WILLAMETTE HATCHERY

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

JULY 1995

HATCHERY EVALUATION REPORT
SUMMARY FOR

Willamette Hatchery
- **Spring Chinook (Willamette Stock)**
- **Summer Steelhead**

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

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JULY 1998

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January 1997

BPA Project Number 95-2
Contract Number 95AC49468

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Section 1

Executive Summary

This report compiles a summary of the findings of two separate Hatchery Evaluation Reports for Spring Chinook and Summer Steelhead at Willamette 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 along Salmon Creek, approximately 3 miles upstream from its confluence with the Middle Fork of the Willamette River. The hatchery is operated by the Oregon Department of Fish and Wildlife and used for adult collection, incubation, and rearing of spring chinook and rainbow trout. In addition, both summer and winter steelhead are reared at his facility for a short period of time. The Dexter satellite serves as an adult collection, rearing and acclimation release site for spring chinook and 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) 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.

Willamette Hatchery - Spring Chinook and Summer Steelhead Results

The Rapid River facility includes three ponds for adult holding, 40 Burrow's ponds, 10 raceways, 4 circular ponds, 13 Canadian troughs, 22 troughs, and incubation facilities. The hatchery is operated as mitigate for fish losses caused by Hills Creek, Lookout Point, and the Dexter hydroelectric/flood control projects. The COE mitigation agreement requires an annual production of no more than 235,000 lb of juvenile chinook salmon and steelhead.

SPRING CHINOOK

The Willamette Hatchery - Spring Chinook program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery was not meeting pre-spawning survival, egg-take, fry-to-smolt, and production goals. The audit found that the hatchery was not in compliance with water quality monitoring requirements, pathology-free water criteria, alarm requirements, double-screening criteria, feed preparation requirements, and predation control facility criteria, which are all facilities requirements. The hatchery also exceeded the loading criteria for rearing in some of the raceways. The hatchery need to develop a smoltification goal and monitoring plan and specific incubation and rearing standards for the IHOT Operations Plan. The hatchery was not in compliance with all the transportation requirements. The hatchery did not have a Genetics Monitoring and Evaluation Program.

The specific areas in which the Willamette 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 tests for feed preparation
- Develop alarm log
- Develop approved genetics M&E plan
- Develop smolt-to-adult survival goal for IHOT Operations Plan
- Develop smoltification goal and monitor
- Develop specific incubation and rearing standards for the IHOT Operations Plan
- Double-screen 20 of the 20'x80'x2.5' raceways
- Follow IHOT protocols for checking of alarms
- Follow IHOT protocols for disinfection of equipment used to collect dead fish prior to its use in another pond and/or lot of fish
- Follow IHOT protocols for disinfection of transport equipment and personnel before and after use
- Follow IHOT protocols for disinfection of transport vehicle interiors and exteriors
- Follow IHOT protocols for water temperature during transport
- Follow IHOT protocols for wearing protective garments when handling fish eggs or cultural water
- Improve egg take by improving pre-spawning survival
- Improve fry-to-smolt survival
- Improve pre-spawning survival
- Improve production to meet production goal
- Increase alkalinity and hardness
- Install alarms in adult holding ponds and rearing ponds
- Install insulation on feed trucks
- Measure temperature of moist pellets at delivery to determine compliance with temperature criteria

- Modify program or increase flow to meet loading criteria in the 20'x100'x4' raceways
- Provide bird screening over all of the 40 20'x80'x2.5' raceways
- Provide disease-free water for incubation and early rearing
- Run analysis for missing water quality parameters nitrite, and contaminants

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

SUMMER STEELHEAD

The Willamette Hatchery - Summer Steelhead program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery needed to document its adult contribution and smolt-to-adult survival. The audit found that the hatchery was not in compliance with water quality monitoring requirements, alarm requirements, and feed preparation requirements, which are all facilities requirements. The hatchery needed to develop a smoltification goal and monitoring plan and specific rearing standards for the IHOT Operations Plan. The hatchery was not in compliance with all the transportation requirements. The hatchery did not have a Genetics Monitoring and Evaluation Program.

The specific areas in which the Willamette 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:

- Conduct fishery contribution studies
- Conduct IHOT QA/QC tests for feed preparation
- Develop alarm log
- Develop approved genetics M&E plan
- Develop smoltification goal and monitor
- Develop specific rearing standards for the IHOT Operations Plan
- Develop M & E plan
- Document adult contribution and smolt-to-adult survival
- Follow IHOT protocols for checking of alarms
- Follow IHOT protocols for disinfection of transport equipment and personnel before and after use
- Follow IHOT protocols for disinfection of transport vehicle interiors and exteriors
- Follow IHOT protocols for water temperature during transport
- Follow IHOT protocols for wearing protective garments when handling fish eggs or cultural water
- Increase alkalinity and hardness
- Install alarms in adult holding ponds and rearing ponds
- Install telephone pagers
- Run analysis for missing water quality parameters nitrite, and contaminants

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

Section 2

Facility Description

Name:	Willamette Fish Hatchery
Stock/Species:	Spring Chinook Summer Steelhead Winter Steelhead Rainbow Trout
Operating Agency:	Oregon Department of Fish & Wildlife
Funding Agency:	COE ODFW
Location:	The hatchery is located along Salmon Creek, approximately 3 miles upstream from its confluence with the Middle Fork of the Willamette River
Address:	76389 Fish Hatchery Road Oakridge, OR 97463
Hatchery Manager:	Mr. Gary Yeager
Phone:	(541) 782-2933
Fax:	(541) 782-4305
Purpose:	The hatchery is operated as mitigation for fish losses caused by Hills Creek, Lookout Point, and the Dexter hydroelectric/flood control projects. The COE mitigation agreement requires an annual production of no more than 235,000 lb of juvenile chinook salmon and steelhead.

Production Goal:

Spring Chinook

Provide 20,900 eggs to CEDC, Oregon's Salmon and Trout Enhancement Program and research

Produce 301,000 smolts (21,500 lb) for transfer to South Santiam Hatchery

Produce 858,000 fingerlings (8,520 lb) and 556,000 smolts (47,085 lb) for transfer to Dexter Ponds

Release 958,000 smolts (113,000 lb) from Dexter Ponds into the South Santiam River

Provide 10,000 smolts (1,000 lb) for ODFW research

Provide 10,000 smolts (670 lb) for transfer to the NMFS research in Newport, Oregon

Produce 1,300,000 fingerlings (13,000) pounds for release into Fall Creek, Hills Creek, and Lookout Point Reservoirs.

Produce 1,369,000 smolts (153,945 lb) for release into the Middle Fork Willamette River

Winter Steelhead

Produce 85,000 smolts (14,167 lb) in the Siuslaw River (not a Columbia Basin river)

Summer Steelhead

Produce 118,000 smolts (26,222 lb) for release into the Middle Fork Willamette River

Rainbow Trout

Produce 208,000 legal-sized fish (69,400 lb) for release into lakes, streams and reservoirs (Cape Cod stock)

Water Supply:

Water flow available to the hatchery, based on the current water delivery system, ranges from 29,623 to 37,028 gpm.

Facilities:

Adult Holding:

1 earth/gravel adult holding pond - 9,500 cf

2 concrete brood ponds - 6,864 cf each

Incubation:	54 full stack of vertical tray incubator (810 trays used)
	22 wood troughs - 12-13 cf each
Early Rearing:	13 fiberglass Canadian troughs - 75 cf each
	1 concrete starter tank - 188 cf
Raceways:	40 Burrow's ponds - 3,710 cf each
	10 concrete raceways - 7,500 cf each
Rearing Ponds:	4 concrete circular ponds - 75 cf each
Satellite Facilities:	Dexter Ponds
	1 adult holding pond - 6,075 cf
	4 concrete raceways - 14,580 cf each
	1 asphalt rearing pond - 66,048 cf

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 Willamette Hatchery - Spring Chinook and Summer Steelhead

This section presents the corrective actions required to bring the Willamette Hatchery - Spring Chinook and Summer 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 (± 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 Willamette Hatchery - Spring Chinook

Remedial Action Required	Cost	PMs[1]
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		
Develop smolt-to-adult survival goal for IHOT Operations Plan	----	4h
Follow IHOT protocols for checking of alarms	----	6
Develop alarm log	----	6
Conduct IHOT QA/QC tests for feed preparation	----	12
Measure temperature of moist pellets at delivery to determine compliance with temperature criteria	----	12
Develop specific incubation and rearing standards for the IHOT Operations Plan	----	18-19
Modify program or add additional rearing space to meet loading criteria in the 20'x100'x4' raceways	----	19
Develop smoltification goal and monitor	----	22a1
Follow IHOT protocols for disinfection of transport equipment and 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
Follow IHOT protocols for water temperature during transport	----	23
Follow IHOT protocols for disinfection of equipment used to collect dead fish prior to its use in another ponds and/or lot of fish	----	28
Develop approved genetics M&E plan	----	43

[1] PMs are performance measures that were extracted from the IHOT 1995 report.

Remedial Action Required	Cost	PMs[1]
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Run analysis for missing water quality parameters nitrite, and contaminants	----	5c, 5f, 5g
Type 4 - Remedial actions requiring significant capital expenditures		
Provide disease-free water for incubation and early rearing	$1.0 million	5h, 21, 28
Install alarms in adult holding ponds and rearing ponds	$20,000	6
Double-screen 20 of the 20'x80'x2.5' raceways	$4,000	10
Provide bird screening over all of the 40 20'x80'x2.5' raceways	$110,000	11
Install insulation on feed trucks	$5,000	12
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Improve pre-spawning survival	----	4b
Improve egg take by improving pre-spawning survival	----	4c
Improve fry-to-smolt survival	----	4e
Improve production to meet production goal	----	4g
Increase alkalinity and hardness	----	5e
Increase flow to 20'x100'x4' raceways	----	19

Table 3b. Remedial Actions Required at Willamette Hatchery - Summer Steelhead

Remedial Action Required	Cost	PMs[2]
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		

[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]
Develop M & E plan	----	3
Document adult contribution and smolt-to-adult survival	----	4a, 4h
Follow IHOT protocols for checking of alarms	----	6
Develop alarm log	----	6
Conduct IHOT QA/QC tests for feed preparation	----	12
Develop specific rearing standards for the IHOT Operations Plan	----	18-19
Develop smoltification goal and monitor	----	22a1
Follow IHOT protocols for disinfection of transport equipment and 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
Follow IHOT protocols for water temperature during transport	----	23
Conduct fishery contribution studies	----	24
Develop approved genetics M&E plan	----	43

Remedial Action Required	Cost	PMs[1]
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Run analysis for missing water quality parameters nitrite, and contaminants	----	5c, 5f, 5g
Type 4 - Remedial actions requiring significant capital expenditures		
Install alarms in adult holding ponds and rearing ponds	$20,000	6
Install telephone pagers	$10,000	6
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Increase alkalinity and hardness		5e

[1] PMs are performance measures that were extracted from the IHOT 1995 report.

Section 4

Hatchery Contribution to Fisheries, Spawning Grounds, and Hatcheries

This section presents the audit findings for the Willamette Hatchery - Spring Chinook and Summer Steelhead programs 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.a Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries: Willamette 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					
1984	3,015	0	4,216	7,231	0.97
1985	7,369	0	19,822	27,191	2.08
1986	408	0	1,739	2,147	1.23
1987	908	0	6,475	7,383	0.69
1988					
1989					
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: Willamette Hatchery - Summer Steelhead

Year	Fisheries[1] (Broodyear)	Spawning Grounds[1] (Broodyear)	Hatchery[1] (Broodyear)	Total Combined Contribution[2] (Broodyear)	Smolt to Adult Survival (percent)
1983					
1984					
1985					
1986	Complete data not available	Complete data not available	Complete data not available	Complete data not available	Complete data not available
1987	Complete data not available	Complete data not available	Complete data not available	Complete data not available	Complete data not available
1988	Complete data not available	Complete data not available	Complete data not available	Complete data not available	Complete data not available
1989	Complete data not available	Complete data not available	Complete data not available	Complete data not available	Complete data not available
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.

Section 5

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 Willamette Hatchery are presented in Table 5 by program. The detailed breakdown of program expenditures for spring chinook and fall chinook at this hatchery are presented in separate tables (Tables 6a, 6b, 6c, and 6d).

Table 6. Annual Operating Expenses - Willamette Hatchery

Program	1994	1995	1996
1. Spring Chinook	**$462,590**	**$423,168**	**$521,014**
2. Spring Chinook (McKenzie)	**$33,042**	**$0**	**$57,314**
3. Spring Chinook (S. Santiam)	**$358,743**	**$303,404**	**$380,356**
4. Summer Steelhead	**$89,686**	**$71,859**	**$83,366**
5.			
Total Hatchery Costs	**$944,061**	**$798,431**	**1,042,071**

Table 6a. Detailed Expenditures at Willamette Hatchery by Program

Spring Chinook

Component	1994	1995	1996
Personnel Costs	$366,571	$330,116	$358,123
Operational Costs	$590,186	$401,261	$524,424
Capital Costs	$47,435	$28,019	$159,008
Indirect Costs	$130,867	$122,178	$133,468
Lumped Hatchery Costs[1]	$3,600	$3,600	$3,600
Lumped Third-Party Costs			
Total Hatchery Costs	**$944,061**	**$798,431**	**1,042,071**
Source of Funds			
COE	**83.7%**	**83.7%**	**83.7%**
ODFW	**16.25%**	**16.25%**	**16.25%**
Program Production (lb)	140,811	150,237	153,611
Total Production (lb)	287,520	283,571	308,311
Program as Percent of Total	49.0%	53%	50%
Program Costs	**$462,590**	**$423,168**	**$521,014**

[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 Willamette Hatchery by Program

Spring Chinook (McKenzie Hatchery)

Component	**1994**	**1995**	**1996**
Personnel Costs	$366,571	$330,116	$358,123
Operational Costs	$590,186	$401,261	$524,424
Capital Costs	$47,435	$28,019	$159,008
Indirect Costs	$130,867	$122,178	$133,468
Lumped Hatchery Costs[1]	$3,600	$3,600	$3,600
Lumped Third-Party Costs			
Total Hatchery Costs	**$944,061**	**$798,431**	**1,042,071**
Source of Funds			
COE	**83.7%**	**83.7%**	**83.7%**
ODFW	**16.25%**	**16.25%**	**16.25%**
Program Production (lb)	9625	0	16533
Total Production (lb)	287,520	283,571	308,311
Program as Percent of Total	3.5%	0%	5.5%
Program Costs	**$33,042**	**$0**	**$57,314**

[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 6c. Detailed Expenditures at Willamette Hatchery by Program

Spring Chinook (South Santiam Hatchery)

Component	**1994**	**1995**	**1996**
Personnel Costs	$366,571	$330,116	$358,123
Operational Costs	$590,186	$401,261	$524,424
Capital Costs	$47,435	$28,019	$159,008
Indirect Costs	$130,867	$122,178	$133,468
Lumped Hatchery Costs[1]	$3,600	$3,600	$3,600
Lumped Third-Party Costs			
Total Hatchery Costs	**$944,061**	**$798,431**	**1,042,071**
Source of Funds			
COE	**83.7%**	**83.7%**	**83.7%**
ODFW	**16.25%**	**16.25%**	**16.25%**
Program Production (lb)	108,861	107,778	112,611
Total Production (lb)	287,520	283,571	308,311
Program as Percent of Total	38%	38%	36.5%
Program Costs	**$358,743**	**$303,404**	**$380,356**

[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 6d. Detailed Expenditures at Willamette Hatchery by Program

Summer Steelhead

Component	1994	1995	1996
Personnel Costs	$366,571	$330,116	$358,123
Operational Costs	$590,186	$401,261	$524,424
Capital Costs	$47,435	$28,019	$159,008
Indirect Costs	$130,867	$122,178	$133,468
Lumped Hatchery Costs[1]	$3,600	$3,600	$3,600
Lumped Third-Party Costs			
Total Hatchery Costs	**$944,061**	**$798,431**	**1,042,071**
Source of Funds			
COE	**83.7%**	**83.7%**	**83.7%**
ODFW	**16.25%**	**16.25%**	**16.25%**
Program Production (lb)	25,556	25,556	25,556
Total Production (lb)	287,520	283,571	308,3181
Program as Percent of Total	9.5	9	8
Program Costs	**$89,686**	**$71,859**	**$83,366**

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