COWLITZ SALMON HATCHERY

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

JULY 1998

HATCHERY EVALUATION REPORT
SUMMARY FOR

Cowlitz Salmon Hatchery
- **Fall Chinook**
- **Spring Chinook**
- **Coho**

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

SUMMARY REPORT PREPARD BY:
DON SAMPSON
SAMPSEL CONSULTING SERVICES
FOR THE
NORTHWEST POWER PLANNING COUNCIL
JULY 1998

Original IHOT Audit Reports Prepared by:

Montgomery Watson
2375 130th Avenue NE
Suite 200
Bellevue, WA 98005
March 1997

BPA Project Number 95-2
Contract Number 95AC49468

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Section 1

Executive Summary

This report compiles a summary of the findings of three separate Hatchery Evaluation Reports for Fall Chinook, Spring Chinook, and Coho at Cowlitz Salmon Hatchery. The original Hatchery Evaluation Reports, prepared by Montgomery Watson, presented each species and program separately and include the complete findings. Details on the audit compliance status for each species and program are included in the original reports. The Hatchery Evaluation Reports were based upon audits conducted in 1996-1997 as part of a 2-year effort that will include 67 hatcheries and satellite facilities located on the Columbia and Snake River system in Idaho, Oregon, and Washington. The hatchery operating agencies include the U.S Fish and Wildlife Service, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife.

The hatchery is located on the Cowlitz River (river mile 45) approximately 10 miles from Mossyrock, Washington. The hatchery is operated by the Washington Department of Fish and Wildlife. The hatchery is used for adult collection, incubation, and rearing of spring chinook, fall chinook, and coho (Type N). Steelhead and cutthroat are also collected at this facility.

Background

The audit is being conducted as a requirement of the Northwest Power Planning Council (NPPC) "Strategy for Salmon" and the Columbia River Basin Fish and Wildlife Program. Under the audit, the hatcheries are evaluated against policies and related performance measures developed by the Integrated Hatchery Operations Team (IHOT) in January 1995. IHOT is a multi-agency group established by the NPPC to direct the development of new basinwide standards for managing and operating fish hatcheries. The Bonneville Power Administration (BPA) contracted with Montgomery Watson to act as an independent contractor for the audit.

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

The Audit Process

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

- Information was obtained from headquarters.
- The hatchery manager was asked to fill out and return the audit form.
- A 1-2 day site audit visit was conducted to inspect facilities, review hatchery records, discuss audit form responses, and develop remedial action plans.

- A compliance report was developed to document the compliance status of each performance measure. This report was then shared with the hatchery manager and IHOT representative.

- This hatchery evaluation report was written to document compliance with IHOT performance measures and develop cost estimates for remedial actions when needed.

Cowlitz Salmon Hatchery - Fall Chinook, Spring Chinook, and Coho Results

The Cowlitz Salmon facility includes ponds for adult holding, 36 concrete raceways, and incubation facilities. The hatchery was built in 1967 and is owned and funded by Tacoma City Light as mitigation for the fish impact caused by Mossyrock and Mayfield dams. The goal of the hatchery is 17,300 spring chinook adults, 8,300 fall chinook adults, and 25,500 coho adults return to Cowlitz River barrier dam. Steelhead (80,000- 160,000) are imprinted at the hatchery for release in April, however audit information for is not available for steelhead at the Cowlitz Salmon hatchery except for annual operating expenditures (Section 5).

FALL CHINOOK

The Cowlitz Salmon Hatchery - Fall Chinook program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery was not meeting its adult return goal and needed to increase its production. The audit found that the hatchery was not in compliance with the incubation and rearing temperature criteria, screen approach criteria, water quality monitoring requirements, predator control requirements, and pathology-free water criteria, which are all facilities requirements. The hatchery was not meeting the flow criteria for incubation and the density and flow criteria for rearing The hatchery was not meeting all the transportation, alarm, or food storage criteria. The hatchery did not have a Genetics Monitoring and Evaluation Program or a smoltification goal and monitoring plan.

The specific areas in which the Cowlitz Salmon Hatchery - Fall Chinook program requires remedial actions based on the IHOT performance measures are listed below. These remedial actions are listed in alphabetical order without intent of ranking or otherwise assigning priority:

- Change flow criteria for vertical stack incubators or increase flow
- Change pond cleaning procedures to improve production
- Check water flow alarms daily
- Chill 780 gpm by 5 °F for incubation
- Conduct IHOT QA/QC tests for feed preparation
- Construct 4 additional Burrow's pond
- Construct bird netting over 125,000 sf of raceway area
- Construct new screening facility to meet IHOT criteria
- Develop approved genetics M&E plan
- Develop disease-free water supply for incubation and early rearing (1,300 gpm)
- Develop smoltification goal and monitor
- Develop training schedule
- Document eyed-egg to fry survival
- Document number of eggs, fry, fingerlings, smolts, and/or adults to meet basinwide needs
- Follow IHOT protocols for disinfection of fish tank interior
- Follow IHOT protocols for disinfection transport vehicle cab
- Follow IHOT protocols for wearing protective garments when handling fish eggs or cultural water
- Follow IHOT temperature criteria for hauling
- Increase flow by 700 gpm/unit for modified Burrow's ponds
- Install alarms on adult holding, headboxes, and rearing ponds
- Install security alarms
- Install telephone pagers
- Monitor DO in the transport tank

- Monitor and record TGP
- Reroute discharge line to downstream of dam (72" line)
- Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants
- Verify that a daily service inspection of the fish transport vehicle is completed before starting up and leaving for the day
- Verify that fish transport truck/chassis and tank/unit receive an inspection and service prior to the release season

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

SPRING CHINOOK

The Cowlitz Salmon Hatchery - Spring Chinook program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery was not meeting its adult return goal and needed to increase its eye-egg to fry and fry-to-smolt survival. The audit found that the hatchery was not in compliance with the incubation and rearing temperature criteria, screen approach criteria, water quality monitoring requirements, predator control requirements, and pathology-free water criteria, which are all facilities requirements. The hatchery was not meeting the flow criteria for incubation or the density criteria for rearing The hatchery was not meeting all the transportation, alarm, or food storage criteria. The hatchery did not have a Genetics Monitoring and Evaluation Program or a smoltification goal and monitoring plan.

The specific areas in which the Cowlitz Salmon Hatchery - Spring Chinook program requires remedial actions based on the IHOT performance measures are listed below. These remedial actions are listed in alphabetical order without intent of ranking or otherwise assigning priority:

- Change flow criteria for vertical stack incubators or increase flow
- Change pond cleaning procedures to improve fry-to-smolt survival
- Check water flow alarms daily
- Chill 400 gpm by 5 °F for incubation
- Conduct IHOT QA/QC tests for feed preparation
- Construct 1 additional Burrow's pond
- Construct bird netting over 125,000 sf of raceway area
- Construct new screening facility to meet IHOT criteria
- Develop approved genetics M&E plan
- Develop disease-free water supply for incubation and early rearing (1,300 gpm)
- Develop smoltification goal and monitor
- Develop training schedule
- Document adult contribution
- Document number of eggs, fry, fingerlings, smolts, and/or adults to meet basinwide needs
- Follow IHOT protocols for disinfection of fish tank interior
- Follow IHOT protocols for disinfection of transport vehicle cab
- Follow IHOT protocols for wearing protective garments when handling fish eggs or cultural water
- Follow IHOT temperature criteria for hauling
- Improve eyed-egg to fry survival
- Install alarms on adult holding, headboxes, and rearing ponds

- Install security alarms
- Install telephone pagers
- Monitor DO in the transport tank
- Monitor and record TGP
- Reroute discharge line to downstream of dam (72" line)
- Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants
- Verify that a daily service inspection of the fish transport vehicle is completed before starting up and leaving for the day
- Verify that fish transport truck/chassis and tank/unit receive an inspection and service prior to the release season

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

COHO

The Cowlitz Salmon Hatchery - Coho (Type N) program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery was not meeting its adult return goal, needed to document eyed-egg to fry survival, and needed to increases its fry-to-smolt survival and production. The audit found that the hatchery was not in compliance with the spawning, incubation, and rearing temperature criteria, screen approach criteria, water quality monitoring requirements, predator control requirements, and pathology-free water criteria, which are all facilities requirements. The hatchery was not meeting the flow criteria for incubation and the density and flow criteria for rearing. The hatchery was not meeting all the transportation, alarm, or food storage criteria. The hatchery did not have a Genetics Monitoring and Evaluation Program or a smoltification goal and monitoring plan.

The specific areas in which the Cowlitz Salmon Hatchery - Coho (Type N) 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:

- Change flow criteria for vertical stack incubators or increase flow
- Change pond cleaning procedures to improve fry-to-smolt and production
- Check water flow alarms daily
- Chill 810 gpm by 2°F for incubation
- Collect an unbiased, representative sample of adults
- Conduct IHOT QA/QC tests for feed preparation
- Construct 4 additional kettle raceways
- Construct bird netting over 125,000 sf of raceway area
- Construct new screening facility to meet IHOT criteria
- Construct new volitional release facility
- Develop approved genetics M&E plan
- Develop disease-free water supply for incubation and early rearing (1,300 gpm)
- Develop smoltification goal and monitor
- Develop training schedule
- Document eyed-egg to fry survival
- Document number of eggs, fry, fingerlings, smolts, and/or adults to meet basinwide needs
- Follow IHOT protocols for disinfection of fish tank interior
- Follow IHOT protocols for disinfection of transport vehicle cab

- Follow IHOT protocols for wearing protective garments when handling fish eggs or cultural water
- Follow IHOT temperature criteria for hauling
- Increase flow by 10,000 gpm (1,000 gpm/unit) in modified Burrow's ponds
- Increase flow by 2,880 gpm (160 gpm/unit) in kettle raceways
- Install alarms on adult holding, headboxes, and rearing ponds
- Install security alarms
- Install telephone pagers
- Monitor DO in the transport tank
- Monitor and record TGP
- Reroute discharge line to downstream of dam (72" line)
- Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants
- Verify that a daily service inspection of the fish transport vehicle is completed before starting up and leaving for the day
- Verify that fish transport truck/chassis and tank/unit receive an inspection and service prior to the release season

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

Section 2

Facility Description

Name:	Cowlitz Salmon Hatchery
Stock/Species:	Fall Chinook Coho (Type N) Spring Chinook Steelhead
Operating Agency:	Washington Department of Fish and Wildlife
Funding Agency:	Tacoma City Light
Location:	The hatchery is located on the Cowlitz River (river mile 45) approximately 10 miles from Mossyrock, Washington.
Address:	2284 Spencer Road Salkum, WA 98582
Hatchery Manager:	Mr. Don Peterson
Phone: **Fax:**	(360) 985-7424 (360) 985-7500
Purpose:	The hatchery was built in 1967 and is owned and funded by Tacoma City Light as mitigation for the fish impact caused by Mossyrock and Mayfield dams. The goal of the hatchery is 17,300 spring chinook adults, 8,300 fall chinook adults, and 25,500 coho adults return to Cowlitz River barrier dam.

Production Goal:

Fall Chinook

Produce 6,500,000 subyearlings for on-station releases

Provide 10,500 eggs/fish to co-op programs

Provide eggs/fish to other facilities

Coho (Type N)

Produce 4,700,000 yearling for on-station release

Produce 800,000 to 1,200,000 subyearlings for upstream coho fishery

Provide 61,200 eggs/fish to co-op programs

Provide eggs/fish to other facilities

Spring Chinook

Produce 1,720,000 yearlings and subyearlings for on-station releases

Provide 60,000 egg/fish to co-op programs

Provide fingerlings for Upper Cowlitz Anadromous Fish Restoration

Provide eggs/fish to other facilities

Steelhead

Imprint 80,000 to 160,000 steelhead smolts - April release

Water Supply:

Water rights total 89,776 gpm from the Cowlitz River and 1,000 gpm from wells. The wells are used between September and April, normally for egg incubation and early fry rearing

Facilities:

Adult Holding:	Ladder + two adult holding ponds
Incubation:	270 16-tray vertical stack incubators (4,320 trays)
Early Rearing:	None
Raceways:	31 Modified Burrow's ponds - 15,000 cf each
	5 Modified Burrow's ponds - 11,000 cf each
	18 Kettles (raceways) - 2,250 cf each
Rearing Ponds:	None

Satellite Facilities: None

Section 3

Remedial Actions

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

The Five Types of Remedial Actions

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

Remedial Actions at Cowlitz Salmon Hatchery - Fall Chinook, Spring Chinook, and Coho

This section presents the corrective actions required to bring the Cowlitz Salmon Hatchery - Fall Chinook program into compliance with IHOT performance measures. The remedial actions described here are suggestions developed by the Montgomery Watson Audit Team. The remedial actions and associated cost estimates have not been analyzed or prioritized by the respective operating agencies, fishery managers, or IHOT. There may be additional remedial actions, not included in this report, proposed by the respective operating agencies. For some non-compliance areas, other remedial actions could be proposed. The required remedial actions are cross-referenced to each IHOT performance measure that was not in compliance. Where appropriate, the costs associated with the remedial actions are also presented (Table 3a, 3b, and 3c).

The cost estimates presented in this section are based on professional experience from similar projects. In most cases, only a lump-sum figure is presented, and detailed take-off lists have not been prepared. The cost estimates are essentially order of magnitude estimates (± 40%).

The suggested remedial activities may also present several levels of action. Optional actions have been listed for several problems. These optional actions are desirable for either operational or safety considerations.

Table 3a. Remedial Actions Required at Cowlitz Salmon Hatchery - Fall Chinook

Remedial Action Required	Cost	PMs[1]
Type 1 – Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery		
Increase adult returns	----	4b, 4h, 22a4
Type 2 – Remedial actions requiring changes in agency policies or procedures		
Document eyed-egg to fry survival	----	4e
Change pond cleaning procedures to improve production	----	4g
Document number of eggs, fry, fingerlings, smolts, and/or adults to meet basinwide needs	----	4i
Check water flow alarms daily	----	6
Conduct IHOT QA/QC tests for feed preparation	----	12
Change flow criteria for vertical stack incubators or increase flow	----	18
Develop smoltification goal and monitor	----	22a1
Follow IHOT protocols for disinfection of fish tank interior	----	23
Follow IHOT protocols for disinfection of transport vehicle cab	----	23
Follow IHOT protocols for wearing protective garments when handling fish eggs or cultural water	----	23
Verify that fish transport truck/chassis and tank/unit receive an inspection and service prior to the release season	----	23
Verify that a daily service inspection of the fish transport vehicle is completed before starting up and leaving for the day	----	23
Monitor DO in the transport tank	----	23
Follow IHOT temperature criteria for hauling	----	23
Develop training schedule	----	25
Develop approved genetics M&E plan	----	43

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

Remedial Action Required	Cost	PMs[1]
Type 3 – Remedial actions requiring changes in monitoring coverage or interval		
Monitor and record TGP	----	5b
Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants	----	5c-5g
Type 4 - Remedial actions requiring significant capital expenditures		
Chill 780 gpm by 5 °F for incubation	$320,000	5a
Develop disease-free water supply for incubation and early rearing (1,300 gpm)	$750,000	5h, 28
Install alarms on adult holding, headboxes, and rearing ponds	$30,000	6
Install security alarms	$5,000	6
Install telephone pagers	$5,000	6
Construct new screening facility to meet IHOT criteria	$2.0 million	10
Construct bird netting over 125,000 sf of raceways	$250,000	11
Reroute discharge line to downstream of dam (72" line)	$300,000	13
Construct 4 additional Burrow's pond	$450,000	19
Increase flow by 700 gpm/unit for Burrow's ponds	$15,000	19
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
None	----	

Table 3b. Remedial Actions Required at Cowlitz Salmon Hatchery - Spring Chinook

Remedial Action Required	Cost	PMs[2]
Type 1 - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery		

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

Remedial Action Required	Cost	PMs[2]
Increase adult returns	----	4b
Type 2 – Remedial actions requiring changes in agency policies or procedures		
Change pond cleaning procedures to improve fry-to-smolt survival	----	4f
Document number of eggs, fry, fingerlings, smolts, and/or adults to meet basinwide needs	----	4i
Check water flow alarms daily	----	6
Conduct IHOT QA/QC tests for feed preparation	----	12
Change flow criteria for vertical stack incubators or increase flow	----	18
Develop smoltification goal and monitor	----	22a1
Follow IHOT protocols for disinfection of fish tank interior	----	23
Follow IHOT protocols for disinfection of of transport vehicle cab	----	23
Follow IHOT protocols for wearing protective garments when handling fish eggs or cultural water	----	23
Verify that fish transport truck/chassis and tank/unit receive an inspection and service prior to the release season	----	23
Verify that a daily service inspection of the fish transport vehicle is completed before starting up and leaving for the day	----	23
Monitor DO in the transport tank	----	23
Follow IHOT temperature criteria for hauling	----	23
Develop training schedule	----	25
Develop approved genetics M&E plan	----	43

Remedial Action Required	Cost	PMs[1]
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Monitor and record TGP	----	5b
Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants	----	5c-5g
Type 4 - Remedial actions requiring significant capital expenditures		
Chill 400 gpm by 5 °F for incubation	$160,000	5a
Develop disease-free water supply for incubation and early rearing (1,300 gpm)	$750,000	5h, 28
Install alarms on adult holding, headboxes, and rearing ponds	$30,000	6
Install security alarms	$20,000	6
Install telephone pagers	$5,000	6
Construct new screening facility to meet IHOT criteria	$2.0 million	10
Construct bird netting over 125,000 sf of raceway area	$250,000	11
Reroute discharge line to downstream of dam (72" line)	$300,000	13
Construct 1 additional Burrow's pond	$150,000	19, 22a2
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Improve eyed-egg to fry survival	----	4e

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

Table 3c. Remedial Actions Required at Cowlitz Salmon Hatchery - Coho (Type N)

Remedial Action Required	Cost	PMs[1]
Type 1 - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery		
Type 2 - Remedial actions requiring changes in agency policies or procedures		
Document eyed-egg to fry survival	----	4e
Change pond cleaning procedures to improve fry-to-smolt and production	----	4f, 4g, 4h
Document number of eggs, fry, fingerlings, smolts, and/or adults to meet basinwide needs	----	4i
Check water flow alarms daily	----	6
Conduct IHOT QA/QC tests for feed preparation	----	12
Change flow criteria for vertical stack incubators or increase flow	----	18
Develop smoltification goal and monitor	----	22a1
Follow IHOT protocols for disinfection of fish tank interior	----	23
Follow IHOT protocols for disinfection of transport vehicle cab	----	23
Follow IHOT protocols for wearing protective garments when handling fish eggs or cultural water	----	23
Verify that fish transport truck/chassis and tank/unit receive an inspection and service prior to the release season	----	23
Verify that a daily service inspection of the fish transport vehicle is completed before starting up and leaving for the day	----	23
Monitor DO in the transport tank	----	23
Follow IHOT temperature criteria for hauling	----	23
Develop training schedule	----	25

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

Remedial Action Required	Cost	PMs[1]
Type 2 (Continued) - Remedial actions requiring changes in agency policies or procedures		
Collect an unbiased, representative sample of adults	----	41
Develop approved genetics M&E plan	----	43
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Monitor and record TGP	----	5b
Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants	----	5c-5g
Type 4 - Remedial actions requiring significant capital expenditures		
Chill 810 gpm by 2°F for incubation	$140,000	5a
Develop disease-free water supply for incubation and early rearing (1,300 gpm)	$750,000	5h, 28
Install alarms on adult holding, headboxes, and rearing ponds	$30,000	6
Install security alarms	$20,000	6
Install telephone pagers	$5,000	6
Construct new screening facility to meet IHOT criteria	$2.0 million	10
Construct bird netting over 125,000 sf of raceway area	$250,000	11
Reroute discharge line to downstream of dam (72" line)	$300,000	13
Construct 4 additional kettle raceways	$220,000	19, 22a2
Increase flow by 2,800 gpm (160 gpm/unit) in kettle raceways	$75,000	19
Construct new volitional release facility	$50,000	22c
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Increase flow by 10,000 gpm (1,000 gpm/unit) in modified Burrow's ponds	----	19

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

Section 4

Hatchery Contribution to Fisheries, Spawning Grounds, and Hatcheries

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

Table 4a. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries: Cowlitz Salmon Hatchery - Fall Chinook

Year	Fisheries[1] (Broodyear)	Spawning Grounds[1] (Broodyear)	Hatchery[1] (Broodyear)	Total Combined Contribution[2] (Broodyear)	Smolt to Adult Survival (percent)
1981					
1982					
1983					
1984					
1985	417	26	109	552	0.28%
1986	147	50	120	317	0.15%
1987	41	11	45	97	0.05%
1988	109	39	74	222	0.11%
1989	114	14	37	165	0.09%
1990					
1991					
1992					

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

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

Table 4b. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries: Cowlitz Salmon Hatchery - Spring Chinook

Year	Fisheries[1] (Broodyear)	Spawning Grounds[1] (Broodyear)	Hatchery[1] (Broodyear)	Total Combined Contribution[2] (Broodyear)	Smolt to Adult Survival (percent)
1981					
1982					
1983					
1984					
1985	2,071	17	1,188	3,276	2.28%
1986	2,227	0	1,480	3,707	2.61%
1987	1,670	13	1,394	3,077	2.08%
1988	No data provided	No data provided	No data provided	No data provided	No data provided
1989	3,599	45	3,306	6,950	1.14%
1990					
1991					
1992					

Table 4c. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries: Cowlitz Salmon Hatchery - Coho (Type N)

Year	Fisheries[3] (Broodyear)	Spawning Grounds[1] (Broodyear)	Hatchery[1] (Broodyear)	Total Combined Contribution[4] (Broodyear)	Smolt to Adult Survival (percent)
1981					

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

1982					
1983					
1984					
1985					
1986					
1987	481	No data provided	231	712	0.79%
1988	5,800	No data provided	1,853	7,653	4.59%
1989	1,388	1	632	2,021	1.18%
1990	702	No data provided	418	1,120	0.65%
1991	**30**	No data provided	89	119	0.17%
1992					

Section 5

Annual Operating Expenditures

The level and detail of annual operating expenditures varies widely depending on hatchery, operating agency, and funding source. When provided, expenditures were presented in terms of personnel costs, operating costs (power, feed, and supplies), capital costs, indirect costs charged to the federal government, third-party costs, and other costs. These cost components were summed to determine a total hatchery annual cost. Based on discussion with the hatchery manager, the percent of total hatchery costs allocated to a given program was estimated. The total hatchery costs and the percent of hatchery costs allocated to a given program were used to compute the cost of a given program. The total expenditures for the Cowlitz Salmon Hatchery are presented in Table 5 by program. The detailed breakdown of program expenditures for fall chinook, spring chinook, coho, and steelhead at this hatchery are presented in separate tables (Tables 6a, 6b, 6c, and 6d).

Table 5. Annual Operating Expenses - Cowlitz Salmon Hatchery

Program	**1994**	**1995**	**1996**
1. Spring Chinook	**$789,550**	**$679,283**	**$714,337**
2. Fall Chinook	**$200,066**	**$221,329**	**$216,085**
3. Coho (Type N)	**$787,133**	**$785,737**	**$812,491**
4. Steelhead	**$7,140**	**$3,380**	**$0**
5.			

Total Hatchery Costs	**$1,784,882**	**$1,689,758**	**$1,743,543**

Table 6a. Detailed Expenditures at Cowlitz Salmon Hatchery by Program

Fall Chinook

Component	**1994**	**1995**	**1996**
Personnel Costs	$587,142	$322,910	$369,768
Operational Costs	$685,415	$782,595	$813,775
Capital Costs	$5,127	$58,763	$0
Indirect Costs			
Lumped Hatchery Costs[1]			
Lumped Third-Party Costs	$507,198	$525,490	$560,000
Total Hatchery Costs	**$1,784,882**	**$1,689,758**	**$1,743,543**
Source of Funds			
Tacoma City Light	**100%**	**100%**	**100%**
Program Production (lb)	77,815	95,993	78,083
Total Production (lb)	694,224	732,869	630,035
Program as Percent of Total	11.2%	13.1%	12.4%
Program Costs	**$200,066**	**$221,329**	**$216,085**

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

Table 6b. Detailed Expenditures at Cowlitz Salmon Hatchery by Program

Spring Chinook

Component	1994	1995	1996
Personnel Costs	$587,142	$322,910	$369,768
Operational Costs	$685,415	$782,595	$813,775
Capital Costs	$5,127	$58,763	$0
Indirect Costs			
Lumped Hatchery Costs[1]			
Lumped Third-Party Costs	$507,198	$525,490	$560,000
Total Hatchery Costs	**$1,784,882**	**$1,689,758**	**$1,743,543**
Source of Funds			
Tacoma City Light	**100%**	**100%**	**100%**
Program Production (lb)	307,093	294,720	258,128
Total Production (lb)	694,224	732,869	630,035
Program as Percent of Total	44.2%	40.2%	41.0%
Program Costs	**$789,550**	**$679,283**	**$714,337**

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

Table 6c. Detailed Expenditures at Cowlitz Salmon Hatchery by Program

Coho (Type N)

Component	1994	1995	1996
Personnel Costs	$587,142	$322,910	$369,768
Operational Costs	$685,415	$782,595	$813,775
Capital Costs	$5,127	$58,763	$0
Indirect Costs			
Lumped Hatchery Costs[1]			
Lumped Third-Party Costs	$507,198	$525,490	$560,000
Total Hatchery Costs	**$1,784,882**	**$1,689,758**	**$1,743,543**
Source of Funds			
Tacoma City Light	**100%**	**100%**	**100%**
Program Production (lb)	306,409	340,789	293,824
Total Production (lb)	694,224	732,869	630,035
Program as Percent of Total	44.1%	46.5%	46.6%
Program Costs	**$787,133**	**$785,737**	**$812,491**

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

Table 6d. Detailed Expenditures at Cowlitz Salmon Hatchery by Program

Steelhead

Component	**1994**	**1995**	**1996**
Personnel Costs	$587,142	$322,910	$369,768
Operational Costs	$685,415	$782,595	$813,775
Capital Costs	$5,127	$58,763	$0
Indirect Costs			
Lumped Hatchery Costs[1]			
Lumped Third-Party Costs	$507,198	$525,490	$560,000
Total Hatchery Costs	**$1,784,882**	**$1,689,758**	**$1,743,543**
Source of Funds			
Tacoma City Light	**100%**	**100%**	**100%**
Program Production (lb)	2907	1367	0
Total Production (lb)	69,4224	732,869	630,035
Program as Percent of Total	0.4%	0.2%	0%
Program Costs	**$7,140**	**$3,380**	**$0**

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