

HATCHERY EVALUATION REPORT

**Oxbow Hatchery - Spring Chinook (Clackamas Stock)
December 1996**

Integrated Hatchery Operations Team (IHOT)

HATCHERY EVALUATION REPORT

Oxbow Hatchery - Spring Chinook (Clackamas Stock)

An Independent Audit Based on Integrated Hatchery Operations Team (IHOT) Performance Measures

Prepared by:

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

Prepared for:

U.S. Department of Energy
Bonneville Power Administration
Environment, Fish and Wildlife
P.O. Box 3621
Portland, OR 97208-3621

Project Number 95-2
Contract Number 95AC49468

December 1996

CONTENTS

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

List of Tables

Table

- 1 Summary Program Information for Oxbow Hatchery - Spring Chinook (Clackamas Stock)
- 2 Compliance with Performance Measures: Oxbow Hatchery - Spring Chinook (Clackamas Stock)
- 3 Remedial Actions Required at Oxbow Hatchery - Spring Chinook (Clackamas Stock)

- 4 Adult Contribution to Fisheries, Spawning Grounds and Hatcheries: Oxbow Hatchery - Spring Chinook (Clackamas Stock)
- 5 Annual Operating Expenses: Oxbow Hatchery - Spring Chinook (Clackamas Stock)
- 6 Annual Operating Expenses - Oxbow Hatchery

Executive Summary

This report presents the findings of the independent audit of the Oxbow Hatchery - Spring Chinook (Clackamas Stock) program. Oxbow Hatchery is located approximately 2 miles east of Cascade Locks, Oregon. Herman Creek Ponds, Lower Herman Creek Ponds, and Wahkeena Pond are operated as satellite facilities to Oxbow Hatchery. The hatchery is used for incubation and early rearing of Spring Chinook, Fall Chinook, and Coho.

The audit was 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.

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). 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)*. That document 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 - Spring Chinook (Clackamas Stock) Results

The Oxbow Hatchery includes 12 concrete raceways, incubation, and early rearing facilities. Oxbow Hatchery was originally constructed in 1913 to provide additional rearing facilities for Bonneville Hatchery. It was relocated to its present site in 1937 following construction of Bonneville Dam. Oxbow was operated as part of the Columbia River Fisheries Development Program (Mitchell Act) - a program to enhance declining fish runs in the Columbia River Basin.

The Oxbow Hatchery - Spring Chinook (Clackamas Stock) program was in general compliance with most of the performance measures. The audit found that the hatchery was not in compliance with the water quality monitoring requirements, needed double screen for a portion of the raceways, and needed bird netting for the raceways. The hatchery was not in compliance with the requirements for regional oversight of feed manufacturing, and needed to develop specific incubation and rearing standards. In the area of fish health, the hatchery was not using foot baths for the incubation facility.

The specific areas in which the Oxbow Hatchery - Spring Chinook (Clackamas Stock) 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 and maintain alarm log
- Develop specific rearing standards for the IHOT Operations Plan
- Develop specific incubation standards for the IHOT Operations Plan; review loading criteria for incubation
- Follow IHOT recommendations for regional oversight of feed production
- Install bird netting over raceways
- Install double screen on 12 raceways used for spring chinook

- Monitor and document DO and TGP levels
- Provide foot baths for incubation facility
- Review IHOT temperature criteria for rearing
- Run analysis for water chemistry parameters, alkalinity, hardness, nitrite, and contaminants

Non-compliance issues resulting from items beyond human control or Performance Measures not relevant to this hatchery (Type 1 in Table 3, Section 4 of this report) were not listed above.

Facility Description

Name: Oxbow Hatchery

Stock/Species: Coho - Tanner Creek Stock (Umatilla Releases)
Coho - Tanner Creek Stock (CEDC Releases)
Coho - Mixed Tanner Creek/Sandy River Stock (CEDC Releases)
Coho - Tanner Creek Stock (Bonneville Releases)
Spring Chinook (Clackamas Stock)

Operating Agency: Oregon Department of Fish & Wildlife
Funding Agency: Mitchell Act
Location: Oxbow Hatchery is located approximately 2 miles east of Cascade Locks, Oregon.

Address: Oxbow Fish Hatchery
Oregon Department of Fish & Wildlife
Star Route, Box 750
Cascade Locks, OR 97014

Hatchery Manager: Mr. Larry Dimmick

Phone: (541) 374-8540
Fax: (503) 374-8827

Purpose:

Oxbow Hatchery was originally constructed in 1913 to provide additional rearing facilities for Bonneville Hatchery. It was relocated to its present site in 1937 following construction of Bonneville Dam.

Oxbow was operated as part of the Columbia River Fisheries Development Program (Mitchell Act) - a program to enhance declining fish runs in the Columbia River Basin.

The goal of the hatchery is to produce coho and spring chinook that will contribute to the Northeast Pacific and Columbia River commercial, tribal, and sports fisheries.

Production Goal:**Coho**

Produce 2 million fingerlings (83,850 lb) at Upper Herman Creek for transfer to Bonneville

Produce 0.825 million fingerlings (at Lower Herman Creek Ponds (Tanner Creek Stock) for transfer to Lower Columbia River net pens

Produce 0.600 million fingerlings at Lower Herman Creek Ponds (Mixed Tanner Creek and Sandy River Stock) for transfer to Lower Columbia River net pens

Produce 500,000 smolts (33,300 lb) at Lower Herman Creek Ponds for release into the Umatilla River.

Spring Chinook

Produce 637,000 fingerlings (5,095 lb) for transfer to Clackamas Hatchery

Water Supply:

The hatchery obtains its water supply from Oxbow Springs through gravity flow. The Oxbow Springs flow dwindles to about 300 gpm in

the summer and fall and is not used for rearing fish during that period.

Facilities:

Adult Holding: None

Incubation: 32 deep troughs - 28 cf each

32 shallow troughs - 13 cf each

Early Rearing: 32 deep troughs - 28 cf each

32 shallow troughs - 13 cf each

Raceways: 12 concrete raceways - 4,695 cf each

Rearing Ponds: None

Satellite Facilities: Herman Creek Satellite

2 concrete raceways - 2,604 each

2 Asphalt ponds - 46,900 cf each

Lower Herman Creek Satellite

3 concrete ponds - 10,800 cf each

Wahkeena Satellite

1 18 acre pond

Compliance Status

The hatchery audits are based on compliance with written IHOT performance measures. These performance measures are documented in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (referred to as *IHOT 1995* in this report).

The purpose of the performance measures is to implement new basinwide policies that provide regional guidelines for operating anadromous hatcheries in the Columbia Basin.

The audit focuses on performance measures for IHOT policies that cover (1) hatchery performance standards, (2) fish health, (3) ecological interaction, and (4) genetics. These performance measures are intended to guide hatchery operations once production is established. For that reason, the hatchery operations audit included broodstock collection, spawning, incubation of eggs, fish rearing and feeding, fish release, equipment maintenance and operations, and personnel training. Production priorities are beyond the scope of this audit.

Based on *IHOT 1995*, a detailed 109-page audit form was developed. The audit form divided the performance measures into six major sections along major program and technical criteria areas. Two additional sections (sections 1 and 8) include general information and expenditure information needed for this Hatchery Evaluation Report and blank forms for additional comments. The following is the basic structure of the IHOT audit form:

Section 1 Performance Measures for General Information and Expenditure
Information (PMs General 1-2)

Integrated Hatchery Operations Team (IHOT) 1995. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*, Bonneville Power Administration, Portland, Oregon.

Section 2	Performance Measures for Program Objectives (PMs 1-4)
Section 3	Performance Measures for Facility Requirements (PMs 5-15)
Section 4	Performance Measures for Hatchery Practices (PMs 16-25)
Section 5	Performance Measures for Fish Health Policy (PMs 26-34)
Section 6	Performance Measures for Ecological Interactions (PMs 35-38)
Section 7	Performance Measures for Genetics Policy (PMs 39-43)
Section 8	Blank Forms for Additional Comments

Several performance measures are repeated in various sections of the audit form. These performance measures overlap in *IHOT 1995* and were retained to allow individuals interested in specific portions of the audit (such as Genetics or Fish Health) to determine the compliance status of all performance measures for a given topic in one location. A repeated performance measure is indicated by shaded text.

The Hatchery Audit Process

The hatchery audit will be conducted over a 2-year period that concludes in 1997. At each hatchery, a five-step process was used to complete the overall hatchery audit. This process consisted of research and onsite visits. The site visit at the Oxbow Hatchery was conducted on October 29, 1996.

The following is the five-step audit process:

1. Information was obtained from headquarters.
2. The hatchery manager was asked to fill out and return the **Audit Form**.

3. A 1-2 day site audit visit was conducted at each hatchery. During that visit an audit team inspected facilities, reviewed hatchery records, discussed audit form responses, and developed remedial action plans when appropriate.
4. During the site visit, the compliance status of each performance measure was discussed with the hatchery manager and IHOT representative. A portion of the Hatchery Evaluation Report was sent to the hatchery manager following the audit visit as a **Compliance Report**. That Compliance Report is Table 2 of this report.
5. Information from steps 1-4 was used to prepare a draft **Hatchery Evaluation Report**. This draft report was submitted to the operating agencies for review of the information used to determine compliance. Based on review and comments, a final Hatchery Evaluation Report was developed. The final report documents the compliance of a particular hatchery with the IHOT performance measures and presents cost estimates to correct any deficiencies.

Compliance Status of Oxbow Hatchery - Spring Chinook (Clackamas Stock)

The following table includes information on life-stages that are held on this facility for some portion of their rearing cycle (Table 1). For multi-facility programs, summary cost and contribution data is presented at the facility where rearing occurs. For the compliance status relating to performance measures that do not occur at this hatchery, please refer to the Hatchery Evaluation Reports for the hatcheries and stocks listed in Table 1. A check mark (✓) indicates that the specific life-stage is held at this facility.

This section documents the compliance status of the Oxbow Hatchery - Spring Chinook (Clackamas Stock) program. Each performance measure is presented in a table taken from the audit form (Table 2). The compliance status is identified by the following categories:

- **N/A** (not applicable)
- **Yes** (in compliance)
- **?** (unknown; generally due to unavailability of information to determine compliance)
- **No** (not in compliance).

Remedial actions are suggested for performance measures not in compliance. These remedial actions are grouped into categories and listed in Section 4 of this report, where the cost of the required remedial actions is also presented.

Table 1 Summary Program Information for Oxbow Hatchery - Spring Chinook (Clackamas Stock)

Component	Location of Adult Holding, Spawning, Incubation, and Rearing					
	Clackamas Hatchery	Oxbow Hatchery				
Adult Collection	4					
Adult Holding	4					
Spawning	4					
Fertilization	4					
Incubation						
green-to-eyed	4					
eyed-to-hatch		4				
Rearing						
fry		4				
fingerlings		4				
smolts	4					
Acclimation/release	4					

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#1	Are the hatchery programs outlined in a subbasin management plan?		4			ODF&W fish production schedule; Clackamas River Basin Plan	
#2	Is the hatchery operating under a current hatchery operational plan? Is it understood by staff? Is it being followed?		4 4 4			IHOT Operations Plan	
#3	Is a hatchery monitoring and evaluation plan in place? Do you have a written monitoring and evaluation plan?		4			CWT program described in IHOT Operations Plan	
#4a	Adult contribution to fisheries, spawning grounds, and hatchery	4				Review of records. Reported for Clackamas Hatchery	
#4b	Adult pre-spawning survival as compared with established goal	4				Held at Clackamas Hatchery	
#4c	Egg-take as compared with established hatchery goal	4				Egg-take at Clackamas Hatchery	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

		N/A	Yes	?	No		
#4d	Green-egg to eyed-egg survival as compared with established goal	4				At Clackamas Hatchery	
#4e	Eyed-egg to fry survival as compared with established goal		4			Review of records; in compliance 3 out of last 3 years	
#4f	Fry to smolt survival as compared with established goal	4				Transferred to Clackamas Hatchery	
#4g	Production as compared with established goal		4			Review of records; in compliance 3 out of last 3 years	
#4h	Percent survival (smolt to adult) as compared with established goal	4				Reported at Clackamas	
#4i	Number of eggs, fry, fingerlings, smolts, and/or adults to meet basinwide needs	4				Review of records/Discussion. Reported at Clackamas	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#5a	Temperature						
	Does your water temperature meet the criteria for spawning?	4				Spawning at Clackamas Hatchery	
	Does your water temperature meet the criteria for incubation?		4			Review of records	
	Does your water temperature meet the criteria for rearing?				4	Constant 45°F; Meet production goals	Review IHOT temperature criteria for rearing
#5b	Dissolved gases						
	Is the oxygen level near saturation?			4		Measured; but not recorded. No problems	Monitor and document DO levels
	Is the dissolved nitrogen level less than saturation?			4		No data (no problems)	Monitor TGP
#5c	Chemistry						
	Ammonia (un-ionized)			4		No recent data	Run analysis
	Carbon Dioxide			4		No recent data	Run analysis
	Chlorine			4		No recent data	Run analysis
	pH			4		No recent data	Run analysis
	Copper			4		No recent data	Run analysis
	Hydrogen Sulfide			4		No recent data	Run analysis
	Iron			4		No recent data	Run analysis
Zinc			4		No recent data	Run analysis	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

		N/A	Yes	?	No		
#5d	<p>Turbidity</p> <p>Does your turbidity meet the criteria?</p>		4			<p>Oxbow Springs water has no visible turbidity</p>	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#5e	Alkalinity and hardness Does your alkalinity and hardness meet the criteria?			4		No recent data	Run analysis
#5f	Nitrite Does your nitrite meet the criteria?			4		No recent data	Run analysis
#5g	Contaminants Aldrin Endrin Dieldrin Heptachlor Chlordane Methoxychlor Lindane Malathion Guthion			4 4 4 4 4 4 4 4 4		No data No data No data No data No data No data No data No data No data	\n Run analysis Run analysis Run analysis Run analysis Run analysis Run analysis Run analysis Run analysis Run analysis
#5h	Pathogens What portions of the hatchery have disease-free water? Adult holding Incubation Early rearing	4				No adult holding Oxbow Springs Oxbow Springs	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

		N/A	Yes	?	No		
	Rearing	4				At Clackamas Hatchery	
	Others	4				At Clackamas Hatchery	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#6	Alarm Systems						
	Do the following areas have alarms?						
	Intake		4			Inspection of facilities	
	Large rearing ponds and adult holding ponds		4			Inspection of facilities	
	Raceway headboxes and rearing ponds		4			Inspection of facilities	
	Incubation facilities		4			Inspection of facilities	
	Quarantine areas and facilities	4				None at hatchery	
	Water treatment systems	4				None at hatchery	
	Security				4	No security problems	Install security alarms
	Are there outside systems and buzzers in onsite residences?		4			Discussion	
	Are water flow alarms checked daily?		4			Review of records/Discussion	
	Are all other alarms checked weekly?	4				No other types	
	Is there a log of alarms for emergencies, tests, and maintenance requirements?				4	Inspection/Discussion	Develop and maintain log for alarms
	Are telephone pagers used?		4			Use radio pagers	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

		N/A	Yes	?	No		
#7	Adult collection and holding facilities						
	Do you meet the adult holding criteria?	4				At Clackamas Hatchery	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#8	<p>Incubation facilities</p> <p>Type 1: shallow troughs Do you have an adequate number of units for the overall program?</p> <p>Type 2: deep troughs Do you have an adequate number of units for the overall program?</p>		4			Valves on headbox need updating but still function	
#9	<p>Rearing facilities</p> <p>Type 1: concrete raceways Do you have an adequate number of units for the overall program?</p> <p>Type 2: _____ Do you have an adequate number of units for the overall program?</p> <p>Type 3: _____ Do you have an adequate number of units for the overall program?</p>		4			Raceways need resurfacing and leakage repair, but still functioning	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

		N/A	Yes	?	No		
#10	Screening facilities						
	Do you meet the approach velocity criteria?	4				Spring water supply; screens not needed	
	Are the fish screens regularly cleaned?	4				See above	
	Does the screen mesh meet screen opening criteria?	4				See above	
	Are rearing containers double screened for fish that should not be released to adjacent water?				4	None on raceways	Install double screens on raceways used for spring chinook
#11	Predator control facilities						
	Are your predation control facilities effective?				4	Inspection of facilities/Discussion	Install bird netting over raceways

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#12	<p>Food storage facilities and quality control</p> <p>Does the storage of dry/semi-moist/moist foods (dry<12%; semi-moist 12-20%; moist >20% moisture) follow food manufacturer's recommendations?</p> <p>Does a regional quality control officer oversee production procedures and monitor:</p> <p>Verification by feed manufacturer that ingredients meet specifications?</p> <p>Ensure feed does not contain unwanted drugs or other additives?</p> <p>Analyze ingredients contained in the final food product to ensure that feed specifications have been met?</p> <p>Are the foods stored and handled according to the following criteria?</p>		4			<p>Discussion with regional quality control (QC) officer</p> <p>See above</p> <p>See above</p> <p>See above</p>	<p>Follow IHOT recommendations for regional oversight of feed production</p> <p>See above</p> <p>See above</p>

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

	N/A	Yes	?	No		
Moist pellets should not exceed 10°F at point of delivery.			4		Don't measure; delivered in refrigerated truck	None
Moist pellets should be removed from freezer just prior to feeding.		4			Discussion	
Do not leave buckets of feed or feed containers outside exposed to light or heat.		4			Discussion	
Open bags of feed should be fed within 1 to 2 days except when feeding small groups of fish.		4			Discussion	
Automatic feeder hoppers and bulk storage facilities should be insulated against excessive temperatures (80°F and above).		4			Discussion	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#13	<p>Release facilities</p> <p>Do the release facilities ensure that fish are not subjected to adverse conditions?</p>	4				Transferred to Clackamas Hatchery prior to release	
#14	<p>Pollution abatement facilities</p> <p>Do the pollution abatement facilities meet all federal and state regulations (or good engineering practice)?</p> <p>Are pollution abatement facilities operated correctly?</p>		4			<p>Inspection of facilities/Discussion</p> <p>Discussion</p>	
#15	<p>Transportation facilities</p> <p>Are the transport systems adequate to meet IHOT performance measures for transportation practices?</p>		4			Use Clackamas Hatchery transport trucks	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#16	Broodstock selection practices						
	Is the donor selection process document attached? (PM #40a)	4				Existing program; does not apply	
	Was the donor selection outline followed in selecting the hatchery broodstock? (PM #40b-c)	4				Existing program; does not apply	
#17	Spawning practices						
	Were the appropriate number of spawners, male/female ratios, and fertilization protocols used? (PM #42c-g)	4				At Clackamas Hatchery	
#18	Incubation practices						
	Are specific incubation standards listed in the hatchery operations plan?				4	Review of IHOT Operations Plan	Develop specific incubation standards for the IHOT Operations Plan
	Are incubation practices written?				4	See above	See above
	Incubation Type 1: shallow troughs (see PM #8) Do you meet the loading and flow criteria?				4	Meet flow; do not meet loading criteria	Review loading criteria for incubation

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

		N/A	Yes	?	No		
	Incubation Type 2: deep troughs (see PM #8) Do you meet the loading and flow criteria?				4	Meet flow; do not meet loading criteria	Review loading criteria for incubation

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#19	Rearing practices						
	Are specific rearing standards listed in the hatchery operations plan?				4	Review of Hatchery Operations Plan	Develop written rearing standards and practices
	Are rearing practices written? Rearing Unit Type 1: concrete raceways (see PM #9)				4	See above	See above
	Do you meet the density and DI criteria?			4		No specific criteria	Develop density & DI criteria
	Do you meet the Loading and FI criteria?			4		No specific criteria	Develop loading & FI criteria
	Rearing Unit Type 2: (see PM #9)						
	Do you meet the density and DI criteria? Do you meet the Loading and FI criteria?	4					
Rearing Unit Type 3: (see PM #9)							
Do you meet the density and DI criteria? Do you meet the Loading and FI criteria?	4						
#20	Smolt quality						
	Do you produce a high quality smolt?	4				Transferred prior to this stage	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#21	Fish health management practices						
	Are the monthly hatchery monitoring visits being conducted? (PM #26)		4			Review of records at regional lab by audit team pathologist	
	Are the annual broodstock inspections being conducted? (PM #27)		4			Review of records at regional lab by audit team pathologist	
	Is there pathogen-free water (PM #5b) and are the sanitation procedures being followed? (PM #28)		4			No incubation at this hatchery	
	Are the following water quality parameters within criteria? (PM #5a-5g)						
	Water temperature				4	Review of records/Discussion	See PM #5a
	Dissolved gases			4		No dissolved nitrogen data	See PM #5b
	Chemistry			4		No data	See PM #5c
	Turbidity		4			Discussion	
	Alkalinity and hardness			4		No data	See PM #5e
Nitrite			4		No data	See PM #5f	
Contaminants			4		No data	See PM #5g	
Are rearing standards being followed? (PM #19)				4	Discussion	See PM #19	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

		N/A	Yes	?	No		
	Are egg and fish transfer/release requirements met? (PM #31)		4			Discussion	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#22a	Does hatchery performance meet requirements outlined in the regional hatchery policies and in subbasin and hatchery plans for the following areas?						
#22a1	Percent smoltification Do you measure percent smoltification? Did you meet the smoltification criteria?	4 4				Transferred to Clackamas prior to this stage Transferred to Clackamas prior to this stage	
#22a2	Rearing density (prior to release) Did you meet the rearing density criteria just prior to release?	4				Transferred to Clackamas prior to this stage	
#22a3	Disease condition (at release) Did you meet all disease regulations just prior to release?	4				Transferred to Clackamas prior to this stage; obtain OK prior to transfer	
#22a4	Number (at release) Did you meet the release number goal?	4				Number transferred met goal; do not release from Oxbow	
#22a5	Size at release						

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

		N/A	Yes	?	No		
	Did you meet the size goal?	4				Size at transfer generally meets goal; do not release from Oxbow	
#22a6	Dates of release Did you meet the release date goal?	4				Dates at transfer generally meet goal; do not release from Oxbow	
#22a7	Location of release Did you release the fish at the specified location?	4				Transferred to Clackamas	
#22b	Are fish reared in the subbasin or acclimated in the subbasin? Are the fish reared in the subbasin? Are the fish acclimated in the subbasin?		4		4	Majority of rearing (weight gain) at Oxbow Hatchery At Clackamas Hatchery	None
#22c	Is the release strategy appropriate for the program?	4				Do not release from Oxbow	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#23	Transportation facilities						
	Do transportation equipment and personnel receive disinfection before and after use?	4				Use Clackamas transport vehicles	
	Is the fish tank interior disinfected using a solution of 200 ppm active chlorine for 30 minutes minimum or formaldehyde gas generation method (relative humidity of 60% for 2 hrs)?	4				See above	
	Is the exterior of the fish transport vehicle disinfected using high pressure steam (115-130°C), high temperature acid, or with 200 ppm chlorine for 30 minutes?	4				See above	
	Is the fish transport vehicle (cab) disinfected using 600 ppm quaternary ammonia compounds (1.5 ml of 50% stock solution/liter water)?	4				See above	
	Is other equipment disinfected including fish pumps, nets, egg sorters, waders, boots, rain gear, hoses and other equipment using one of the following solutions?	4				See above	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

	N/A	Yes	?	No		
200 ppm chlorine for 30 minutes 600 ppm quaternary ammonia compound for 30 minutes 200 ppm iodophor solution for 10 minutes		4			Discussion	
Do personnel wear protective garments when handling fish eggs or cultural water?		4			Discussion	
Do the fish transport truck/chassis and tank/unit receive an inspection and service prior to the release season?	4				Use Clackamas transport vehicles	
Is a daily service inspection completed before starting up and leaving for the day?	4				See above	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#23 (cont)	Transportation facilities						
	Does the fish transport unit receive an inspection prior to loading?	4				Use Clackamas transport vehicles	
	Does a pre-loading inspection covering tank water level, pumps or aerators, oxygen injection system settings, displacement gauge, and truck loading/hauling density tables checked and reviewed occur prior to loading fish in the transport unit?	4				See above	
	Do hauling criteria include checking the fish 45 minutes to 1 hour after loading?	4				See above	
	When fish are active and systems are functioning properly, is the oxygen concentration reduced and maintained at approximately 8 ppm?	4				See above	
	Is water temperature in the transportation unit maintained within the 42-48 °F range?	4				See above	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

	N/A	Yes	?	No	
Do fish releasing procedures include the following criteria?	4				See above
Releasing the fish at the correct release site or into the correct water body.	4				See above
Tempering or the difference between the liberation tank and the target water body should not exceed 10°F.	4				See above
The liberation hose should be angled so that fish gently hit the water. Using a tripod is a method of ensuring the hose will stay at the proper angle.	4				See above

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#24	<p>Evaluation practices</p> <p>Has the hatchery conducted fishery contribution studies to:</p> <p>Determine the requirements for evaluating and improving management programs?</p> <p>Develop guidelines that define the geographical area and identify component stocks (hatchery and/or wild) that comprise the management unit?</p> <p>Develop guidelines that define if the proper stocks of fish are currently being used?</p> <p>Determine which management units contribute to a specific fishery and the time periods of those contributions?</p> <p>Determine the relative contributions of the various management units to a specific fishery over the different time periods?</p>		4			<p>CWT program</p> <p>See above</p> <p>See above</p> <p>See above</p> <p>See above</p>	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#25	Training practices						
	Does the hatchery have a training schedule for its staff?		4			Discussion	
	Does each staff member have a personal training plan approved by a supervisor and reviewed annually?		4			Discussion	
	Does the hatchery routinely exchange training details between other hatcheries and agencies?		4			Discussion	
	Does the hatchery encourage and reward off-duty training of staff?		4			Discussion	
	Does the hatchery conduct monthly staff meetings?		4			Discussion	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#26	<p>Are monthly hatchery monitoring visits being conducted by a qualified fish health specialist as described below?</p> <p>Conduct visit at least monthly</p> <p>Monitoring conducted by qualified fish health specialist</p> <p>Examine a representative sample of healthy and moribund fish from each lot.</p> <p>Review fish culture practices with hatchery manager.</p> <p>Report finding and results of necropsies on standard form.</p> <p>Recommend appropriate drug or chemical treatment.</p> <p>Summarize fish health status or stock prior to release or transfer to another facility.</p>		4			<p>Review of regional lab records by audit team pathologist</p> <p>Review of regional lab records by audit team pathologist</p> <p>Review of regional lab records by audit team pathologist</p> <p>Review of regional lab records by audit team pathologist</p> <p>Review of regional lab records by audit team pathologist</p> <p>Review of regional lab records by audit team pathologist</p> <p>Review of regional lab records by audit team pathologist</p>	
#27	<p>Are all of the functions of the hatchery yearly monitoring visits being completed as described below?</p>						

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

		N/A	Yes	?	No		
	Annually examine each broodstock for the presence of reportable viral pathogens.	4				At Clackamas	
	Annually screen each salmon broodstock for the presence of <i>Renibacterium salmoninarum</i> .	4				see above	
	Conduct inspection by or under the supervision of qualified fish health specialist.	4				see above	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#28	<p>Is the hatchery following accepted sanitation procedures?</p> <p>Are there any sources of pathogen-free water, especially for incubation and early rearing?</p> <p>Are the hatchery sanitation procedures understood and being followed as described below?</p> <p>Disinfect/water harden eggs in iodophor?</p> <p>Are foot baths containing disinfectant placed at the incubation facility's entrance and exit?</p> <p>Is equipment and rain gear utilized in broodstock handling or spawning sanitized prior to its use elsewhere in the hatchery?</p> <p>Is equipment used to collect dead fish sanitized prior its use in another pond and/or lot of fish?</p>		4			<p>Inspection/Discussion</p> <p>Inspection of facilities/Discussion</p> <p>Inspection of facilities/Discussion</p> <p>Inspection of facilities/Discussion</p> <p>Inspection of facilities/Discussion</p>	<p>Provide foot baths</p>

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

		N/A	Yes	?	No		
	Is equipment, including vehicles used to transfer fish between facilities, disinfected prior to use with any other fish lots or at any other location?		4			Inspection of facilities/Discussion	
	Are rearing vessels sanitized after fish are removed and prior to introducing a new fish lot or stock?		4			Inspection of facilities/Discussion	
	Are dead fish properly disposed of?		4			Inspection of facilities/Discussion	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#29	<p>Are water quality parameters being followed?</p> <p>Are the following water quality parameters within criteria? (PM #5a-5g)</p>						
	<p>Water temperature</p> <p>Dissolved gases</p> <p>Chemistry</p> <p>Turbidity</p> <p>Alkalinity and hardness</p> <p>Nitrite</p> <p>Contaminants</p> <p>Go to PM #21</p>		4	4	4	<p>Does not meet criteria for rearing</p> <p>No dissolved nitrogen data</p> <p>No data</p> <p>Discussion</p> <p>No data</p> <p>No data</p> <p>No data</p>	<p>See PM #5a</p> <p>See PM # 5b</p> <p>See PM #5c</p> <p>See PM #5e</p> <p>See PM #5f</p> <p>See PM #5g</p>
#30	<p>Are incubation and rearing standards being followed?</p> <p>Are the incubation practices following the IHOT incubation criteria? (PM #18)</p>				4	Review of records/Discusion	See PM #18
	<p>Are the rearing practices following the IHOT criteria? (PM #19)</p> <p>Go to rearing practices PM #18-PM #19</p>				4	Review of records/Discusion	See PM #19
#31	<p>Are egg and fish transfer/release requirements met?</p>		4			Discussion	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#32	<p>Is the hatchery's program outlined in a subbasin management plan?</p> <p>Go to subbasin plan PM #1</p>		4			ODF&W fish production schedule	
#33	<p>Is the hatchery operating under a current hatchery operational plan?</p> <p>Go to operational plan PM #2</p>		4			Review of IHOT Operations Plan	
#34	<p>Is a hatchery monitoring and evaluation plan in place?</p> <p>Go to hatchery monitoring and evaluation plan PM #3</p>		4			M&E program described in IHOT Operations Plan	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#35	<p>Does the hatchery program meet requirements established in the regional hatchery policies and subbasin planning documents in the following areas: species, stock, broodstock collection location, broodstock numbers, broodstock collection strategy, and spawning and egg-take protocols?</p> <p>Does the hatchery program meet the requirements for the following?</p> <p>Species protocols (PM #4a)</p> <p>Stock protocols (PM #4a)</p> <p>Broodstock collection location protocols (PM #41b)</p> <p>Broodstock numbers protocols (PM #42c)</p> <p>Broodstock collection strategy protocols (PM #41b-d)</p>						
		4				All at Clackamas Hatchery	
		4				See above	
		4				See above	
		4				See above	
		4				See above	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

		N/A	Yes	?	No	
	Spawning protocols (PM #42d-e)	4				See above
	Egg-take protocols (PM #42f-g)	4				See above

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#36	<p>Does the hatchery’s performance meet requirements outlined in the regional hatchery policies and in subbasin and hatchery plans for the following areas: percent smoltification, rearing density, disease condition, and the number, size date(s), and location of release?</p> <p>Percent smoltification (PM #22a1)</p> <p>Rearing density (PM #22a2)</p> <p>Disease condition (PM #22a3)</p> <p>Number at release (PM #22a4)</p> <p>Size at release (PM #22a5)</p> <p>Date of release (PM #22a6)</p> <p>Location of release (PM #22a7)</p>						
		4				Transferred to Clackamas Hatchery	
		4				See above	
		4				See above	
		4				See above	
		4				See above	
		4				See above	
		4				See above	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

		N/A	Yes	?	No	
#37	<p>Are fish reared in the subbasin or acclimated in the subbasin?</p> <p>See PM #22b</p>	4				Transfer to Clackamas Hatchry for release
#38	<p>Is the release strategy appropriate for the program?</p> <p>See PM #22c</p>	4				Not release at Oxbow

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#39	For new programs, has a broodstock collection plan been developed?						
	Is the broodstock collection plan written?	4				Existing Program; does not apply	
	For a non-captive broodstock program:	4				Existing Program; does not apply	
	Was an unbiased, representative sample collected?						
	Was the recommended number of broodstock collected?	4				Existing Program; does not apply	
	For a captive broodstock program:						
	Were captive brood progeny excluded as donors for propagating the next generation of the captive broodstock program?	4				Existing Program; does not apply	
	Were full-sib crosses avoided?	4				Existing Program; does not apply	
	Is the broodstock collection plan understood and being followed by staff?	4				Existing Program; does not apply	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

		N/A	Yes	?	No		
#40	For a new program, was the donor selection outline followed in selecting the hatchery broodstock?						
#40a	Is a donor selection plan written?	4				Existing Program; does not apply	
#40b	Was the donor selection outline followed in selecting the broodstock?	4				Existing Program; does not apply	
#40c	Was the target stock recommended in the donor selection process actually used?	4				Existing Program; does not apply	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#41	For existing programs, were the broodstock collection procedures followed?						
#41a	Is the broodstock collection plan written? Does the broodstock collection plan follow the guideline:	4				Brood not collected at this facility	
#41b	Was an unbiased, representative sample collected?	4				See above	
#41c	Was the recommended number of broodstock collected?	4				See above	
#41d	Were the broodstock collection procedures in hatchery operation plan understood and followed?	4				See above	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#42	Was the appropriate number of spawners, male/female ratios, and fertilization protocols used?						
#42a	Are the spawning protocols written?	4				At Clackamas Hatchery	
#42b	Are daily or weekly spawning logs available?	4				See above	
#42c	Was the appropriate number of spawners used?	4				See above	
#42d	Did you attempt to spawn all collected broodstock and randomize mating with respect to age class, and other traits?	4				See above	
#42e	Was the sex-ratio within the limits given in the performance standards?	4				See above	
#42f	Were the fertilization protocols followed?	4				See above	
#42g	If the hatchery needed to reduce the number of eggs retained, was this done by representative sampling of each male/female cross?	4				See above	

Table 2 Oxbow Hatchery - Spring Chinook (Clackamas Stock) Compliance With Performance Measures

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#43	Is there a genetics monitoring and evaluation program in place?						
	Is a genetics monitoring and evaluation program available?	4				Responsibility of Clackamas Hatchery	
	Does the plan address the following elements listed in IHOT:					See above	
	Does the program have elements needed to meet evaluation goals 1-4?	4				See above	
	Has a qualified geneticist reviewed and endorsed the program (goal 5)?	4				See above	
	Will the program collect the data and maintain the records needed to evaluate compliance on an ongoing basis (goal 5)?	4				See above	
	Is the program understood and followed by staff?	4				See above	

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 Oxbow Hatchery - Spring Chinook (Clackamas Stock)

This section presents the corrective actions required to bring the Oxbow Hatchery - Spring Chinook (Clackamas Stock) program into compliance with IHOT performance measures. The remedial actions suggested here are just that, suggestions developed by the Montgomery Watson Audit Team. 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 3).

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 ($\pm 40\%$).

More importantly, 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 3. Remedial Actions Required at Oxbow Hatchery - Spring Chinook
(Clackamas Stock)**

Remedial Action Required	Cost	PMS¹
Type 1 - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery Install security alarms	---	
Type 2 - Remedial actions requiring changes in agency policies or procedures Develop and maintain alarm log Review IHOT temperature criteria for rearing Follow IHOT recommendations for regional oversight of feed production Develop specific incubation standards for the IHOT Operations Plan; review loading criteria for incubation Develop specific rearing standards for the IHOT Operations Plan Provide foot baths for incubation facility	--- --- --- --- --- --- ---	6 5a 12 18 19 28
Type 3 - Remedial actions requiring changes in monitoring coverage or interval Monitor and document DO and TGP levels Run analysis for water chemistry parameters, alkalinity, hardness, nitrite, and contaminants	--- ---	5b 5c, 5e, 5f, & 5g

Remedial Action Required	Cost	PMs ²
Type 4 - Remedial actions requiring significant capital expenditures		
Install double screen on 12 raceways used for spring chinook	\$2,400	10
Install bird netting over raceways	\$30,000	11
Type 5 - Remedial actions that may require significant capital		
expenditures but are not clearly definable at this time		
None	---	

Hatchery Contribution to Fisheries, Spawning Grounds, and Hatcheries

This section presents the audit findings for the Oxbow Hatchery - Spring Chinook (Clackamas Stock) program 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. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries:
Oxbow Hatchery - Spring Chinook (Clackamas Stock)**

Year	Fisheries (Broodyear)	Spawning Grounds (Broodyear)	Hatchery ¹ (Broodyear)	Total Combined Contribution (Broodyear)	Smolt to Adult Survival (percent)
1984					
1985					

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

Total combined adult contribution; presented when it is not possible to subdivide the contribution into fisheries, spawning grounds, and hatchery contributions.

1986					
1987	See Clackamas Hatchery				
1988	See Clackamas Hatchery				
1989	See Clackamas Hatchery				
1990	See Clackamas Hatchery				
1991	See Clackamas Hatchery				
1992					

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. Table 5 shows the annual operating expenses for the Oxbow Hatchery - Spring Chinook (Clackamas Stock) program. For programs that occur at more than one facility (as shown on Table 1 in Section 3 of this report), the cost breakdown for the component(s) at each facility is presented in separate tables (Table 5a).

**Table 5. Annual Operating Expenses: Oxbow Hatchery - Spring Chinook
(Clackamas Stock)**

Hatchery	1993	1994	1995
1. Oxbow Hatchery	\$19,356	\$14,661	\$10,804
2. Clackamas Hatchery	\$469,316	\$469,316	\$469,316
3.			
4.			
5.			

Total Program Costs	\$488,672	\$483,977	\$516,883
----------------------------	------------------	------------------	------------------

The total expenditures for the Oxbow Hatchery are presented in Table 6 by program. The detailed breakdown of program expenditures at this hatchery are presented in separate tables (Tables 6a, 6b, 6c, 6d, and 6e).

Table 6. Annual Operating Expenses - Oxbow Hatchery

Program	1994	1995	1996
1. Spring Chinook (Clackamas Stock)	\$19,356	\$14,661	\$10,804
2. Coho (Tanner Creek Stock, Umatilla releases)	\$61,589	\$34,095	\$27,782
3. Coho (Tanner Creek Stock, Bonneville releases)	\$219,959	\$143,200	\$98,781
4. Coho (Tanner Creek Stock, CEDC release)	\$158,370	\$88,648	\$70,999
5. Coho (Mixed Tanner Creek and Sandy River Stock, CEDC release)	\$0	\$64,781	\$108,042
Total Hatchery Costs	\$439,918	\$340,952	\$308,692

**Table 5a. Annual Operating Expenses: Oxbow Hatchery - Spring Chinook
(Clackamas Stock)**

Expenditure Occurring at Oxbow Hatchery

Component	1994	1995	1996
Personnel Costs	\$198,941	\$190,665	\$185,401
Operational Costs	\$156,758	\$90,519	\$57,624
Capital Costs	\$15,821	\$2,890	\$20,842
Indirect Costs	\$68,399	\$56,878	\$44,825
Lumped Hatchery Costs			
Lumped Third-Party Costs	\$0	\$0	\$0
Total Hatchery Costs	\$439,918	\$340,952	\$308,692
Source of Funds			
Program Production (lb)	4,074	5,460	5,096
Total Production (lb)	91,627	125,332	142,229
Program as Percent of Total	4.4%	4.3%	3.5%
Program Costs	\$19,356	\$14,661	\$10,804

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

Table 6a. Detailed Expenditures at Oxbow Hatchery by Program

Spring Chinook (Clackamas Stock)

Component	1994	1995	1996
Personnel Costs	\$198,941	\$190,665	\$185,401
Operational Costs	\$156,758	\$90,519	\$57,624
Capital Costs	\$15,821	\$2,890	\$20,842
Indirect Costs	\$68,399	\$56,878	\$44,825
Lumped Hatchery Costs			
Lumped Third-Party Costs	\$0	\$0	\$0
Total Hatchery Costs	\$439,918	\$340,952	\$308,692
Source of Funds			
Program Production (lb)	4,074	5,460	5,096
Total Production (lb)	91,627	125,332	142,229
Program as Percent of Total	4.4%	4.3%	3.5%
Program Costs	\$19,356	\$14,661	\$10,804

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

Coho (Tanner Creek Stock: Umatilla Release)

Component	1994	1995	1996
Personnel Costs	\$198,941	\$190,665	\$185,401
Operational Costs	\$156,758	\$90,519	\$57,624
Capital Costs	\$15,821	\$2,890	\$20,842
Indirect Costs	\$68,399	\$56,878	\$44,825
Lumped Hatchery Costs			
Lumped Third-Party Costs	\$0	\$0	\$0
Total Hatchery Costs	\$439,918	\$340,952	\$308,692
Source of Funds			
Program Production (lb)	13,553	13,466	13,133
Total Production (lb)	91,627	125,332	142,229
Program as Percent of Total	14%	10%	9%
Program Costs	\$61,589	\$34,095	\$27,782

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 Oxbow Hatchery by Program

Coho (Tanner Creek Stock: Bonneville Releases)

Component	1994	1995	1996
Personnel Costs	\$198,941	\$190,665	\$185,401
Operational Costs	\$156,758	\$90,519	\$57,624
Capital Costs	\$15,821	\$2,890	\$20,842
Indirect Costs	\$68,399	\$56,878	\$44,825
Lumped Hatchery Costs			
Lumped Third-Party Costs	\$0	\$0	\$0
Total Hatchery Costs	\$439,918	\$340,952	\$308,692
Source of Funds			
I			
Program Production (lb)	46,250	53,748	46,250
Total Production (lb)	91,627	125,332	142,229
Program as Percent of Total	50%	42%	32%
Program Costs	\$219,959	\$143,200	\$98,781

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 Oxbow Hatchery by Program

Coho (Tanner Creek Stock: CEDC Releases)

Component	1994	1995	1996
Personnel Costs	\$198,941	\$190,665	\$185,401
Operational Costs	\$156,758	\$90,519	\$57,624
Capital Costs	\$15,821	\$2,890	\$20,842
Indirect Costs	\$68,399	\$56,878	\$44,825
Lumped Hatchery Costs			
Lumped Third-Party Costs	\$0	\$0	\$0
Total Hatchery Costs	\$439,918	\$340,952	\$308,692
Source of Funds			
I			
Program Production (lb)	33,000	33,000	33,000
Total Production (lb)	91,627	125,332	142,229
Program as Percent of Total	36%	26%	23%
Program Costs	\$158,370	\$88,648	\$70,999

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

Table 6e. Detailed Expenditures at Oxbow Hatchery by Program

Coho (Mixed Tanner Creek and Sandy River Stocks: CEDC Release)

Component	1994	1995	1996
Personnel Costs	\$198,941	\$190,665	\$185,401
Operational Costs	\$156,758	\$90,519	\$57,624
Capital Costs	\$15,821	\$2,890	\$20,842
Indirect Costs	\$68,399	\$56,878	\$44,825
Lumped Hatchery Costs			
Lumped Third-Party Costs	\$0	\$0	\$0
Total Hatchery Costs	\$439,918	\$340,952	\$308,692
Source of Funds			
I			
Program Production (lb)	0	24,000	50,000
Total Production (lb)	91,627	125,332	142,229
Program as Percent of Total	0%	19%	35%
Program Costs	\$0	\$64,781	\$108,042

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

PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.

PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.