
OXBOW HATCHERY

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

JULY 1998

**HATCHERY EVALUATION REPORT
SUMMARY FOR**

- Oxbow Hatchery**
- **Summer Steelhead**
- **Spring Chinook**

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

SUMMARY REPORT PREPARED BY:
DON SAMPSON
SAMPSEL CONSULTING SERVICES
FOR THE
NORTHWEST POWER PLANNING COUNCIL
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Original IHOT Audit Reports Prepared by:

Montgomery Watson
2375 130th Avenue NE
Suite 200
Bellevue, WA 98005
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CONTENTS

Section 1 Executive Summary	1
Section 2 Facility Description	4
Section 3 Remedial Actions	6
Section 4 Hatchery Contribution to Fisheries, Spawning Grounds and Hatcheries	11
Section 5 Annual Operating Expenditures	13

Executive Summary

This report compiles a summary of the findings of two separate Hatchery Evaluation Reports for Spring Chinook and Summer Steelhead at Oxbow 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 in Oregon near the Oxbow hydroelectric facility on the Snake River and is operated by the Idaho Department of Fish and Game. The hatchery is used for adult collection of Spring Chinook and adult collection, spawning, and incubation of Summer 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) was contracted along with Montgomery Watson to complete the hatchery audit.

IHOT has established five basic policies that cover: (1) hatchery coordination, (2) hatchery performance standards, (3) fish health, (4) ecological interaction, and (5) genetics. The audit focuses on all these policies, with the exception of hatchery coordination. These policies are set forth in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995)*, which is the source for the performance measures that are the basis of this audit.

The Audit Process

The audit was based on the facility management's response to a 109-page questionnaire. This audit form was completed through a five-step process in which:

- Information was obtained from headquarters.
- The hatchery manager was asked to fill out and return the audit form.
- A 1-2 day site audit visit was conducted to inspect facilities, review hatchery records, discuss audit form responses, and develop remedial action plans.
- A compliance report was developed to document the compliance status of each performance measure. This report was then shared with the hatchery manager and IHOT representative.
- This hatchery evaluation report was written to document compliance with IHOT performance measures and develop cost estimates for remedial actions when needed.

Oxbow Hatchery - and Spring Chinook Results

The Oxbow River facility includes four ponds for adult holding, 6 concrete raceways, and incubation facilities. Oxbow Hatchery began operating in 1962 as part of the Idaho Power's mitigation for fishery losses caused by construction of hydroelectric dams on the Snake River in Hells Canyon.

Summer Steelhead

The Oxbow Hatchery - Summer Steelhead program was in compliance with most of the performance measures. In the area of program objectives, the hatchery did not have a Monitoring and Evaluation Plan in place and was not meeting its adult return goal. The audit found that the hatchery was not in compliance with the screen approach criteria, turbidity criteria, water chemistry and contaminant monitoring requirements, and alarm facilities, which are all facilities requirements. The hatchery was not in compliance with the requirement to rear or acclimate smolts in the subbasin.

The specific areas in which the Oxbow 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 (or document) fisheries contribution studies
- Construct acclimation ponds at Oxbow Hatchery
- Determine if Idaho Power follows IHOT transport protocols
- Develop alarm log
- Develop annual training schedule
- Develop hatchery monitoring and evaluation plan
- Develop genetics M&E program for IHOT
- Document adult contribution
- Install flow and security alarms
- Install intake screening system
- Monitor DO and TGP

- Provide Rearing in the subbasin
- Review iron data and iron criteria
- Review pH data and pH criteria
- Review release strategy as it relates to the overall program
- Run analysis for contaminants (river)
- Run analysis for missing water chemistry parameters (wells and river)
- Run analysis for nitrite (river)
- Run analysis for turbidity (river)

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

Spring Chinook

The Oxbow Hatchery - Spring Chinook program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery did not have a Monitoring and Evaluation Plan in place and was not meeting its adult return goal. The audit found that the hatchery was not in compliance with the turbidity criteria, water chemistry and contaminant monitoring requirements, and alarm facilities, which are all facilities requirements. The hatchery was not in compliance with the requirement to rear or acclimate smolts in the subbasin.

The specific areas in which the Oxbow 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 (or document) fisheries contribution studies
- Consider installation of flow alarms
- Construct acclimation ponds at Oxbow Hatchery
- Determine if Idaho Power follows IHOT transport protocols
- Develop alarm log
- Develop annual training schedule
- Develop hatchery monitoring and evaluation plan
- Document adult contribution
- Follow IHOT protocols for disinfection of the interior and exterior of transport vehicles
- Install intake screening system
- Monitor DO and TGP
- Provide rearing in the subbasin
- Review iron data and iron criteria
- Review pH data and pH criteria
- Run analysis for contaminants
- Run analysis for missing water chemistry parameters
- Run analysis for nitrite
- Run analysis for turbidity
- Verify that adequate transport systems are available

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

Facility Description

Name:	Oxbow Hatchery
Stock/Species:	Spring Chinook Summer Steelhead
Operating Agency:	Idaho Department of Fish & Game
Funding Agency:	Idaho Power
Location:	Located in Oregon near the Oxbow hydroelectric facility on the Snake River. The facility is 1,689 feet above sea level.
Address:	Oxbow Hatchery Idaho Department of Fish & Game Box 200 Oxbow, OR 97840
Hatchery Manager:	Ms. Julie Hislop
Phone:	(541) 785-3459
Fax:	
Purpose:	Oxbow Hatchery began operating in 1962 as part of the Idaho Power's mitigation for fishery losses caused by construction of hydroelectric dams on the Snake River in Hells Canyon.
Production Goal:	Summer Steelhead Trap and spawn adult steelhead; incubate eggs to the eyed stage for transfer to other hatcheries. Rear available excess steelhead eggs to the fry stage for release in the Snake and Salmon River basins. Spring Chinook Trap and hold returning adults for eventual transfer to the Rapid River Hatchery.
Water Supply:	Water used at Oxbow Hatchery is obtained by pumping it from either the Snake River or an on-site well. The two production pumps produce approximately 6,750 gpm and the two wells produce a total of 200 gpm.

Facilities:

Adult Holding:	4 adult holding ponds
Incubation:	24 double stack vertical tray incubators
Early Rearing:	None used
Raceways:	6 raceways (not used)
Rearing Ponds:	
Satellite Facilities:	

Remedial Actions

Based on the compliance status for each performance measure, remedial actions were developed. The required remedial actions are organized into five categories. The categories range from those actions that are beyond human control, to those that require a change in agency policy or procedures, to those that involve a significant capital cost to put in place. The following are the five types of remedial actions identified under phase 1 of the audit:

Table 2. The Five Types of Remedial Actions

Type	Description
1	Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery
2	Remedial actions requiring changes in agency policies or procedures
3	Remedial actions requiring changes in monitoring coverage or interval
4	Remedial actions requiring significant capital expenditures
5	Remedial actions that may require significant capital expenditures but are not clearly definable at this time

Remedial Actions at Oxbow Hatchery - Summer Steelhead and Spring Chinook

This section presents the corrective actions required to bring the Oxbow Hatchery - Summer Steelhead program 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 Oxbow Hatchery - Summer Steelhead

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>Improve adult returns</p>	----	17, 41, 35, 41, 42
<p>Type 2 – Remedial actions requiring changes in agency policies or procedures</p> <p>Develop hatchery monitoring and evaluation plan</p> <p>Document adult contribution</p> <p>Determine if Idaho Power follows IHOT transport protocols</p> <p>Conduct (or document) fisheries contribution studies</p> <p>Develop annual training schedule</p> <p>Review release strategy as it relates to the overall program</p> <p>Develop genetics M&E program for IHOT</p>	<p>----</p> <p>----</p> <p>----</p> <p>----</p> <p>----</p> <p>----</p> <p>----</p>	<p>3</p> <p>4a</p> <p></p> <p>24</p> <p>25</p> <p>22c</p> <p>43</p>
<p>Type 3 – Remedial actions requiring changes in monitoring coverage or interval</p> <p>Monitor DO and TGP</p> <p>Run analysis for missing water chemistry parameters (wells and river)</p> <p>Run analysis for turbidity (river)</p> <p>Run analysis for nitrite (river)</p> <p>Run analysis for contaminants (river)</p>	<p>----</p> <p>----</p> <p>----</p> <p>----</p> <p>----</p>	<p>5b</p> <p>5b</p> <p>5d</p> <p></p> <p></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 flow and security alarms	\$10,000	6
Develop alarm log	\$1,000	6
Install intake screening system	\$70,000 - \$100,000	10
Construct acclimation ponds near area of release		22b
1 acclimation pond @ \$1,000,000 per site	\$1,000,000	
Type 5 – Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Review pH data and pH criteria	----	5c
Review iron data and iron criteria	----	5c
Provide rearing in the subbasin	----	22b

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

Table 3b. Remedial Actions Required at Oxbow 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>Improve adult returns</p>	----	41
<p>Type 2 – Remedial actions requiring changes in agency policies or procedures</p> <p>Develop hatchery monitoring and evaluation plan</p> <p>Document adult contribution</p> <p>Verify that adequate transport systems are available</p> <p>Follow IHOT protocols for disinfection of the interior and exterior of transport vehicles</p> <p>Determine if Idaho Power follows IHOT transport protocols</p> <p>Conduct (or document) fisheries contribution studies</p> <p>Develop annual training schedule</p>	----	<p>3</p> <p>4a</p> <p>15</p> <p>23</p> <p>24</p> <p>25</p>
<p>Type 3 – Remedial actions requiring changes in monitoring coverage or interval</p> <p>Monitor DO and TGP</p> <p>Run analysis for missing water chemistry parameters</p> <p>Run analysis for turbidity</p> <p>Run analysis for nitrite</p> <p>Run analysis for contaminants</p>	----	<p>5b</p> <p>5b</p> <p>5d</p> <p>5g</p> <p>5h</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		
Consider installation of flow alarms	\$10,000	6
Develop alarm log	\$1,000	6
Install intake screening system	\$70,000 - \$100,000	10
Construct acclimation ponds near release area 1 acclimation pond @ \$1,000,000 per site	\$1,000,000	22b
Type 5 – Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Review pH data and pH criteria	----	5c
Review iron data and iron criteria	----	5c
Provide rearing in the subbasin	----	22b

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 Oxbow Hatchery - Summer Steelhead and Spring Chinook programs contribution of adult fish to fisheries, local fisheries, spawning grounds, and hatcheries (Tables 4a and 4b). Data is reported by broodyear. A broodyear refers to the adult contribution from the eggs produced from a single group of spawning adults. For some species, this may include fish caught as 2-, 3-, 4-, 5-, and 6-year old fish. Because of the return distribution and data processing delays, the complete adult contribution for a given broodyear may not be available until 4 to 5 years after the fish have been released from the hatchery.

**Table 4a. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries:
Oxbow Hatchery - Summer Steelhead**

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	See Niagara Hatchery	See Niagara Hatchery	See Niagara Hatchery	See Niagara Hatchery	See Niagara Hatchery
1989	See Niagara Hatchery	See Niagara Hatchery	See Niagara Hatchery	See Niagara Hatchery	See Niagara Hatchery
1990	See Niagara Hatchery	See Niagara Hatchery	See Niagara Hatchery	See Niagara Hatchery	See Niagara Hatchery
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:
Oxbow Hatchery - Spring Chinook**

Year	Fisheries¹ (Broodyear)	Spawning Grounds¹ (Broodyear)	Hatchery¹ (Broodyear)	Total Combined Contribution² (Broodyear)	Smolt to Adult Survival (percent)
1981					
1982					
1983					
1984					
1985					
1986					
1987					
1988	See Rapid River Hatchery	See Rapid River Hatchery	See Rapid River Hatchery	See Rapid River Hatchery	See Rapid River Hatchery
1989	See Rapid River Hatchery	See Rapid River Hatchery	See Rapid River Hatchery	See Rapid River Hatchery	See Rapid River Hatchery
1990	See Rapid River Hatchery	See Rapid River Hatchery	See Rapid River Hatchery	See Rapid River Hatchery	See Rapid River Hatchery
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, 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 Oxbow Hatchery are presented in Table 5 by program. The detailed breakdown of the Summer Steelhead and Spring Chinook program expenditures at this hatchery are presented in separate tables (Tables 6a and 6b).

Table 5. Annual Operating Expenses - Oxbow Hatchery

Program	1993	1994	1995
1. Summer Steelhead	\$110,100	\$94,143	\$94,128
2. Spring Chinook	\$78,654	\$67,255	\$67,244
3.			
4.			
5.			
Total Hatchery Costs	\$188,754	\$161,398	\$161,372

Table 6a. Detailed Expenditures at Oxbow Hatchery by Program
Summer Steelhead

Component	1993	1994	1995
Personnel Costs			
Operational Costs			
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs ¹	\$188,754	\$161,398	\$161,372
Lumped Third-Party Costs			
Total Hatchery Costs			
Source of Funds			
	100%	100%	100%
Program Production (lb)			
Total Production (lb)			
Program as Percent of Total	58.33%	58.33%	58.33%
Program Costs	\$110,100	\$94,143	\$94,128

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 Oxbow Hatchery by Program
Spring Chinook**

Component	1993	1994	1995
Personnel Costs			
Operational Costs			
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs ¹	\$188,754	\$161,398	\$161,372
Lumped Third-Party Costs			
Total Hatchery Costs			
Source of Funds			
Idaho Power	100%	100%	100%
Program Production (lb)			
Total Production (lb)			
Program as Percent of Total	41.67%	41.67%	41.67%
Program Costs	\$78,654	\$67,255	\$67,244

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