
DWORSHAK HATCHERY

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

JULY 1998

**HATCHERY EVALUATION REPORT
SUMMARY FOR**

**Dworshak NFH
- Spring Chinook**

**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 three separate Hatchery Evaluation Reports for Spring Chinook and Summer Steelhead at Dworshak 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 at the confluence of the North Fork Clearwater River and the main stem Clearwater River near Ahsahka in northcentral Idaho. The hatchery is operated by the US Fish and Wildlife Service and is used for adult collection, incubation, and rearing of 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.

Dworshak NFH - Spring Chinook and Summer Steelhead Results

The Dworshak NFH facility includes four ponds for adult holding, 128 nursery tanks, 84 Burrow's rearing ponds, 42 raceways, and incubation facilities. The hatchery was constructed to mitigate for fish losses caused by construction of Dworshak Dam on the North Fork Clearwater River and hydroelectric facilities on the lower Snake River.

SPRING CHINOOK

The Dworshak NFH 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 screen approach criteria, adult holding facilities, rearing facilities, release facilities, water chemistry monitoring, alkalinity criteria, hardness criteria, and pathology-free water criteria, which are all facilities requirements. The hatchery exceeds its flow and density criteria for rearing, size at release, and disinfection protocols. In the compliance area for fish health policy, the hatchery was not following IHOT protocols for foot baths and did not maintain summaries of all diagnostic cases by fish lots. The hatchery did not have a broodstock collection plan or Genetics Monitoring and Evaluation Program in place.

The specific areas in which the Dworshak 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 broodstock collection plan
- Develop disease-free water supply
- Develop genetics and monitoring evaluation program
- Develop incubation standards for IHOT Operation Plan
- Develop rearing standards for IHOT Operation Plan
- Develop smoltification goal and monitoring program
- Develop summary of all diagnostic cases by fish lot
- Extend release pipe into the river to reduce stress
- Follow IHOT equipment and rain gear disinfection protocols
- Follow IHOT equipment disinfection protocols
- Follow IHOT foot bath protocols
- Improve green-egg to eyed egg survival
- Increase alkalinity and hardness
- Install solids removal system for Burrow's Ponds
- Insulate feed hoppers and bulk storage facilities
- Modify adult holding ponds to reduce adult mortality
- Modify intake to reduce approach velocity or reduce flow
- Reduce growth rate of fish (or water temperature), fish too large
- Reduce the number of eggs retained by representative sampling of each male/female cross (when needed)
- Review published information on adult contribution
- Run analysis for missing water chemistry parameters

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

SUMMER STEELHEAD

The Dworshak NFH 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 screen approach criteria, adult holding facilities, rearing facilities, release facilities, water chemistry monitoring, alkalinity criteria, hardness criteria, and pathology-free water criteria, which are all facilities requirements. The hatchery exceeds its density criteria for early rearing, size at release, and disinfection protocols. In the compliance area for fish health policy, the hatchery was not following IHOT protocols for footbaths and did not maintain summaries of all diagnostic cases by fish lots. The hatchery did not have a broodstock collection plan or Genetics Monitoring and Evaluation Program in place.

The specific areas in which the Dworshak NFH - 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:

- Develop broodstock collection plan
- Develop disease-free water supply
- Develop genetics and monitoring evaluation program
- Develop incubation standards for IHOT Operation Plan
- Develop rearing standards for IHOT Operation Plan
- Develop smoltification goal and monitoring program
- Develop summary of all diagnostic cases by fish lot
- Ensure the COE is following IHOT transportation procedures
- Extend release pipe into the river to reduce stress
- Follow IHOT criteria for female:male ratio
- Follow IHOT equipment and rain gear disinfection protocols
- Follow IHOT equipment disinfection protocols
- Follow IHOT footbath protocols
- Follow IHOT incubation standards for loading
- Improve fry- to- smolt survival
- Improve green-egg to eyed egg survival
- Increase alkalinity and hardness
- Increase flow to adult holding or reduce the number of adults held
- Install 64 additional nursery tanks
- Install solids removal system for Burrow's ponds
- Insulate feed hoppers and bulk storage facilities
- Modify adult holding ponds to reduce adult mortality
- Modify intake to reduce approach velocity or reduce flow
- Reduce the number of eggs retained by representative sampling of each male/female cross (when needed)
- Review published information on adult contribution
- Run analysis for missing water chemistry parameters
- Upgrade bird netting for Burrow's Ponds

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: Dworshak National Fish Hatchery

Stock/Species: Spring Chinook
Spring Chinook (Kooskia Stock)
Summer Steelhead
Rainbow Trout

Operating Agency: U.S. Fish and Wildlife Service

Funding Agencies: Lower Snake River Compensation Program
U.S. Fish & Wildlife Service
U.S. Army Corps of Engineers

Location: At the confluence of the North Fork Clearwater River and the main stem Clearwater River near Ahsahka in northcentral Idaho.

Address: Dworshak/Kooskia National Fish Hatchery
U.S. Fish and Wildlife Service
P.O. Box 18, State Highway 7
Ahsahka, ID 83520-0018

Hatchery Manager: Mr. William Miller

Phone: (208) 476-4591

Fax:

Purpose: Dworshak NFH began operations in 1969 rearing summer steelhead and resident trout. Additional construction was completed in 1982 under the Lower Snake River Compensation Program (LSRCP). The purpose of the hatchery is to mitigate for loss of summer steelhead and resident trout habitat after the construction of Dworshak Dam on the North Fork of the Clearwater River. Spring chinook production is to mitigate for dams constructed on the lower Snake River.

Production Goal:

Summer Steelhead (B-Strain)

1.2 million yearling smolts (5.7/lb) for on-station release

1.1 million yearling smolts (5.7/lb) for off-station release

Spring Chinook

1.1 million yearling smolts (20/lb) for on-station release

Spring Chinook (Kooskia Stock)

Holding of adults, spawning, and incubation to green-eggs only

Rainbow Trout

200,000 fish (20/lb)

Total production 459,000 lb/year

Water Supply:

Clearwater River (90,000 gpm)

Pipeline from Dworshak Reservoir to incubation and early rearing (YYY gpm)

Facilities:

Adult Holding:	4 adult holding raceways - 8,815 cf each
Incubation:	58 16-tray vertical tray incubators (928 trays)
Early Rearing:	128 nursery tanks - 90 cf each
Raceways:	84 Burrow's Ponds - 3,000 cf each
	42 raceways - 1400 cf each
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 Dworshak NFH - Spring Chinook and Summer Steelhead

This section presents the corrective actions required to bring the Dworshak NFH - 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 ($\pm 40\%$).

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.

Type 4 - Remedial actions requiring significant capital expenditures		
Extend release pipe into the river to reduce stress	\$150,000	13
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Modify adult holding ponds to reduce adult mortality	----	4b
Improve green-egg to eyed egg survival	----	4d
Increase alkalinity and hardness	----	5e, 21, 29
Insulate feed hoppers and bulk storage facilities	----	12
Develop disease-free water supply	----	5h, 21, 28
Install solids removal system for Burrow's Ponds	----	14

Table 3b. Remedial Actions Required at Dworshak NFH - Summer Steelhead

Remedial Action Required	Cost	PMs¹
Type 1 - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery		
Improved adult returns	----	4h
Type 2 - Remedial actions requiring changes in agency policies or procedures		
Review published information on adult contribution	----	4a
Install security system	----	6
IHOT requires outside security systems and buzzers	----	6
Ensure the COE is following IHOT transportation procedures	----	15,23
Follow IHOT criteria for female:male ratio	----	17
Develop incubation standards for IHOT Operation Plan	----	18
Follow IHOT incubation standards for loading	----	18
Develop rearing standards for IHOT Operation Plan	----	19
Develop smoltification goal and monitoring program	----	22a1, 36
Follow IHOT equipment disinfection protocols	----	23

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

Remedial Action Required	Cost	PMS¹
Follow IHOT footbath protocols	----	28
Follow IHOT equipment and rain gear disinfection protocols	----	28
Develop summary of all diagnostic cases by fish lot	----	31
Develop broodstock collection plan	----	41
Reduce the number of eggs retained by representative sampling of each male/female cross (when needed)	----	42
Develop genetics and monitoring evaluation program	----	43
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Run analysis for missing water chemistry parameters	----	5c, 21,29

Type 4 - Remedial actions requiring significant capital expenditures		
Install 64 additional nursery tanks	\$1,000,000	9,19,21
Modify intake to reduce approach velocity or reduce flow	\$1,500,000	10
Upgrade bird netting for Burrow's Ponds	\$150,000	11
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Modify adult holding ponds to reduce adult mortality	----	4b
Improve green-egg to eyed-egg survival	----	4d
Improve fry-to-smolt survival	----	4e
Increase alkalinity and hardness	----	5e, 21, 29
Develop disease-free water supply	----	5h, 21, 28
Increase flow to adult holding ponds or reduce the number of adults held	----	7
Insulate feed hoppers and bulk storage facilities		12
Extend release pipe into the river to reduce stress	----	13
Install solids removal system for Burrow's ponds	----	14

Hatchery Contribution to Fisheries, Spawning Grounds, and Hatcheries

This section presents the audit findings for the Dworshak NFH - Spring Chinook and Summer 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:
Dworshak NFH - Spring Chinook**

Year	Fisheries ¹ (Broodyear)	Spawning Grounds ¹ (Broodyear)	Hatchery ¹ (Broodyear)	Total Combined Contribution ¹ (Broodyear)	Smolt to Adult Survival (percent)
1981					
1982					
1983					
1984					
1985					
1986					
1987					
1988	232	0	617		0.071
1989					
1990					
1991					
1992					

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

¹ 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:
Dworshak NFH - Summer Steelhead**

Year	Fisheries¹ (Broodyear)	Spawning Grounds¹ (Broodyear)	Hatchery¹ (Broodyear)	Total Combined Contribution¹ (Broodyear)	Smolt to Adult Survival (percent)
1981					
1982					
1983					
1984					
1985					
1986	17,316	--	5,973		1.93
1987	7,646	--	4,528		0.95
1988	3,312	--	2,152		0.51
1989	6,047		4,566		0.91
1990					
1991					
1992					

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

¹ 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 Dworshak NFH are presented in Table 5 by program. The detailed breakdown of program expenditures for spring chinook and summer steelhead at this hatchery is presented in separate tables (Tables 6a and 6b).

Table 5. Annual Operating Expenses - Dworshak NFH

Program	1994	1995	1996
1. Spring Chinook	\$407,000	\$334,000	\$337,000
2. Summer Steelhead	1,360,130	\$1,448,600	\$1,441,911
3. Rainbow Trout	\$10,000	\$10,000	\$10,000
4. Spring Chinook (Kooskia stock)	Information Not Provided	Information Not Provided	Information Not Provided
5.			
Total Hatchery Costs	\$1,777,130	\$1,792,600	\$1,788,911

Table 6a. Detailed Expenditures at Dworshak NFH by Program
Spring Chinook

Component	1994	1995	1996
Personnel Costs	\$185,000	\$192,000	\$185,000
Operational Costs	\$222,000	\$113,000	\$115,000
Capital Costs	0	\$29,000	\$37,000
Indirect Costs	0	0	0
Lumped Hatchery Costs ¹			
Lumped Third-Party Costs			
Total Hatchery Costs	\$407,000	\$334,000	\$337,000
Source of Funds			
LSRCP, COE, USF&WS	100%	100%	100%
Program Production (lb)	--	--	--
Total Production (lb)	--	--	--
Program as Percent of Total	24%	19%	19%
Program Costs	\$407,000	\$334,000	\$337,000

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 Dworshak NFH by Program

Summer Steelhead

Component	1994	1995	1996
Personnel Costs ¹	\$690,000	\$700,000	\$725,000
Operational Costs	\$365,440	\$394,320	\$461,000
Capital Costs	\$75,400	\$117,000	\$40,000
Indirect Costs	\$113,000	\$137,280	\$115,191
Lumped Hatchery Costs ²			
Lumped Third-Party Costs	\$100,000	\$100,000	\$100,000
Total Hatchery Costs	\$1,777,130	\$1,792,600	\$1,788,991
Source of Funds			
LSRCP, COE, USF&WS	100%	100%	100%
Program Production (lb)	--	--	--
Total Production (lb)	--	--	--
Program as Percent of Total	76%	81%	81%
Program Costs	1,360,130	\$1,448,600	\$1,441,911

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¹ Rainbow program costs of \$10,000/year included with summer steelhead program; rainbow costs assigned to personnel cost component

² When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.