
CLACKAMAS HATCHERY

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

JULY 1998

**HATCHERY EVALUATION REPORT
SUMMARY FOR**

Clackamas Hatchery
- **Spring Chinook**
- **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 Spring Chinook and Winter Steelhead at Clackamas 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 included 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 Clackamas Hatchery is located on the Clackamas River, approximately 5 miles west of Estacada, Oregon and is operated by the Oregon Department of Fish and Wildlife. Clackamette Cove net pens, Marmot Ponds, and Hublou net pens are operated as satellite facilities to Clackamas Hatchery. The hatchery is used for adult collection, egg incubation, and rearing of spring chinook and the rearing of winter steelhead.

Background

The hatchery audit was 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.

Clackamas Hatchery - Spring Chinook and Winter Steelhead Results

The Clackamas facility includes three ponds for adult holding, 10 concrete raceways, 3 rearing ponds, and incubation facilities. Clackamas Hatchery began operation in 1979 and is operated from four funding sources: ODFW, NMFS, Portland General Electric, and the City of Portland. The NMFS funding is part of the Columbia River Fisheries Development Program (Mitchell Act) - a program to enhance declining fish runs in the Columbia River Basin. Portland General Electric and City of Portland provide funding as mitigation for fishery losses caused by hydroelectric development in the Sandy and Clackamas river systems.

SPRING CHINOOK

The Clackamas Hatchery - Spring Chinook program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery needed to improve its pre-spawning survival and develop a smolt-to-adult goal. The audit found that the hatchery was not in compliance the temperature criteria for rearing, water quality monitoring requirements, alarm requirements, predation control requirements, and regional feed preparation oversight, which are all facilities requirements. The hatchery needs to provide rearing in the subbasin or acclimation for all releases. The hatchery needed to develop specific incubation and rearing standards for the IHOT Operations Plan, smoltification goal and monitoring plan, and follow IHOT disinfection protocols for transport vehicles. The hatchery did not have a Genetics Monitoring and Evaluation Program in place.

The specific areas in which the Clackamas 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:

- Conduct IHOT QA/QC for feed preparation
- Determine if design of release lines and manhole subjects fish to adverse conditions
- Develop alarm log
- Develop genetics and M&E program
- Develop smolt-to-adult survival goal for IHOT Operations Plan
- Develop smoltification goal and monitor
- Develop specific incubation and rearing standards for IHOT Operations Plan
- Follow IHOT protocols for disinfection of exterior and interiors of transport vehicles
- Follow IHOT transportation protocols for water temperature; provide heating and cooling capabilities on transport trucks
- Implement IHOT recommendations for alarm monitoring and checking
- Improve pre-spawning survival by controlling disease problems
- Install outside systems and buzzers in onsite residences
- Monitor TGP
- Provide bird netting on B ponds
- Provide chilling to approximately 19,900 gpm and/or disinfect
- Provide rearing or acclimation in the subbasin

- Review incubation standards or modify rearing programs
- 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

Hatchery - Winter Steelhead program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery needed to improve its fry-to-smolt survival and document its adult contribution. The audit found that the hatchery was not in compliance the temperature criteria for rearing, water quality monitoring requirements, alarm requirements, predation control requirements, and regional feed preparation oversight, which are all facilities requirements. The hatchery needs to provide rearing in the subbasin or acclimation for Sandy subbasin releases. The hatchery needed to develop specific rearing standards for the IHOT Operations Plan, smoltification goal and monitoring plan, and follow IHOT disinfection protocols for transport vehicles. The hatchery did not have a Genetics Monitoring and Evaluation Program in place.

The specific areas in which the Clackamas 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:

- Conduct fish contribution studies
- Conduct IHOT QA/QC for feed preparation
- Determine if design of release lines and manhole subjects fish to adverse conditions
- Develop alarm log
- Develop genetics and M & E program
- Develop smoltification goal and monitor
- Develop specific rearing standards for IHOT Operations Plan
- Document adult contribution
- Follow IHOT protocols for disinfection of exterior and interiors of transport vehicles
- Follow IHOT transportation protocols for water temperature; provide heating and cooling capabilities on transport trucks
- Implement IHOT recommendations for alarm monitoring and checking
- Improve fry-to-smolt survival by disinfecting water supply or prophylactic treatment
- Install outside systems and buzzers in onsite residences
- Monitor TGP
- Provide bird netting on A ponds
- Provide chilling to approximately 19,900 gpm and/or disinfect
- Provide rearing or acclimation for fish released in Sandy subbasin
- 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

Name:	Clackamas Hatchery
Stock/Species:	Spring Chinook Winter Steelhead
Operating Agency:	Oregon Department of Fish & Wildlife
Funding Agency:	Mitchell Act, ODFW, Portland General Electric, and City of Portland
Location:	Clackamas Hatchery is located on the Clackamas River, approximately 5 miles west of Estacada, Oregon. Clackamette Cove net pens, Marmot Ponds, and Hublou net pens are operated as satellite facilities to Clackamas Hatchery.
Address:	Clackamas Hatchery Oregon Department of Fish & Wildlife 24500 S. Entrance Rd. Estacada, OR 97023
Hatchery Manager:	Mr. Mel Kelly
Phone:	(503) 630-7210
Fax:	(503) 630-4566
Purpose:	Clackamas Hatchery began operation in 1979 and is operated from four funding sources: ODFW, NMFS, Portland General Electric, and the City of Portland. The NMFS funding is part of the Columbia River Fisheries Development Program (Mitchell Act) - a program to enhance declining fish runs in the Columbia River Basin. Portland General Electric and City of Portland provide funding as mitigation for fishery losses caused by hydroelectric development in the Sandy and Clackamas river systems.

Production Goal:

Spring Chinook

Provide 1,781,000 eggs to ODFW hatcheries and the Salmon and Trout Enhancement Program.

Produce 976,670 smolts (98,880 lb) for on-station releases into the Clackamas River.

Produce 50,000 smolts (5,000 lb) for release into the Clackamas River from the Clackamette Cove net pens

Produce 30,000 smolts (3,000 lb) for release into the Clackamas River from the Hublou Harbor net pens

Produce 360,000 smolts (41,110 lb) for release into the Sandy River.

Produce 100,000 smolts (10,000 lb) for release into Sandy River from the Marmot acclimation pond.

Winter Steelhead

Produce 30,000 smolts (5,000 lb) for on-station releases into the Clackamas River.

Produce 30,000 smolts (5,000 lb) for release into the Sandy River.

Water Supply:

Water rights total 44,354 gpm from the Clackamas River and a well. The Clackamas River provides the majority of water used for hatchery operations.

Facilities:

Adult Holding:	3 concrete adult holding ponds - 5,040 cf each
Incubation:	20 16-tray stacks
Early Rearing:	2 Canadian troughs - 28 cf each
Raceways:	10 concrete raceways - 4,080 cf each
Rearing Ponds:	3 asphalt/concrete rearing ponds - 67,500 cf each
Satellite Facilities:	Clackamette Cove net pens Hublou net pens Marmot Ponds

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 Clackamas Hatchery - Spring Chinook and Winter Steelhead

This section presents the corrective actions required to bring the Clackamas Hatchery - Spring Chinook 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 (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 Clackamas Hatchery - Spring Chinook

Remedial Action Required	Cost	PMS ¹
<p>Type 1 - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery</p> <p>Install security alarms</p>	----	6
<p>Type 2 - Remedial actions requiring changes in agency policies or procedures</p> <p>Improve pre-spawning survival by controlling disease problems</p> <p>Develop smolt-to-adult survival goal for IHOT Operations Plan</p> <p>Implement IHOT recommendations for alarm monitoring and checking</p> <p>Develop alarm log</p> <p>Conduct IHOT QA/QC for feed preparation</p> <p>Develop specific incubation and rearing standards for IHOT Operations Plan</p> <p>Review incubation standards or modify rearing programs</p> <p>Develop smoltification goal and monitor</p> <p>Follow IHOT protocols for disinfection of exterior and interiors of transport vehicles</p> <p>Develop genetics and M&E program</p>	----	<p>4b</p> <p>4h</p> <p>6</p> <p>6</p> <p>12</p> <p>18-19</p> <p>18</p> <p>22a1</p> <p>23</p> <p>43</p>
<p>Type 3 - Remedial actions requiring changes in monitoring coverage or interval</p> <p>Monitor TGP</p> <p>Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants</p>	----	<p>5b</p> <p>5c-5g</p>

¹ PMS are performance measures that were extracted from the IHOT 1995 report.

Remedial Action Required	Cost	PMS¹
Type 4 - Remedial actions requiring significant capital expenditures		
Install outside systems and buzzers in 4 onsite residences	\$20,000	6
Provide bird netting on B ponds	\$180,000	11
Determine if design of release lines and manhole subjects fish to adverse conditions	\$25,000	13
Provide rearing or acclimation in the subbasin	\$1,000,000	22b
Follow IHOT transportation protocols for water temperature; provide heating and cooling capabilities on transport trucks	\$25,000	23
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Provide chilling to approximately 19,900 gpm and/or disinfect	----	5a

Table 3b. Remedial Actions Required at Clackamas Hatchery - Winter Steelhead

Remedial Action Required	Cost	PMS²
Type 1 - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery		
Install security alarms	----	6
Type 2 - Remedial actions requiring changes in agency policies or procedures		
Document adult contribution	----	4a, 4h
Implement IHOT recommendations for alarm monitoring and checking	----	6
Develop alarm log	----	6
Conduct IHOT QA/QC for feed preparation	----	12
Develop specific rearing standards for IHOT Operations Plan	----	18-19
Develop smoltification goal and monitor	----	22a1
Follow IHOT protocols for disinfection of exterior and interiors of transport vehicles	----	23

¹ PMS are performance measures that were extracted from the IHOT 1995 report.

² PMS are performance measures that were extracted from the IHOT 1995 report.

Remedial Action Required	Cost	PMS ²
Conduct fish contribution studies	----	24
Develop genetics and M & E program	----	43
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Monitor TGP	----	5b
Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants	----	5c-5g

Remedial Action Required	Cost	PMs ¹
Type 4 - Remedial actions requiring significant capital expenditures		
Improve fry-to-smolt survival by disinfecting entire facility water supply or prophylactic treatment	\$25 Million	4f
Install outside systems and buzzers in 4 onsite residences	\$20,000	6
Provide bird netting on A ponds	\$5,000	11, 22a4
Determine if design of release lines and manhole subjects fish to adverse conditions	\$25,000	13
Provide rearing or acclimation for fish released in Sandy subbasin	\$1,000,000	22b
Follow IHOT transportation protocols for water temperature; provide heating and cooling capabilities on transport trucks	\$25,000	23
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Provide chilling to approximately 19,900 gpm and/or disinfect	----	5a, 5h, 22a4

¹ 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 Clackamas Hatchery - Spring Chinook 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:
Clackamas Hatchery - Spring Chinook**

Year	Fisheries ¹ (Broodyear)	Spawning Grounds ¹ (Broodyear)	Hatchery ¹ (Broodyear)	Total Combined Contribution ² (Broodyear)	Smolt to Adult Survival (percent)
1981					
1982					
1983	4,123	4,386	1,472		
1984	2,637	3,371	1,004		
1985	2,900	3,114	1,075		0.07
1986	5,335	5,591	2,754		0.51
1987	3,708	5,249	4,326		0.86
1988	2,699	3,258	4,502		1.17
1989	1,420	1,742	2,775		0.35
1990					
1991					
1992					

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

² 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:
Clackamas Hatchery - Winter Steelhead**

Year	Fisheries¹ (Broodyear)	Spawning Grounds¹ (Broodyear)	Hatchery¹ (Broodyear)	Total Combined Contribution² (Broodyear)	Smolt to Adult Survival (percent)
1983					
1984					
1985	No Information Provided	No Information Provided	No Information Provided	No Information Provided	No Information Provided
1986	No Information Provided	No Information Provided	No Information Provided	No Information Provided	No Information Provided
1987	No Information Provided	No Information Provided	No Information Provided	No Information Provided	No Information Provided
1988	No Information Provided	No Information Provided	No Information Provided	No Information Provided	No Information Provided
1989	No Information Provided	No Information Provided	No Information Provided	No Information Provided	No Information Provided
1990					
1991					
1992					

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

² 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, and 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 Clackamas Hatchery 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 - Clackamas Hatchery

Program	1994	1995	1996
1. Spring Chinook	\$469,316	\$469,316	\$506,079
2. Winter Steelhead	\$29,956	\$29,956	\$30,365
3.			
4.			
5.			
Total Hatchery Costs	\$499,272	\$499,272	\$506,079

6a. Detailed Expenditures at Clackamas Hatchery by Program

Spring Chinook

Component	1994	1995	1996
Personnel Costs	\$185,598	\$185,598	\$182,944
Operational Costs	\$238,451	\$238,451	\$246,968
Capital Costs	\$0	\$0	\$0
Indirect Costs	\$75,223	\$75,223	\$76,167
Lumped Hatchery Costs ¹			
Lumped Third-Party Costs			
Total Hatchery Costs	\$499,272	\$499,272	\$506,079
Source of Funds			
Mitchell Act, ODFW, Portland General Electric, and City of Portland			
Program Production (lb)	161,111	161,111	161,111
Total Production (lb)	171,336	171,336	171,336
Program as Percent of Total	94%	94%	94%
Program Costs	\$469,316	\$469,316	\$475,714

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

Table 6b. Detailed Expenditures at Clackamas Hatchery by Program

Winter Steelhead

Component	1994	1995	1996
Personnel Costs	\$185,598	\$185,598	\$182,944
Operational Costs	\$238,451	\$238,451	\$246,968
Capital Costs	\$0	\$0	\$0
Indirect Costs	\$75,223	\$75,223	\$76,167
Lumped Hatchery Costs ¹			
Lumped Third-Party Costs			
Total Hatchery Costs	\$499,272	\$499,272	\$506,079
Source of Funds			
Mitchell Act, ODFW, Portland General Electric, and City of Portland			
Program Production (lb)	10,000	10,000	10,000
Total Production (lb)	171,336	171,336	171,336
Program as Percent of Total	5.8%	5.8%	5.8%
Program Costs	\$29,956	\$29,956	\$30,365

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