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# **HATCHERY EVALUATION REPORT**

**OXBOW Hatchery - Coho  
(Tanner Creek Stock: CEDC Releases)**

**December 1996**

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**Integrated Hatchery Operations Team (IHOT)**

# **HATCHERY EVALUATION REPORT**

**Oxbow Hatchery - Coho (Tanner Creek Stock: CEDC releases)**

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

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## Executive Summary

This report presents the findings of the independent audit of the Oxbow Hatchery - Coho (Tanner Creek Stock: CEDC releases) 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 - Coho (Tanner Creek Stock: CEDC releases) 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 - Coho (Tanner Creek Stock: CEDC releases) program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery needed to document adult contribution. The audit found that the hatchery was not in compliance with the water quality monitoring requirements and needed double screen for upper Herman Creek Ponds. The hatchery was not in compliance with the requirements for regional oversight of feed manufacturing and needed to develop specific rearing standards, smoltification goal, and smoltification monitoring program.

The specific areas in which the Oxbow Hatchery - Coho (Tanner Creek Stock: CEDC releases) 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
- Document adult contribution
- Follow IHOT recommendations for regional oversight of feed production
- Install double screen on upper Herman Creek ponds
- Monitor and document DO and TGP levels
- 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

## Section 3

# 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).<sup>1</sup> 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)
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

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<sup>1</sup>Integrated Hatchery Operations Team (IHOT) 1995. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*, Bonneville Power Administration, Portland, Oregon.

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 - Coho (Tanner Creek stock: CEDC releases)**

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 - Coho (Tanner Creek Stock: CEDC releases) 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 - Coho (Tanner Creek Stock: CEDC releases)**

Component	Location of Adult Holding, Spawning, Incubation, and Rearing					
	Bonneville Hatchery	Cascade Hatchery	Oxbow Hatchery	CEDC Netpens		
Adult Collection	✓					
Adult Holding		✓				
Spawning		✓				
Fertilization		✓				
Incubation						
green-to-eyed		✓				
eyed-to-hatch		✓				
Rearing		✓				
fry		✓				
fingerlings		✓	✓			
smolts			✓			
Acclimation/release				✓		

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
the hatchery programs outlined in a subbasin management plan?		✓			ODF&W fish production schedule; Columbia River Fish Management Plan; US v. Oregon.	
Is the hatchery operating under a current hatchery operational plan?		✓			IHOT Operations Plan	
Is it understood by staff?		✓			Discussion	
Is it being followed?		✓			Discussion	
Is a hatchery monitoring and evaluation plan in place?						
Do you have a written monitoring and evaluation plan?		✓			CWT program for determining fisheries contribution	
Adult contribution to fisheries, spawning grounds, and hatchery			✓		Missing Production Groups Report did not identify this group	Document adult contribution
Adult pre-spawning survival as compared with established goal	✓				Adults held at Cascade Hatchery	
Egg-take as compared with established hatchery goal	✓				Egg-take at Cascade Hatchery	
Embryo-egg to eyed-egg survival as compared with established goal	✓				At Cascade Hatchery	
Eye-egg to fry survival as compared with established goal	✓				At Cascade Hatchery	
Smolt to smolt survival as compared with established goal	✓				Reported by Cascade Hatchery	
Production as compared with established goal		✓			Review of records; in compliance 3 out of last 3 years	
Percent survival (smolt to adult) as compared with established goal	✓				Reported at Bonneville Hatchery	
Number of eggs, fry, fingerlings, smolts, and/or adults meet basinwide needs	✓				Reported at Cascade Hatchery	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Temperature</b>						
Does your water temperature meet the criteria for spawning?	✓				No spawning on station	
Does your water temperature meet the criteria for incubation?	✓				At Cascade	
Does your water temperature meet the criteria for rearing?		✓			Review of records	
<b>Dissolved gases</b>						
Is the oxygen level near saturation?			✓		Regularly measured; but not recorded	Document DO levels
Is the dissolved nitrogen level less than saturation?			✓		No data; no problems observed	Monitor TGP
<b>Chemistry</b>						
Ammonia (un-ionized)			✓		No recent data	Run analysis for chemistry parameters on water supplies
Carbon Dioxide			✓		No recent data	See above
Chlorine			✓		No recent data	See above
Hardness			✓		No recent data	See above
Copper			✓		No recent data	See above
Hydrogen Sulfide			✓		No recent data	See above
Iron			✓		No recent data	See above
Manganese			✓		No recent data	See above
<b>Turbidity</b>						
Does your turbidity meet the criteria?			✓		Oxbow Springs OK. No data for Herman Creek	Run analysis for Herman Creek

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Alkalinity and hardness</b>						
Does your alkalinity and hardness meet the criteria?			✓		No recent data	Run analysis for water supply
<b>Nitrite</b>						
Does your nitrite meet the criteria?			✓		No recent data	Run analysis for water supply
<b>Pesticide Contaminants</b>						
Aldrin			✓		No data	Run analysis for water supplies
Dieldrin			✓		No data	See above
Endrin			✓		No data	See above
Heptachlor			✓		No data	See above
Chlordane			✓		No data	See above
Methoxychlor			✓		No data	See above
Endosulfan			✓		No data	See above
Malathion			✓		No data	See above
Parathion			✓		No data	See above
<b>Disease</b>						
What portions of the hatchery have disease-free water?						
Adult holding	✓				Not on station for this stock	
Incubation	✓				Not on station for this stock	
Early rearing	✓				Not on station for this stock	
Rearing				✓	Herman Creek	None
Others				✓	Herman Creek	None

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Alarm Systems</b>						
Do the following areas have alarms?						
Intake		✓			Inspection	
Large rearing ponds and adult holding ponds		✓			Inspection	
Raceway headboxes and rearing ponds	✓				None on station	
Incubation facilities	✓				None on station	
Quarantine areas and facilities	✓				None on station	
Water treatment systems	✓				None on station	
Security				✓	Site security not a problem	Install security alarms
Are there outside systems and buzzers in onsite residences?				✓	Staff carry radio pagers	None
Are water flow alarms checked daily?		✓			Discussion	
Are all other alarms checked weekly?	✓				Only water flow alarms	
Is there a log of alarms for emergencies, tests, and maintenance requirements?				✓	Discussion	Develop and maintain a log of alarms
Are telephone pagers used?		✓			Use radio pagers	
<b>Adult collection and holding facilities</b>						
Do you meet the adult holding criteria?	✓				Held at Cascade Hatchery	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Incubation facilities</b>						
Type 1: None Do you have an adequate number of units for the overall program?	✓				Incubation at Cascade Hatchery	
Type 2: None Do you have an adequate number of units for the overall program?	✓				Incubation at Cascade Hatchery	
<b>Inspection facilities</b>						
Type 1: large asphalt ponds Do you have an adequate number of units for the overall program?		✓			Inspection of upper Herman Creek ponds	
Type 2: Do you have an adequate number of units for the overall program?						
Type 3: Do you have an adequate number of units for the overall program?						
<b>Screening facilities</b>						
Do you meet the approach velocity criteria?		✓			Inspection of facilities/Discussion	
Are the fish screens regularly cleaned?		✓			Inspection of facilities/Discussion	
Does the screen mesh meet screen opening criteria?		✓			Inspection of facilities/Discussion	
Are rearing containers double screened for fish that should not be released to adjacent water?				✓	Have second set of guides on ponds	Provide second set of screens at upper Herman Creek ponds
<b>Predator control facilities</b>						
Are your predation control facilities effective?		✓			Inspection of facilities/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>d storage facilities and quality control</b>						
Does the storage of dry/semi-moist/moist foods (dry <12%; semi-moist 12-20%; moist >20% moisture) follow food manufacturer's recommendations?		✓			Inspection of facilities/Discussion	
Does a regional quality control officer oversee production procedures and monitor:						
Verification by feed manufacturer that ingredients meet specifications?				✓	Correspondence from regional quality control (QC) officer. Does not do these tasks	Follow IHOT recommendations for regional QC and monitoring of food production
Ensure feed does not contain unwanted drugs or other additives?				✓	See above	See above
Analyze ingredients contained in the final food product to ensure that feed specifications have been met?				✓	See above	See above
Are the foods stored and handled according to the following criteria?						
Moist pellets should not exceed 10°F at point of delivery.			✓		Delivered in refrigerated trucks but do not measure on arrival	None; no problems observed
Moist pellets should be removed from freezer just prior to feeding.		✓			Inspection/Discussion	
Do not leave buckets of feed or feed containers outside exposed to light or heat.		✓			Inspection/Discussion	
Open bags of feed should be fed within 1 to 2 days except when feeding small groups of fish.		✓			Inspection/Discussion	
Automatic feeder hoppers and bulk storage facilities should be insulated against excessive temperatures (80°F and above).		✓			Inspection/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Release facilities</b>						
Do the release facilities ensure that fish are not subjected to adverse conditions?	✓				Transferred to Youngs Bay net pens prior to release	
<b>Pollution abatement facilities</b>						
Do the pollution abatement facilities meet all federal and state regulations (or good engineering practice)?		✓			Inspection of facilities/Discussion	
Are pollution abatement facilities operated correctly?		✓			See above	
<b>Transportation facilities</b>						
Are the transport systems adequate to meet IHOT performance measures for transportation practices?		✓			Use transportation facilities and equipment of other regions and adjacent hatcheries	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Broodstock selection practices</b>						
Is the donor selection process document attached? (PM #40a)	✓				Existing program; does not apply	
Was the donor selection outline followed in selecting hatchery broodstock? (PM #40b-c)	✓				Existing program; does not apply	
<b>Spawning practices</b>						
Were the appropriate number of spawners, male/female ratios, and fertilization protocols used? (PM #42c-g)	✓				Covered at Cascade Hatchery	
<b>Incubation practices</b>						
Are specific incubation standards listed in the hatchery operations plan?	✓				Incubation at Cascade Hatchery	
Are incubation practices written?	✓				See above	
Incubation Type 1: (see PM #8) Do you meet the loading and flow criteria?	✓				See above	
Incubation Type 2: (see PM #8) Do you meet the loading and flow criteria?	✓				See above	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>rearing practices</b>						
specific rearing standards listed in the hatchery operations plan?				✓	Review IHOT Hatchery Operations Plan	Develop written rearing standards and rearing practices
rearing practices written?				✓	See above	See above
rearing Unit Type 1: large asphalt pond (see PM #9)						
Do you meet the density and DI criteria?			✓		No written criteria	Develop written density and DI criteria
Do you meet the Loading and FI criteria?			✓		No written criteria	Develop written flow and 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?	✓					
rearing Unit Type 3: (see PM #9)						
Do you meet the density and DI criteria?	✓					
Do you meet the Loading and FI criteria?	✓					
<b>smolt quality</b>						
Do you produce a high quality smolt?		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Health management practices</b>						
Are the monthly hatchery monitoring visits being conducted? (PM #26)		✓			Review by audit team pathologist	
Are the annual broodstock inspections being conducted? (PM #27)		✓			Review of audit team pathologist	
Is there pathogen-free water and are the sanitation procedures being followed? (PM #28)	✓				No incubation and early rearing on station	
Are the following water quality parameters within criteria? (PM #5a-5g)						
Water temperature		✓			Review of records	
Dissolved gases			✓		No dissolved nitrogen data	See PM #5b
Chemistry			✓		No data	See PM #5c
Turbidity			✓		No data	See PM #5d
Alkalinity and hardness			✓		No data	See PM #5e
Nitrite			✓		No data	See PM #5f
Contaminants			✓		No data	See PM # 5g
Are rearing standards being followed? (PM #19)				✓	No written standards	See PM #19
Are egg and fish transfer/release requirements met? (PM #31)		✓			Review by audit team pathologist	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>Do hatchery performance meet requirements defined in the regional hatchery policies and in basin and hatchery plans for the following areas?</b></p> <p><b>Percent smoltification</b></p> <p>Do you measure percent smoltification?</p> <p>Did you meet the smoltification criteria?</p>	✓				Cost recovery fishery program for this stock	
<p><b>Rearing density (prior to release)</b></p> <p>Did you meet the rearing density criteria just prior to release?</p> <p><b>Disease condition (at release)</b></p> <p>Did you meet all disease regulations just prior to release?</p>	✓				Transferred to Youngs Bay net pens prior to release	
<p><b>Number (at release)</b></p> <p>Did you meet the release number goal?</p> <p><b>Size (at release)</b></p> <p>Did you meet the size goal?</p> <p><b>Timing of release</b></p> <p>Did you meet the release date goal?</p> <p><b>Location of release</b></p> <p>Did you release the fish at the specified location?</p>	✓				Transferred to Youngs Bay	
<p><b>Are fish reared in the subbasin or acclimated in the basin?</b></p> <p>Are the fish reared in the subbasin?</p> <p>Are the fish acclimated in the subbasin?</p> <p><b>Is the release strategy appropriate for the program?</b></p>		✓		✓	Reared in Herman Creek Acclimated at Youngs Bay	None. Cost recovery fishery; not supplementation program See above
		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Transportation facilities</b>						
Do transportation equipment and personnel receive disinfection before and after use?	✓				All transportation provided by other ODF&W hatcheries	
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)?	✓				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?	✓				See above	
Is the fish transport vehicle (cab) disinfected using 600 ppm quaternary ammonia compounds (1.5 ml of 50% stock solution/liter water)?	✓				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?	✓				See above	
200 ppm chlorine for 30 minutes					See above	
600 ppm quaternary ammonia compound for 30 minutes					See above	
200 ppm iodophor solution for 10 minutes	✓				See above	
Do personnel wear protective garments when handling fish eggs or cultural water?	✓				See above	
Do the fish transport truck/chassis and tank/unit receive an inspection and service prior to the release season?	✓				See above	
Is a daily service inspection completed before starting up and leaving for the day?	✓				See above	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Transportation facilities</b>						
Does the fish transport unit receive an inspection prior to loading?	✓				All transportation provided by other ODF&W hatcheries	
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?	✓				See above	
Do hauling criteria include checking the fish 45 minutes to 1 hour after loading?	✓				See above	
When fish are active and systems are functioning properly, is the oxygen concentration reduced and maintained at approximately 8 ppm?	✓				See above	
Is water temperature in the transportation unit maintained within the 42-48 °F range?	✓				See above	
Do fish releasing procedures include the following criteria?					See above	
Releasing the fish at the correct release site or into the correct water body.	✓				See above	
Tempering or the difference between the liberation tank and the target water body should not exceed 10°F.	✓				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.	✓				See above	

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

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

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>monthly hatchery monitoring visits being conducted by a qualified fish health specialist as described below?</b></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>		<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>			<p>Review of records at regional labs by audit team pathologist</p> <p>See above</p> <p>See above</p> <p>See above</p> <p>See above</p> <p>See above</p> <p>See above</p>	
<p><b>all of the functions of the hatchery yearly monitoring visits being completed as described below?</b></p> <p>Annually examine each broodstock for the presence of reportable viral pathogens.</p> <p>Annually screen each salmon broodstock for the presence of <i>Renibacterium salmoninarum</i>.</p> <p>Conduct inspection by or under the supervision of qualified fish health specialist.</p>		<p>✓</p> <p>✓</p> <p>✓</p>			<p>Review of records at regional lab by audit team pathologist</p> <p>See above</p> <p>See above</p>	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Are hatchery following accepted sanitation procedures?</b>		✓			Available from Oxbow Springs; but not needed for this program	
Are there any sources of pathogen-free water, especially for incubation and early rearing?		✓				
Are the hatchery sanitation procedures understood and being followed as described below?						
Disinfect/water harden eggs in iodophor?	✓				No spawning for this program on station	
Are foot baths containing disinfectant placed at the incubation facility's entrance and exit?	✓				No incubation of this program on station	
Is equipment and rain gear utilized in broodstock handling or spawning sanitized prior to its use elsewhere in the hatchery?	✓				See above	
Is equipment used to collect dead fish sanitized prior its use in another pond and/or lot of fish?		✓			Inspection of facilities/Discussion	
Is equipment, including vehicles used to transfer fish between facilities, disinfected prior to use with any other fish lots or at any other location?		✓			Inspection of facilities/Discussion	
Are rearing vessels sanitized after fish are removed and prior to introducing a new fish lot or stock?		✓			Inspection of facilities/Discussion	
Are dead fish properly disposed of?		✓			Inspection of facilities/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>water quality parameters being followed?</b>						
Are the following water quality parameters within criteria? (PM #5a-5g)						
Water temperature		✓			Review of records	
Dissolved gases			✓		No dissolved nitrogen data	See PM #5b
Chemistry			✓		No data	See PM #5c
Turbidity			✓		No data	See PM #5d
Alkalinity and hardness			✓		No data	See PM #5e
Nitrite			✓		No data	See PM #5f
Contaminants			✓		No data	See PM #5g
io to PM #21						
<b>incubation and rearing standards being followed?</b>						
Are the incubation practices following the IHOT incubation criteria? (PM #18)	✓				Incubation at Cascade	
Are the rearing practices following the IHOT criteria? (PM #19)				✓	No written practices	See PM #19
io to rearing practices PM #18-PM #19						
<b>egg and fish transfer/release requirements met?</b>		✓			Discussion	

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

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

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Do the hatchery's performance meet requirements defined in the regional hatchery policies and in the subbasin and hatchery plans for the following areas: percent smoltification, rearing density, disease condition, and the number, size date(s), and location of release?</b>						
Percent smoltification (PM #22a1)	✓				Transferred to Youngs Bay	
Rearing density (PM #22a2)	✓				Transferred to Youngs Bay	
Disease condition (PM #22a3)	✓				Transferred to Youngs Bay	
Number at release (PM #22a4)	✓				Transferred to Youngs Bay	
Size at release (PM #22a5)	✓				Transferred to Youngs Bay	
Date of release (PM #22a6)	✓				Transferred to Youngs Bay	
Location of release (PM #22a7)	✓				Transferred to Youngs Bay	
<b>Are fish reared in the subbasin or acclimated in the subbasin?</b>				✓	Not reared in subbasin; acclimated in Youngs Bay	See PM # 22b
PM #22b						
<b>Is the release strategy appropriate for the program?</b>		✓			Discussion	
PM #22c						

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>new programs, has a broodstock collection plan developed?</b>						
Is the broodstock collection plan written?	✓				Existing Program; does not apply	
For a non-captive broodstock program: Was an unbiased, representative sample collected?	✓				Existing Program; does not apply	
Was the recommended number of broodstock collected?	✓				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?	✓				Existing Program; does not apply	
Were full-sib crosses avoided?	✓				Existing Program; does not apply	
Is the broodstock collection plan understood and being followed by staff?	✓				Existing Program; does not apply	
<b>a new program, was the donor selection outline followed in selecting the hatchery broodstock?</b>						
Is a donor selection plan written?	✓				Existing Program; does not apply	
Was the donor selection outline followed in selecting the broodstock?	✓				Existing Program; does not apply	
Was the target stock recommended in the donor selection process actually used?	✓				Existing Program; does not apply	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>existing programs, were the broodstock collection procedures followed?</b></p> <p>Is the broodstock collection plan written?</p> <p>Does the broodstock collection plan follow the guideline:</p> <p>    Was an unbiased, representative sample collected?</p> <p>    Was the recommended number of broodstock collected?</p> <p>    Were the broodstock collection procedures in hatchery operation plan understood and followed?</p>	<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>				<p>Broodstock collection at Bonneville Hatchery; holding at Cascade Hatchery</p> <p>See above</p> <p>See above</p> <p>See above</p>	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Are the appropriate number of spawners, male/female ratios, and fertilization protocols used?</b>						
Are the spawning protocols written?	✓				These elements occur at Cascade Hatchery	
Are daily or weekly spawning logs available?	✓				See above	
Was the appropriate number of spawners used?	✓				See above	
Did you attempt to spawn all collected broodstock and randomize mating with respect to age class, and other traits?	✓				See above	
Was the sex-ratio within the limits given in the performance standards?	✓				See above	
Were the fertilization protocols followed?	✓				See above	
If the hatchery needed to reduce the number of eggs retained, was this done by representative sampling of each male/female cross?	✓				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 - Coho (Tanner Creek Stock: CEDC releases)

This section presents the corrective actions required to bring the Oxbow Hatchery - Coho (Tanner Creek Stock: CEDC releases) 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 - Coho (Tanner Creek Stock: CEDC releases)**

<b>Remedial Action Required</b>	<b>Cost</b>	<b>PMs<sup>1</sup></b>
<b>Type 1</b> - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery  Install security alarms	----	
<b>Type 2</b> - Remedial actions requiring changes in agency policies or procedures  Document adult contribution  Develop and maintain alarm log  Follow IHOT recommendations for regional oversight of feed production  Develop specific rearing standards for the IHOT Operations Plan	----  ----  ----  ----	4a  6  12  19
<b>Type 3</b> - 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
<b>Type 4</b> - Remedial actions requiring significant capital expenditures  Install double screen on upper Herman Creek ponds	\$400	10
<b>Type 5</b> - Remedial actions that may require significant capital expenditures but are not clearly definable at this time  None	----	

<sup>1</sup> 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.

## Hatchery Contribution to Fisheries, Spawning Grounds, and Hatcheries

This section presents the audit findings for the Oxbow Hatchery - Coho (Tanner Creek Stock: CEDC releases) 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 - Coho (Tanner Creek Stock: CEDC releases)**

Year	Fisheries <sup>1</sup> (Broodyear)	Spawning Grounds <sup>1</sup> (Broodyear)	Hatchery <sup>1</sup> (Broodyear)	Total Combined Contribution <sup>2</sup> (Broodyear)	Smolt to Adult Survival (percent)
1983					
1984					
1985					
1986					
1987	No information provided	No information provided	No information provided	No information provided	No information provided
1988	No information provided	No information provided	No information provided	No information provided	No information provided
1989	No information provided	No information provided	No information provided	No information provided	No information provided
1990	No information provided	No information provided	No information provided	No information provided	No information provided
1991	No information provided	No information provided	No information provided	No information provided	No information provided
1992					

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

<sup>2</sup> 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. Table 5 shows the annual operating expenses for the Oxbow Hatchery - Coho (Tanner Creek Stock: CEDC releases) 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 - Coho (Tanner Creek Stock: CEDC Releases)**

Hatchery	1993	1994	1995
1. Oxbow Hatchery	\$158,370	\$88,648	\$70,999
2.			
3.			
4.			
5.			
<b>Total Program Costs</b>	<b>\$158,370</b>	<b>\$88,648</b>	<b>\$70,999</b>

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**

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

**Table 5a. Annual Operating Expenses: Oxbow Hatchery - Coho (Tanner Creek Stock: CEDC Releases)**

**Expenditure Occurring at Oxbow Hatchery**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
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 <sup>1</sup>			
Lumped Third-Party Costs	\$0	\$0	\$0
<b>Total Hatchery Costs</b>	<b>\$439,918</b>	<b>\$340,952</b>	<b>\$308,692</b>
<b>Source of Funds</b>			
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%
<b>Program Costs</b>	<b>\$158,370</b>	<b>\$88,648</b>	<b>\$70,999</b>

<sup>1</sup> 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)**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
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 <sup>1</sup>			
Lumped Third-Party Costs	\$0	\$0	\$0
<b>Total Hatchery Costs</b>	<b>\$439,918</b>	<b>\$340,952</b>	<b>\$308,692</b>
<b>Source of Funds</b>			
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%
<b>Program Costs</b>	<b>\$19,356</b>	<b>\$14,661</b>	<b>\$10,804</b>

<sup>1</sup> 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)**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
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 <sup>1</sup>			
Lumped Third-Party Costs	\$0	\$0	\$0
<b>Total Hatchery Costs</b>	<b>\$439,918</b>	<b>\$340,952</b>	<b>\$308,692</b>
<b>Source of Funds</b>			
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%
<b>Program Costs</b>	<b>\$61,589</b>	<b>\$34,095</b>	<b>\$27,782</b>

<sup>1</sup> 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)**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
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 <sup>1</sup>			
Lumped Third-Party Costs	\$0	\$0	\$0
<b>Total Hatchery Costs</b>	<b>\$439,918</b>	<b>\$340,952</b>	<b>\$308,692</b>
<b>Source of Funds</b>			
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%
<b>Program Costs</b>	<b>\$219,959</b>	<b>\$143,200</b>	<b>\$98,781</b>

<sup>1</sup> 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)**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
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 <sup>1</sup>			
Lumped Third-Party Costs	\$0	\$0	\$0
<b>Total Hatchery Costs</b>	<b>\$439,918</b>	<b>\$340,952</b>	<b>\$308,692</b>
<b>Source of Funds</b>			
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%
<b>Program Costs</b>	<b>\$158,370</b>	<b>\$88,648</b>	<b>\$70,999</b>

<sup>1</sup> 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)**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
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 <sup>1</sup>			
Lumped Third-Party Costs	\$0	\$0	\$0
<b>Total Hatchery Costs</b>	<b>\$439,918</b>	<b>\$340,952</b>	<b>\$308,692</b>
<b>Source of Funds</b>			
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%
<b>Program Costs</b>	<b>\$0</b>	<b>\$64,781</b>	<b>\$108,042</b>

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