
None	----	

**Table 3b. Remedial Actions Required at Eagle Creek NFH - Winter Steelhead**

<b>Remedial Action Required</b>	<b>Cost</b>	<b>PMS<sup>2</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	----	4c
<b>Type 2</b> - Remedial actions requiring changes in agency policies or procedures		
Review and follow IHOT Operations Plan	----	2
Develop written hatchery M&E plan	----	3
Document adult contribution	----	4a

<sup>1</sup> PMS are performance measures that were extracted from the IHOT 1995 report.

<sup>2</sup> PMS are performance measures that were extracted from the IHOT 1995 report.

<b>Remedial Action Required</b>	<b>Cost</b>	<b>PMS<sup>2</sup></b>
Document smolt-to-adult survival	----	4h
Follow IHOT requirements for checking of water alarms daily and other alarms weekly	----	6
Follow food manufacturer's storage recommendations	----	12
Follow IHOT requirements for regional QC oversight of feed preparation	----	12
Measure temperature of moist pellets at delivery	----	12
Follow IHOT requirements for not leaving feed or feed containers outside exposed to light or heat	----	12
Insulate feed hoppers and bulk storage	----	12
Develop specific incubation and rearing standards for IHOT Operations Plan	----	9, 18-19, 22a2
Review IHOT flow criteria for vertical tray incubators	----	18
Review final rearing/release size/release time strategy for changes needed to meet smoltification criteria	----	22c
Follow IHOT protocols for disinfection of personnel before and after use	----	23
Follow IHOT protocols for disinfection of transport vehicle interiors and exteriors	----	23
Follow IHOT protocols for wearing protective garments when handling fish eggs or cultural water	----	23
Conduct fish contribution studies	----	24
Develop exchange training details among other hatcheries and agencies	----	25

<b>Remedial Action Required</b>	<b>Cost</b>	<b>PMS<sup>1</sup></b>
<b>Type 2 (Continued)</b> - Remedial actions requiring changes in agency policies or procedures		
Install foot baths in incubation facilities	----	28
Develop broodstock collection plan	----	41
Develop spawning protocols	----	42
Develop approved genetics M&E plan	----	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
<b>Type 4</b> - Remedial actions requiring significant capital expenditures		
Install alarms at intake, adult holding ponds, incubation	\$30,000	6
Install telephone pagers	\$5,000	6
Install security alarms	10,000	6
Install 10, 16-tray incubators	\$20,000	8
Provide new screens to meet IHOT mesh criteria	\$8000	10
<b>Type 5</b> - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Improve fry-to-smolt survival	----	4f

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<sup>1</sup> PMS are performance measures that were extracted from the IHOT 1995 report.

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

This section presents the audit findings for the Eagle Creek NFH - Coho and Winter Steelhead programs contribution of adult fish to fisheries, local fisheries, spawning grounds, and hatcheries (Tables 4a and 4b). 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 4a. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries:  
Eagle Creek NFH - Coho**

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	34,735	?	7,610	42,345	4.18%
1989	6,969	?	4,357	11,326	0.95%
1990	906	?	429	1,335	0.12%
1991	319	?	3,267	3,586	0.34%
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.

**Table 4b. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries:  
Eagle Creek NFH - Winter Steelhead**

<b>Year</b>	<b>Fisheries<sup>1</sup> (Broodyear)</b>	<b>Spawning Grounds<sup>1</sup> (Broodyear)</b>	<b>Hatchery<sup>1</sup> (Broodyear)</b>	<b>Total Combined Contribution<sup>2</sup> (Broodyear)</b>	<b>Smolt to Adult Survival (percent)</b>
1984					
1985					
1986					
1987	Complete information not available	Complete information not available	Complete information not available	Complete information not available	Complete information not available
1988	Complete information not available	Complete information not available	Complete information not available	Complete information not available	Complete information not available
1989	Complete information not available	Complete information not available	Complete information not available	Complete information not available	Complete information not available
1990	Complete information not available	Complete information not available	Complete information not available	Complete information not available	Complete information not available
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.



## 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. The total expenditures for the Eagle Creek NFH are presented in Table 5 by program. The detailed breakdown of program expenditures at this hatchery are presented in separate tables (Tables 6a and 6b).

**Table 5. Annual Operating Expenses - Eagle Creek NFH**

<b>Program</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
1. Coho	<b>\$366,734</b>	<b>\$388,368</b>	<b>\$379,425</b>
2. Winter Steelhead	<b>122,245</b>	<b>\$96,492</b>	<b>\$113,335</b>
3.			
4.			
5.			
<b>Total Hatchery Costs</b>	<b>\$488,978</b>	<b>\$482,460</b>	<b>\$492,760</b>

**Table 6a. Detailed Expenditures at Eagle Creek NFH by Program**

**Coho**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
Personnel Costs	\$324,090	\$333,993	\$317,182
Operational Costs	\$66,988	\$97,045	\$88,376
Capital Costs	\$86,377	\$39,081	\$77,353
Indirect Costs			
Lumped Hatchery Costs <sup>1</sup>			
Lumped Third-Party Costs	\$11,523	\$12,341	\$9,849
<b>Total Hatchery Costs</b>	<b>\$488,978</b>	<b>\$482,460</b>	<b>\$492,760</b>
<b>Source of Funds</b>			
NMFS	<b>100%</b>	<b>100%</b>	<b>100%</b>
Program Production (lb)	141,157	192,367	112,098
Total Production (lb)	187,218	239,280	145,539
Program as Percent of Total	75%	80%	77%
<b>Program Costs</b>	<b>\$366,734</b>	<b>\$388,368</b>	<b>\$379,425</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 6b. Detailed Expenditures at Eagle Creek NFH by Program**

**Winter Steelhead**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
Personnel Costs	\$324,090	\$333,993	\$317,182
Operational Costs	\$66,988	\$97,045	\$88,376
Capital Costs	\$86,377	\$39,081	\$77,353
Indirect Costs			
Lumped Hatchery Costs <sup>1</sup>			
Lumped Third-Party Costs	\$11,523	\$12,341	\$9,849
<b>Total Hatchery Costs</b>	<b>\$488,978</b>	<b>\$482,460</b>	<b>\$492,760</b>
<b>Source of Funds</b>			
NMFS	<b>100%</b>	<b>100%</b>	<b>100%</b>
Program Production (lb)	46,061	46,913	33,441
Total Production (lb)	187,218	239,280	145,539
Program as Percent of Total	25%	20%	23%
<b>Program Costs</b>	<b>122,245</b>	<b>\$96,492</b>	<b>\$113,335</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.