LITTLE WHITE SALMON HATCHERY

A COMPILATION AND SUMMARY OF IHOT AUDITS FOR SPRING CHINOOK, FALL CHINOOK, AND COHO

JULY 1998

HATCHERY EVALUATION REPORT
SUMMARY FOR

Little White Salmon NFH
- **Spring Chinook**
- **Fall Chinook (URB)**
- **Coho**

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

SUMMARY REPORT PREPARD BY:
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CONTENTS

Section 1

Executive Summary

This report compiles a summary of the findings of three separate Hatchery Evaluation Reports for Spring Chinook, Fall Chinook -Up River Bright (URB), and Coho at Little White Salmon National Fish 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 Little White Salmon River approximately 12 miles east of Stevenson, Washington and operated by the US Fish and Wildlife Service. The hatchery is situated just above Drano Lake, a water body where the Little White Salmon joins the Columbia River. The hatchery is used for adult collection, incubation, and rearing of spring chinook and URB Fall Chinook and the collection, spawning, and incubation coho.

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.

Little White Salmon NFH - Spring Chinook, Fall Chinook, and Coho Results

The Little White Salmon facility includes four ponds for adult holding, 52 concrete raceways of various sizes, 10 starter tanks, and incubation facilities. The hatchery was originally constructed in 1989 and was remodeled and expanded in 1958. It currently operates as part of the Columbia River Fisheries Development Program (Mitchell Act) - a program to provide for the conservation of Columbia River fish resources.

SPRING CHINOOK

The Little White Salmon NFH - Spring Chinook 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. The audit found that the hatchery was not in compliance with the rearing temperature criteria, water quality monitoring requirements, predation control criteria, and pathology-free water criteria, which are all facilities requirements. The hatchery exceeds its density criteria for rearing and needed more early rearing and rearing volume. The hatchery needed to develop a smoltification goal, a smoltification monitoring program and specific incubation and rearing standards for the IHOT Operations Plan. The hatchery was not in compliance with all the feed preparation, transportation, and alarms requirements. The hatchery did not have a Genetics Monitoring and Evaluation Program.

The specific areas in which the Little White Salmon NFH - 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:

- Develop approved genetics M&E program
- Develop smoltification goal and monitor
- Develop specific incubation and early rearing standards for IHOT Operations Plan
- Expand early rearing space to accommodate 190 additional nursery tanks
- Follow IHOT incubation loading and flow criteria or revise criteria
- Follow IHOT protocols for disinfection of transport vehicle interiors and exteriors
- Follow IHOT requirements for checking flow alarms daily
- Monitor DO and TGP and record
- Provide disease-free water for incubation and early rearing (4,700 gpm)
- Provide covers for raceways 1-10 and old brood ponds (200,000 sf)
- Review IHOT criteria for rearing temperature
- Run analysis for water chemistry, 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.

FALL CHINOOK (URB)

The Little White Salmon NFH - URB Fall Chinook program was in general compliance with most of the performance measures. The audit found that the hatchery was not in compliance with the rearing temperature criteria, water quality monitoring requirements, predation control criteria, and pathology-free water criteria, which are all facilities requirements. The hatchery exceeds its density criteria for rearing and needed more rearing volume. The hatchery needed to develop a smoltification goal, a smoltification monitoring program and specific incubation and rearing standards for the IHOT Operations Plan. The hatchery was not in compliance with all the feed preparation, transportation, and alarms requirements. The hatchery did not have a Genetics Monitoring and Evaluation Program.

The specific areas in which the Little White Salmon NFH - URB Fall 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:

- Construct 6 additional 1,159 cf raceways
- Develop approved genetics M&E program
- Develop smoltification goal and monitor
- Develop specific incubation and early rearing standards for IHOT Operations Plan
- Follow IHOT incubation loading and flow criteria or revise criteria
- Follow IHOT protocols for disinfection of transport vehicle interiors and exteriors
- Follow IHOT requirements for checking flow alarms daily
- Monitor DO and TGP and record
- Provide covers for raceways 1-10 and old brood ponds (200,000 sf)
- Provide disease-free water for incubation and early rearing (4,700 gpm)
- Resolve conflict between IHOT and PAC production goals
- Review IHOT criteria for rearing temperature
- Run analysis for water chemistry, 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.

COHO

The Little White Salmon 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. The audit found that the hatchery was not in compliance with the water quality monitoring requirements and pathology-free water criteria, which are all facilities requirements. The hatchery was not meeting the IHOT incubation standards and needed to develop specific incubation standards for the IHOT Operations Plan The hatchery was not in compliance with all the alarms requirements. The hatchery did not have a Genetics Monitoring and Evaluation Program.

The specific areas in which the Little White Salmon 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 program

- Develop specific incubation standards for IHOT Operations Plan
- Follow IHOT incubation loading and flow criteria or revise criteria
- Follow IHOT requirements for checking flow alarms daily
- Monitor DO and TGP and record
- Provide disease-free water for incubation and early rearing (4,700 gpm)
- Run analysis for water chemistry, 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.

Section 2

Facility Description

Name: Little White Salmon National Fish Hatchery

Stock/Species: Coho
Spring Chinook
URB Fall Chinook

Operating Agency: U.S. Fish and Wildlife Service

Funding Agency: Mitchell Act (NMFS)

Location: The hatchery is located on the Little White Salmon River approximately 12 miles east of Stevenson, Washington. The hatchery is situated just above Drano Lake, a water body where the Little White Salmon joins the Columbia River.

Address: 56961 SR 14
Cook, WA 98605

Hatchery Manager: Mr. Speros Doulos

Phone: (509) 538-2755
Fax:

Purpose: The hatchery was originally constructed in 1896, began operations in 1898, and was remodeled and expanded in 1958. It currently operates as part of the Columbia River Fisheries Development Program (Mitchell Act) - a program to provide for the conservation of Columbia River fish resources.

Production Goal:

Spring Chinook

Produce 1.5 million fish for on-station release.

URB Fall Chinook

Produce 1.7 million subyearling smolts for on-station release.

Produce 3.7 million subyearling smolts for release above John Day Dam.

Coho

Collect, spawn adults, and incubate eggs to produce 2.5 million coho smolts at Willard Hatchery

Water Supply: Water rights total 33,868 gpm from the Little White Salmon River and springs. Water use for fish production ranges from 11,221 gpm to 28,232 gpm. The river supplies most of this water flow. A water re-use system was constructed in 1967 for egg incubation.

Facilities:

Adult Holding:	2 concrete brood ponds - 16,200 cf each
	2 concrete brood ponds - 5,188 cf each
Incubation:	24 full stacks of vertical tray incubator (360 trays)
Early Rearing:	10 fiberglass starter tanks - 135 cf each
Raceways:	52 concrete raceways of various sizes - 74,538 cf total volume
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 Little White Salmon NFH - Spring Chinook, Fall Chinook (URB), and Coho

This section presents the corrective actions required to bring the Little White Salmon NFH - Spring Chinook, Fall Chinook (URB), and Coho 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, 3b, and 3c).

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 Little White Salmon NFH - 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		
Increase adult returns	----	4c
Type 2 - Remedial actions requiring changes in agency policies or procedures		
Review IHOT criteria for rearing temperature	----	5a
Follow IHOT requirements for checking flow alarms daily	----	6
Install security alarms	----	6
Develop specific incubation and early rearing standards for IHOT Operations Plan	----	18
Follow IHOT incubation loading and flow criteria or revise criteria	----	18
Develop smoltification goal and monitor	----	22a1
Follow IHOT protocols for disinfection of transport vehicle interiors and exteriors	----	23
Develop approved genetics M&E program	----	43
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Monitor DO and TGP and record	----	5a
Run analysis for water chemistry, turbidity, alkalinity, hardness, nitrite, and contaminants	----	5c-5g

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

Remedial Action Required	Cost	PMs[1]
Type 4 - Remedial actions requiring significant capital expenditures		
Provide disease-free water for incubation and early rearing (4,700 gpm)	$2.7 million	5h, 28
Expand early rearing space to accommodate 190 additional nursery tanks	$2.75 million	9, 19
Provide covers for raceways 1-10 and old brood ponds (200,000 sf)	$300,000	11
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
None	----	

Table 3b. Remedial Actions Required at Little White Salmon NFH - URB Fall Chinook

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		
Type 2 - Remedial actions requiring changes in agency policies or procedures		
Resolve conflict between IHOT and PAC production goals	----	4h
Review IHOT criteria for rearing temperature	----	5a
Follow IHOT requirements for checking flow alarms daily	----	6
Install security alarms	----	6
Develop specific incubation and early rearing standards for IHOT Operations Plan	----	18
Follow IHOT incubation loading and flow criteria or revise criteria	----	18
Develop smoltification goal and monitor	----	22a1
Follow IHOT protocols for disinfection of transport vehicle interiors and exteriors	----	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]
Develop approved genetics M&E program	----	43
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Monitor DO and TGP and record	----	5a
Run analysis for water chemistry, turbidity, alkalinity, hardness, nitrite, and contaminants	----	5c-5g

Remedial Action Required	Cost	PMs[1]
Type 4 - Remedial actions requiring significant capital expenditures		
Provide disease-free water for incubation and early rearing (4,700 gpm)	$2.7 million	5h, 28
Construct 6 additional 1,159 cf raceways	$200,000	9, 19
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
None	----	

Table 3c. Remedial Actions Required at Little White Salmon NFH - Coho

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		
Increase adult returns	----	4c
Type 2 - Remedial actions requiring changes in agency policies or procedures		
Follow IHOT requirements for checking flow alarms daily	----	6
Install security alarms	----	6
Develop specific incubation standards for IHOT Operations Plan	----	18
Follow IHOT incubation loading and flow criteria or revise criteria	----	18
Develop approved genetics M&E program	----	43
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Monitor DO and TGP and record	----	5a
Run analysis for water chemistry, turbidity, alkalinity, hardness, nitrite, and contaminants	----	5c-5g

[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[1]
Type 4 - Remedial actions requiring significant capital expenditures Provide disease-free water for incubation and early rearing (4,700 gpm)	$2.7 million	5h, 28
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time None	----	

[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 Little White Salmon NFH - Spring Chinook, Fall Chinook (URB), and Coho programs contribution of adult fish to fisheries, local fisheries, spawning grounds, and hatcheries (Tables 4a, 4b, and 4c). 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: Little White Salmon NFH - 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					
1985					
1986					
1987					
1988	2,385		2,441	4,826	1.05
1989	1,126		1,019	2,145	0.21
1990					
1991					

[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.

1992					

Table 4b. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries: Little White Salmon NFH - URB Fall 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	8,010	---	1,069	9,079	0.98
1984	16,605	1,827	2,175	20,607	1.97
1985	3,439	479	785	4,703	0.40
1986					
1987					
1988	3,275	225	1,027	4,527	0.31
1989					
1990					
1991					
1992					

Table 4c. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries: Little White Salmon NFH - Coho

Year	Fisheries[3] (Broodyear)	Spawning Grounds[1] (Broodyear)	Hatchery[1] (Broodyear)	Total Combined Contribution[4] (Broodyear)	Smolt to Adult Survival (percent)

[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.
[3] Data obtained from Missing Production Groups Annual Report or from the Regional Mark Information System database.
[4] Total combined adult contribution; presented when it is not possible to subdivide the contribution into fisheries, spawning grounds, and hatchery contributions.

1983					
1984					
1985					
1986					
1987					
1988	See Willard Hatchery	See Willard Hatchery	See Willard Hatchery	See Willard Hatchery	See Willard Hatchery
1989	See Willard Hatchery	See Willard Hatchery	See Willard Hatchery	See Willard Hatchery	See Willard Hatchery
1990	See Willard Hatchery	See Willard Hatchery	See Willard Hatchery	See Willard Hatchery	See Willard Hatchery
1991	See Willard Hatchery	See Willard Hatchery	See Willard Hatchery	See Willard Hatchery	See Willard Hatchery
1992					

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 Little White Salmon NFH are presented in Table 5 by program. The detailed breakdown of program expenditures for spring chinook, fall chinook, and coho at this hatchery are presented in separate tables (Tables 6a, 6b, and 6c).

Table 6. Annual Operating Expenses - Little White Salmon NFH

Program	1994	1995	1996
1. Spring Chinook	$323,058	$266,574	$231,096
2. URB Fall Chinook	$126,800	$115,828	$196,604
3. Coho (Willard)	$357,787	$496,272	$434,599
4.			
5.			
Total Hatchery Costs	**$807,646**	**$851,675**	**$862,300**

Table 6a. Detailed Expenditures at Little White Salmon NFH by Program

Spring Chinook

Component	1994	1995	1996
Personnel Costs	$503,436	$492,700	$478,159
Operational Costs	$304,210	$358,975	$384,141
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs[1]			
Lumped Third-Party Costs			
Total Hatchery Costs	**$807,646**	**$851,675**	**$862,300**
Source of Funds			
NMFS	**100%**	**100%**	**100%**
Program Production (lb)	95,188	64,149	48,661
Total Production (lb)	237,747	204,728	181,600
Program as Percent of Total	40.0	31.3	26.8
Program Costs	**$323,058**	**$266,574**	**$231,096**

[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 Little White Salmon NFH by Program

URB Fall Chinook

Component	**1994**	**1995**	**1996**
Personnel Costs	$503,436	$492,700	$478,159
Operational Costs	$304,210	$358,975	$384,141
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs[1]			
Lumped Third-Party Costs			
Total Hatchery Costs	**$807,646**	**$851,675**	**$862,300**
Source of Funds			
NMFS	**100%**	**100%**	**100%**
Program Production (lb)	37,255	27,856	41,479
Total Production (lb)	237,747	204,728	181,600
Program as Percent of Total	15.7	13.6	22.8
Program Costs	**$126,800**	**$115,828**	**$196,604**

[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 Little White Salmon NFH by Program

Coho (Willard)

Component	1994	1995	1996
Personnel Costs	$503,436	$492,700	$478,159
Operational Costs	$304,210	$358,975	$384,141
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs[1]			
Lumped Third-Party Costs			
Total Hatchery Costs	**$807,646**	**$851,675**	**$862,300**
Source of Funds			
NMFS	**100%**	**100%**	**100%**
Program Production (lb)	105,304	112,723	91,460
Total Production (lb)	237,747	204,728	181,600
Program as Percent of Total	44.3	55.1	50.4
Program Costs	**$357,787**	**$496,272**	**$434,599**

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