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**RINGOLD HATCHERY**

**A COMPILATION AND SUMMARY OF  
IHOT AUDITS FOR SUMMER  
STEELHEAD AND SPRING CHINOOK**

**JULY 1998**

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**HATCHERY EVALUATION REPORT  
SUMMARY FOR**

- Ringold Hatchery**  
- **Summer Steelhead**  
- **Spring Chinook**

**A Summarized Compilation of Independents 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 Summer Steelhead and Spring Chinook at Ringold 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.

The hatchery is located on the Columbia River, approximately 17 miles west of Mesa, Washington and is operated by the Washington Department of Fish and Wildlife. The hatchery is used for adult collection, rearing, acclimation and release of spring chinook; acclimation and release of URB fall chinook; and rearing, acclimation, and release of summer 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). 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) was contracted along with Montgomery Watson to complete the hatchery 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.

## **Ringold Springs Hatchery - Summer Steelhead and Spring Chinook Results**

The Ringold Springs Hatchery includes a 9-acre earthen rearing pond and 14 vinyl raceways, Summer steelhead rearing facilities consist of a 4.8-acre earthen pond. The facility water supply consists of a gravity-flow, spring supply of approximately 27,000 gpm. The facility began operation in 1962 as part of the Columbia River Fisheries Development Program, a program to mitigate for fishery losses due to hydroelectric development in the Columbia River basin. Up River Bright (URB) Fall Chinook are reared and released at Ringold Hatchery, however audit information is not available except for annual operating expenditures (Section 5).

### **Summer Steelhead**

The Ringold Springs Hatchery Summer Steelhead program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery did not meet its fry-to-smolt survival goal as a result of heavy losses of fish to bird predation. In the area of facility requirements, the audit found that the hatchery was not in compliance with the IHOT criteria for water quality in the areas of dissolved gases, chemistry, alkalinity and hardness, nitrite, and contaminants due to a lack of analyses for these parameters. The hatchery also did not have alarms at several recommended areas, did not follow IHOT recommendations for the frequency of monitoring alarms, and needs predator control for the large earthen rearing pond. The facility did also not meet several IHOT recommendations in the area of food storage quality control. In the area of hatchery practices, the audit found that the hatchery did not have a density and loading criteria for rearing, did not measure smoltification, and did not have written criteria for percent smoltification. The facility also needs to develop several training protocols to be in line with IHOT recommendations. In the area of genetics policy, the audit found that the hatchery did not have a Genetics Monitoring and Evaluation Program in place, but this program should probably be developed at Skamania Hatchery where the adults are collected.

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

- Adopt IHOT recommendations for monitoring food production
- Conduct appropriate fishery contribution studies
- Develop a genetics M&E program in line with IHOT policies and procedures
- Develop density and loading criteria for earthen pond
- Develop goal for fry-to smolt survival for IHOT Operations Plan
- Develop goal for smolt-to-adult survival
- Develop training protocols in line with IHOT recommendations
- Develop written monitoring and evaluation plan
- Implement IHOT monitoring schedule for alarm system checks
- Install appropriate alarms on the intake and rearing pond, improve security at the broodstock collection area
- Install new discharge pipe for earthen pond to river

- Measure smoltification and develop written smoltification criteria
- Provide new food storage unit for dry and moist foods
- Provide predator control on 4.8-acre pond to increase fry to smolt survival
- Run analysis for alkalinity and hardness
- Run analysis for chemistry parameters where no data is available
- Run analysis for contaminants
- Run analysis for nitrite
- Run analysis for TGP

Non-compliance issues resulting from items beyond human control or Performance Measures not relevant to this hatchery were not listed above.

### **Spring Chinook**

The Ringold Springs Hatchery - Spring Chinook program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery did not meet its fry to smolt survival goal as a result of heavy losses of fish to bird predation. In the area of facility requirements, the audit found that the hatchery was not in compliance with the IHOT criteria for water quality in the areas of dissolved gases, chemistry, alkalinity and hardness, nitrite, and contaminants due to a lack of analyses for these parameters. The hatchery also did not have alarms at several recommended areas, did not follow IHOT recommendations for the frequency of monitoring alarms, and needs predator control for the large earthen rearing pond. The facility also did not meet several IHOT recommendations in the area of food storage quality control. In the area of hatchery practices, the audit found that the hatchery exceeded density criteria for rearing near the end of the rearing cycle, did not measure smoltification or have written criteria for percent smoltification, and did not follow several IHOT protocols regarding transportation. The facility also needs to develop several training protocols to be in line with IHOT recommendations. In the area of genetics policy, the audit found that the hatchery did not have a Genetics Monitoring and Evaluation Program in place.

The specific areas in which the Ringold Springs Hatchery - Spring 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:

- Adopt IHOT procedures for transport vehicle disinfection
- Adopt IHOT recommendations for monitoring food production
- Conduct appropriate fishery contribution studies
- Develop a genetics M&E program in line with IHOT policies and procedures
- Develop training protocols in line with IHOT recommendations
- Document adult contribution
- Implement IHOT monitoring schedule for alarm system checks
- Install appropriate alarms on the intake and large rearing ponds, improve security at the broodstock collection area

- Measure smoltification and develop written smoltification criteria
- Provide additional raceway rearing volume
- Provide new food storage unit for dry and moist foods
- Provide predator control on 9-acre pond to increase fry to smolt survival
- Run analysis for alkalinity and hardness
- Run analysis for chemistry parameters where no data is available
- Run analysis for contaminants
- Run analysis for dissolved nitrogen
- Run analysis for nitrite

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>	Ringold Springs Hatchery
<b>Stock/Species:</b>	Spring Chinook Summer Steelhead Fall Chinook
<b>Operating Agency:</b>	Washington Department of Fish and Wildlife
<b>Funding Agency:</b>	NMFS through the Columbia River Fisheries Development Program
<b>Location:</b>	About 17 miles west of Mesa, WA on the Columbia River
<b>Address:</b>	Ringold Springs Hatchery 1871 Ringold River Road Mesa, WA 99343
<b>Hatchery Manager:</b>	Mr. Art Brown
<b>Phone:</b>	(509) 269-4448
<b>Fax:</b>	(509) 269-4408
<b>Purpose:</b>	Ringold Springs Hatchery serves as an adult collection, rearing, and release facility for spring chinook, rearing and release for summer steelhead, and final rearing and release for fall chinook.
<b>Production Goal:</b>	<b>Spring Chinook</b> Produce 1,100,000 smolts <b>Summer Steelhead</b> Produce 180,000 smolts <b>URB Fall Chinook</b> Final rearing for 3,500,000
<b>Water Supply:</b>	Springs supplying approximately 27,000 gpm
<b>Facilities:</b>	
Adult Holding:	Short-term holding within channel of the trap
Incubation:	N/A



Early Rearing:	N/A
Raceways:	14 8'x 80' vinyl raceways - 1920 cf each
Rearing Ponds:	1 9-acre earthen rearing pond 1 4.8-acre earthen rearing pond
Satellite Facilities:	N/A

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 categories range 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:

**Table 2. 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 Ringold Spring Hatchery - Summer Steelhead and Spring Chinook**

This section presents the corrective actions required to bring the Ringold Spring Hatchery - Summer Steelhead and Spring Chinook 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 (Table 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 Ringold Spring Hatchery - Summer 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		
Provide telephone pagers; however, not a problem for this hatchery because residences are hard-wired to alarm system	---	6
<b>Type 2</b> - Remedial actions requiring changes in agency policies or procedures		
Develop written monitoring and evaluation plan	---	3, 34
Develop goal for fry-to smolt survival for IHOT Operations Plan	---	4f
Develop goal for smolt-to-adult survival		4h
Implement IHOT monitoring schedule for alarm system checks	---	6
Adopt IHOT recommendations for monitoring food production	---	12
Develop density and loading criteria for earthen pond	---	19, 22a2, 30, 36
Measure smoltification and develop written smoltification criteria	---	22a1, 36
Develop training protocols in line with IHOT recommendations	---	25
Develop a genetics M&E program in line with IHOT policies and procedures	---	43
<b>Type 3</b> - Remedial actions requiring changes in monitoring coverage or interval		
Run analysis for TGP	---	5c, 21, 29
Run analysis for chemistry parameters where no data is available	---	5c, 21, 29
Run analysis for alkalinity and hardness	---	5e, 21, 29
Run analysis for nitrite	---	5f, 21, 29
Run analysis for contaminants	---	5g, 21, 29
Conduct appropriate fishery contribution studies	---	24

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

Remedial Action Required	Cost	PMs <sup>1</sup>
<b>Type 4</b> - Remedial actions requiring significant capital expenditures		
Provide predator control on 4.8-acre pond to increase fry to smolt survival	\$400,000	4f, 11
Install appropriate alarms on the intake and rearing pond, improve security at the broodstock collection area	\$20,000	6
Install new discharge pipe for earthen pond to river	\$50,000	13
<b>Type 5</b> - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Provide new food storage unit for dry and moist foods	---	12

**Table 3b. Remedial Actions Required at Ringold Springs Hatchery - Spring Chinook**

Remedial Action Required	Cost	PMs <sup>1</sup>
<b>Type 1</b> - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery		
Provide data on smolt to adult survival as it becomes available	----	4h
Water temperatures do not meet rearing criteria but no remedial action required because of manipulation of feed to manage growth	----	5a
Provide telephone pagers; however, not a problem for this hatchery because residences are hard-wired to alarm system	N/A	6
<b>Type 2</b> - Remedial actions requiring changes in agency policies or procedures		
Document adult contribution	----	4a
Implement IHOT monitoring schedule for alarm system checks	----	6
Adopt IHOT recommendations for monitoring food production	----	12
Measure smoltification and develop written smoltification criteria	----	22a1, 36
Adopt IHOT procedures for transport vehicle disinfection and temperature control	----	23

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

<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>
Develop training protocols in line with IHOT recommendations	----	25
Develop a genetics M&E program in line with IHOT policies and procedures	----	43
<b>Type 3</b> - Remedial actions requiring changes in monitoring coverage or interval		
Run analysis for dissolved nitrogen	----	5c, 21, 29
Run analysis for chemistry parameters where no data is available	----	5c, 21, 29
Run analysis for alkalinity and hardness	----	5e, 21, 29
Run analysis for nitrite	----	5f, 21, 29
Run analysis for contaminants	----	5g, 21, 29
Conduct appropriate fishery contribution studies	----	24

<b>Remedial Action Required</b>	<b>Cost</b>	<b>PMs<sup>1</sup></b>
<b>Type 4</b> - Remedial actions requiring significant capital expenditures		
Provide predator control on 9-acre pond to increase fry to smolt survival	\$800,000	4f, 11
Install appropriate alarms on the intake and large rearing ponds, improve security at the broodstock collection area	\$20,000	6
Provide additional raceway rearing volume	\$205,000	9, 19, 21, 30, 36
<b>Type 5</b> - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Provide new food storage unit for dry and moist foods	N/A	12

<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 Ringold Spring Hatchery - Summer Steelhead and Spring Chinook 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:  
Ringold Spring Hatchery - Summer Steelhead**

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)
1984	2,267	no data available	no data available		no data available
1985	3,928	no data available	no data available		no data available
1986	3,680	no data available	no data available		no data available
1987	3,578	no data available	no data available		no data available
1988					
1989					
1990					
1991					
1992					
1993					
1994					
1995					

<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.

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**Table 4b. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries:  
Ringold Springs Hatchery - Spring Chinook**

<b>Year</b>	<b>Fisheries<sup>3</sup> (Broodyear)</b>	<b>Spawning Grounds<sup>1</sup> (Broodyear)</b>	<b>Hatchery<sup>1</sup> (Broodyear)</b>	<b>Total Combined Contribution<sup>4</sup> (Broodyear)</b>	<b>Smolt to Adult Survival (percent)</b>
1984					
1985					
1986					
1987					
1988					
1989	123	12	41	176	0.41%
1990	no data available	no data available	1,750	no data available	no data available
1991	no data available	no data available	286	no data available	no data available
1992	no data available	no data available	524	no data available	no data available
1993	no data available	no data available	1,620	no data available	no data available
1994	no data available	no data available	524	no data available	no data available
1995	no data available	no data available	286	no data available	no data available

<sup>3</sup> Data obtained from Missing Production Groups Annual Report or from the Regional Mark Information System database.

<sup>4</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 Ringold Hatchery are presented in Table 5 by program. The detailed breakdown of the Summer Steelhead and Spring Chinook program expenditures at this hatchery are presented in separate tables (Tables 6a and 6b).

**Table 5. Annual Operating Expenses - Ringold Springs Hatchery**

<b>Program</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
1. Summer Steelhead	\$100,000	\$100,000	\$100,000
2. Spring Chinook	\$262,225	\$274,376	\$185,645
3. URB Fall Chinook	\$20,000	\$20,000	\$40,000
4.			
5.			
<b>Total Hatchery Costs</b>	<b>\$382,225</b>	<b>\$394,396</b>	<b>\$325,645</b>



**Table 6a. Detailed Expenditures at Ringold Springs Hatchery by Program  
Spring Chinook**

<b>Component</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>
Personnel Costs			
Operational Costs			
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs <sup>1</sup>	\$382,225	\$394,396	\$325,645
Lumped Third-Party Costs	\$0	\$0	\$0
<b>Total Hatchery Costs</b>	<b>\$382,225</b>	<b>\$394,396</b>	<b>\$325,645</b>
<b>Source of Funds</b>			
NMFS - 100%			
Program Production (lb)	1,278,000	1,180,000	1,025,494
Total Production (lb)	5,671,139	4,873,112	4,549,170
Program as Percent of Total <sup>6</sup>	N/A	N/A	N/A
<b>Program Costs</b>	<b>\$262,225</b>	<b>\$274,376</b>	<b>\$185,645</b>

<sup>51</sup> When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

<sup>6</sup> Percent by weight not appropriate. Program cost shown is actual for Spring Chinook.

**Table 6b. Detailed Expenditures at Ringold Springs Hatchery by Program  
Summer Steelhead**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
Personnel Costs			
Operational Costs			
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs <sup>1</sup>	\$382,225	\$394,396	\$325,645
Lumped Third-Party Costs	\$0	\$0	\$0
<b>Total Hatchery Costs</b>	<b>\$382,225</b>	<b>\$394,396</b>	<b>\$325,645</b>
<b>Source of Funds</b>			
NMFS - 100%			
Program Production (lb)	175,648	168,217	167,548
Total Production (lb)	5,671,139	4,873,112	4,549,170
Program as Percent of Total <sup>8</sup>	N/A	N/A	N/A
<b>Program Costs</b>	<b>\$100,000</b>	<b>\$100,000</b>	<b>\$100,000</b>

<sup>71</sup> When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

<sup>8</sup> Percent by weight not appropriate. Program cost shown is actual for Summer Steelhead.

**Table 6c. Detailed Expenditures at Ringold Springs Hatchery by Program**

**Fall Chinook**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
Personnel Costs			
Operational Costs			
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs <sup>1</sup>	\$382,225	\$394,396	\$325,645
Lumped Third-Party Costs	\$0	\$0	\$0
<b>Total Hatchery Costs</b>	<b>\$382,225</b>	<b>\$394,396</b>	<b>\$325,645</b>
<b>Source of Funds</b>			
NMFS - 100%			
Program Production (lb)	4,217,491	3,524,895	3,356,128
Total Production (lb)	5,671,139	4,873,112	4,549,170
Program as Percent of Total <sup>10</sup>	N/A	N/A	N/A
<b>Program Costs</b>	<b>\$20,000</b>	<b>\$20,000</b>	<b>\$40,000</b>

<sup>91</sup> When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

<sup>10</sup> Percent by weight not appropriate. Program cost shown is actual for Fall Chinook.