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LEWIS RIVER/SPEELYAI HATCHERIES

A COMPILATION AND SUMMARY OF  
HOT AUDITS FOR SPRING CHINOOK  
AND COHO

JULY 1998

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# **HATCHERY EVALUATION REPORT SUMMARY FOR**

## **Lewis River/Speelyai Hatcheries**

- **Spring Chinook**
  - **Coho (S)**
  - **Coho (N)**

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

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

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

|  |    |
|--|----|
| Section 1 Executive Summary.....   | 1  |
| Section 2 Facility Description.....  | 5  |
| Section 3 Remedial Actions.....  |    |
| Section 4 Hatchery Contribution to Fisheries, Spawning Grounds and Hatcheries..... | 14 |
| Section 5 Annual Operating Expenditures.....                                       | 18 |

# Executive Summary

This report compiles a summary of the findings of three separate Hatchery Evaluation Reports for Spring Chinook, Coho (S), and Coho (N) at Lewis River/Speelyai Hatcheries. 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 adjacent to the Lewis River, 3 miles downstream from Merwin Dam, about 8 miles east of Woodland, Washington. Speelyai hatchery is operated as a satellite facility to the Lewis River Hatchery. The Washington Department of Fish and Wildlife operates the facilities. It is located in a mountainous area at the upper end of Lake Merwin on the Lewis River, approximately 21 miles east of Woodland. The hatchery is used for adult collection, incubation, and rearing of spring chinook, early coho (Type S), and late coho (Type N).

## 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.

## **Lewis River/Speelyai Hatcheries - Spring Chinook, Coho (S), and Coho (N) Results**

The Lewis River facility includes 12 concrete raceways, 2 rearing ponds, and incubation facilities. The Speelyai facility includes 1 adult holding pond, 12 concrete raceways, and 1 rearing pond. Lewis River and Speelyai hatcheries were originally constructed to provide mitigation for hydroelectric system development in the Lewis River System. An almost total remodel at Lewis River Hatchery was funded with state enhancement funds in 1979 and 1980. The goal of the hatchery is to produce adult coho and spring chinook that will contribute to NE Pacific and Columbia River Basin sport and commercial fisheries.

### **Spring Chinook**

The Lewis River/Speelyai Hatcheries - 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. The audit found that the hatchery was not in compliance with the screen approach and screen mesh criteria, temperature criteria, water quality monitoring requirements, and pathology-free water criteria, which are all facilities requirements. The hatchery was not meeting the flow criteria for incubation or the loading criteria for rearing ponds at Lewis River Hatchery. The hatchery needed to develop specific incubation and rearing standards for the IHOT Operations Plan, smoltification goal, and smoltification monitoring plan. The hatchery was not meeting all the alarm, food storage/quality control, transportation facilities, and sanitation requirements. The hatchery did not have a Genetics Monitoring and Evaluation Program.

The specific areas in which the Lewis River/Speelyai Hatcheries - 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:

- Check flow alarms daily
- Chill 300 gpm for incubation by 5°F
- Conduct IHOT QA/QC tests for feed preparation
- Develop approved genetics M&E plan
- Develop smoltification goal and monitor
- Develop specific incubation and rearing standards for the IHOT Operations Plan
- Follow IHOT incubation flow criteria or revise
- Follow IHOT protocols for disinfection of interiors and exteriors of transport vehicle
- Install security alarms at Lewis River and Speelyai Hatcheries
- Purchase telephone pagers for 8 staff
- Reduce program at Lewis River Hatchery or revise piping system to provide more water to the rearing ponds
- Replace screens at Speelyai Hatchery
- Run analysis for water quality parameters, turbidity, alkalinity, hardness, nitrite, and contaminants
- Sanitize equipment and rain gear utilized in broodstock handling or spawning prior to its use elsewhere in the hatchery
- Sanitize rearing vessels after fish are removed and prior to introducing a new fish lot or stock

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

### **Coho (S)**

The Lewis River/Speelyai Hatcheries - Coho (Type S) 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. The audit found that the hatchery was not in compliance with the screen approach and screen mesh criteria, temperature criteria, water quality monitoring requirements, and pathology-free water criteria, which are all facilities requirements. The hatchery was not meeting the flow criteria for incubation, the loading criteria for raceways at Lewis River Hatchery, the loading criteria for the Lewis River Hatchery rearing ponds, and space and flow criteria for the Speelyai rearing ponds. The hatchery needed to develop specific incubation and rearing standards for the IHOT Operations Plan, smoltification goal, and smoltification monitoring plan. The hatchery was also not meeting all the alarm, food storage/quality control, transportation facilities, and sanitation requirements. The hatchery did not have a Genetics Monitoring and Evaluation Program. The hatchery needed to construct acclimation ponds for the fish released in the Upper Columbia River Basin.

The specific areas in which the Lewis River/Speelyai Hatcheries - Coho (Type S) 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:

- Check flow alarms daily
- Build acclimation ponds for fish released in upper Columbia River Basin
- Conduct IHOT QA/QC tests for feed preparation
- Develop approved genetics M&E plan
- Develop smoltification goal and monitor
- Develop specific incubation and rearing standards for the IHOT Operations Plan
- Follow IHOT incubation flow criteria or revise
- Follow IHOT protocols for disinfection of interiors and exteriors of transport vehicle
- Install security alarms at Lewis River and Speelyai Hatcheries
- Purchase telephone pagers for 8 staff
- Reduce program at Speelyai Hatchery or revise piping system to provide more water to the raceways
- Reduce program at Lewis River Hatchery or revise piping system to provide more water to the rearing ponds
- Reduce program at Speelyai Hatchery or provide additional space and flow for the rearing ponds
- Replace screens at Speelyai Hatchery
- Run analysis for water quality parameters, turbidity, alkalinity, hardness, nitrite, and contaminants
- Sanitize equipment and rain gear utilized in broodstock handling or spawning prior to its use elsewhere in the hatchery
- Sanitize rearing vessels after fish are removed and prior to introducing a new fish lot or stock

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

## **Coho (N)**

The Lewis River/Speelyai Hatcheries - 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. The audit found that the hatchery was not in compliance with the temperature criteria, water quality monitoring requirements, and pathology-free water criteria, which are all facilities requirements. The hatchery was not meeting the flow criteria for incubation and the loading criteria for the Lewis River Hatchery rearing ponds. The hatchery needed to develop specific incubation and rearing standards for the IHOT Operations Plan, smoltification goal, and smoltification monitoring plan. The hatchery was not meeting all the alarm, food storage/quality control, transportation facilities, and sanitation requirements. The hatchery did not have a Genetics Monitoring and Evaluation Program.

The specific areas in which the Lewis River/Speelyai Hatcheries - 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:

- Check flow alarms daily
- Conduct IHOT QA/QC tests for feed preparation
- Develop approved genetics M&E plan
- Develop smoltification goal and monitor
- Develop specific incubation and rearing standards for the IHOT Operations Plan
- Follow IHOT incubation flow criteria or revise
- Follow IHOT protocols for disinfection of fish tank interiors and interiors and exteriors of transport vehicle
- Install security alarms at Lewis River Hatchery
- Monitor DO during transport
- Purchase telephone pagers for 8 staff
- Reduce program at Lewis River Hatchery or revise piping system to provide more water to the rearing ponds
- Run analysis for water quality parameters, turbidity, alkalinity, hardness, nitrite, and contaminants
- Sanitize equipment and rain gear utilized in broodstock handling or spawning prior to its use elsewhere in the hatchery
- Sanitize rearing vessels after fish are removed and prior to introducing a new fish lot or stock (rearing pond at Speelyai hatchery)

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



## Facility Description

|                          |  |
|--------------------------|--|
| <b>Name:</b>             | Lewis River and Speelyai Hatcheries  |
| <b>Stock/Species:</b>    | Spring Chinook<br>Coho (Type N)<br>Coho (Type S)   |
| <b>Operating Agency:</b> | Washington Department of Fish and Wildlife   |
| <b>Funding Agency:</b>   | PacifiCorp<br>NMFS (Mitchell Act)  |
| <b>Location:</b>         | The hatchery is located adjacent to the Lewis River, 3 miles downstream from Merwin Dam, about 8 miles east of Woodland, Washington. Speelyai hatchery is operated as a satellite facility to the Lewis River Hatchery. It is located in a mountainous area at the upper end of Lake Merwin on the Lewis River, approximately 21 miles east of Woodland.   |
| <b>Address:</b>          | 4404 Lewis River Road<br>Woodland, WA 98674  |
| <b>Hatchery Manager:</b> | Mr. Robin Nicolay  |
| <b>Phone:</b>            | (360) 225-2120   |
| <b>Fax:</b>              | (360) 225-6330   |
| <b>Purpose:</b>          | Lewis River and Speelyai hatcheries were originally constructed to provide mitigation for hydroelectric system development in the Lewis River System. An almost total remodel at Lewis River Hatchery was funded with state enhancement funds in 1979 and 1980. The goal of the hatchery is to produce adult coho and spring chinook that will contribute to NE Pacific and Columbia River Basin sport and commercial fisheries. |

**Production Goal:**

**Lewis River Hatchery Production**

**Spring Chinook**

Produce 900,000 yearlings for on-station release

**Coho (Type N)**

Produce 2,100,000 yearlings for on-station release

Provide 50,000 eggs to co-op programs

Provide eggs and fish to other facilities

**Coho (Type S)**

Produce 1,400,000 yearlings for on-station release

Produce 1,000,000 yearlings for upriver release

Produce 870,000 yearlings (from Speelyai Hatchery) for on-station release

Provide 14,000 eggs to co-op programs

Provide eggs and fish to other facilities

**Speelyai Hatchery Production**

**Spring Chinook**

Rear 315,000 spring chinook yearlings for transfer to Lewis River Hatchery

**Coho (Type S)**

Produce 200,000 yearlings for release into Lake Merwin

Provide 31,000 eggs/fish to co-op programs

**Water Supply:**

Lewis River Hatchery water rights total 38,613 gpm from three sources: the Lewis River, an unnamed stream, and Colvin Creek. Speelyai Hatchery water rights total 6,732 gpm from Speelyai Creek.

**Facilities (Lewis River Hatchery):**

|                |  |
|----------------|--|
| Adult Holding: | None   |
| Incubation:    | 80 10-tray vertical stack incubators (800 trays) |
| Early Rearing: | 5 deep troughs                                   |

Raceways: 12 concrete raceways - 4,000 cf each  
Rearing Ponds: 2 concrete ponds - 90,000 cf and 80,000 cf

**Facilities (Speelyai Hatchery):**

Adult Holding: 1 asphalt adult holding pond - 18,000 cf  
Incubation: 50 10-tray vertical stack incubators (500 trays)  
Early Rearing: 1 deep trough  
Raceways: 12 concrete raceways - 7,200 cf each  
Rearing Ponds: 1 asphalt rearing pond - 18,000 cf

## 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 Lewis River/Speelyai Hatcheries - Spring Chinook, Coho (S), and Coho (N)**

This section presents the corrective actions required to bring the Lewis River/Speelyai Hatcheries - Spring Chinook, Coho (S), and Coho(N) programs into compliance with IHOT performance measures. The remedial actions described here are suggestions developed by the Montgomery Watson Audit Team. The remedial actions and associated cost estimates have not been analyzed or prioritized by the respective operating agencies, fishery managers, or IHOT. There may be additional remedial actions, not included in this report, proposed by the respective operating agencies. For some non-compliance areas, other remedial actions could be proposed. The required remedial actions are cross-referenced to each IHOT performance measure that was not in compliance. Where appropriate, the costs associated with the remedial actions are also presented (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 ( $\pm 40\%$ ).

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

**Table 3a. Remedial Actions Required at Lewis River/Speelyai Hatcheries - Spring Chinook**

| <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 |             |                        |
| Improve adult returns  | ----        | 4h                     |
| <b>Type 2</b> - Remedial actions requiring changes in agency policies or procedures  |             |                        |
| Check flow alarms daily  | ----        | 6                      |
| Conduct IHOT QA/QC tests for feed preparation  | ----        | 12                     |
| Follow IHOT incubation flow criteria or revise   | ----        | 18                     |
| Develop specific incubation and rearing standards for the IHOT Operations Plan   | ----        | 18-19                  |
| Develop smoltification goal and monitor  | ----        | 22a1                   |
| Follow IHOT protocols for disinfection interiors and exteriors of transport vehicle  | ----        | 23                     |
| Sanitize equipment and rain gear utilized in broodstock handling or spawning prior to its use elsewhere in the hatchery                | ----        | 28                     |
| Sanitize rearing vessels after fish are removed and prior to introducing a new fish lot or stock                                       | ----        | 28                     |
| Develop approved genetics M&E plan   | ----        | 43                     |
| <b>Type 3</b> - Remedial actions requiring changes in monitoring coverage or interval  |             |                        |
| Run analysis for water quality parameters, turbidity, alkalinity, hardness, nitrite, and contaminants                                  | ----        | 5c-5g                  |

<sup>1</sup> PMs are performance measures that were extracted from the IHOT 1995 report.

| Remedial Action Required  | Cost      | PMS <sup>1</sup> |
|---|-----------|------------------|
| <b>Type 4</b> - Remedial actions requiring significant capital expenditures   |           |                  |
| Chill 300 gpm for incubation by 5°F   | \$120,000 | 5a               |
| Install security alarms at Lewis River and Speelyai Hatcheries  | \$25,000  | 6                |
| Purchase telephone pagers for 8 staff   | \$5,000   | 6                |
| Replace screens at Speelyai Hatchery  | \$32,000  | 10               |
| Reduce program at Lewis River Hatchery or revise piping system to provide more water to the rearing ponds                     | \$75,000  | 19               |
| <b>Type 5</b> - Remedial actions that may require significant capital expenditures but are not clearly definable at this time |           |                  |
| None  | ----      |                  |

**Table 3b. Remedial Actions Required at Lewis River/Speelyai Hatcheries - Coho (Type S)**

| Remedial Action Required   | Cost | PMS <sup>2</sup> |
|--|------|------------------|
| <b>Type 1</b> – Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery |      |                  |
| Improve adult returns  | ---- | 4c. 4h           |
| <b>Type 2</b> – Remedial actions requiring changes in agency policies or procedures  |      |                  |
| Check flow alarms daily  | ---- | 6                |
| Conduct IHOT QA/QC tests for feed preparation  | ---- | 12               |
| Follow IHOT incubation flow criteria or revise   | ---- | 18               |
| Develop specific incubation and rearing standards for the IHOT Operations Plan   | ---- | 18-19            |
| Develop smoltification goal and monitor  | ---- | 22a1             |

<sup>1</sup> PMS are performance measures that were extracted from the IHOT 1995 report.

<sup>2</sup> PMS are performance measures that were extracted from the IHOT 1995 report.

| <b>Remedial Action Required</b>   | <b>Cost</b> | <b>PMS<sup>2</sup></b> |
|---|-------------|------------------------|
| Follow IHOT protocols for disinfection of interiors and exteriors of transport vehicle                                  | ----        | 23                     |
| Sanitize equipment and rain gear utilized in broodstock handling or spawning prior to its use elsewhere in the hatchery | ----        | 28                     |
| Sanitize rearing vessels after fish are removed and prior to introducing a new fish lot or stock                        | ----        | 28                     |
| Develop approved genetics M&E plan  | ----        | 43                     |
| <b>Type 3</b> – Remedial actions requiring changes in monitoring coverage or interval                                   |             |                        |
| Run analysis for water quality parameters, turbidity, alkalinity, hardness, nitrite, and contaminants                   | ----        | 5c-5g                  |

| Remedial Action Required  | Cost          | PMS <sup>1</sup> |
|---|---------------|------------------|
| <b>Type 4</b> - Remedial actions requiring significant capital expenditures   |               |                  |
| Install security alarms at Lewis River and Speelyai Hatcheries  | \$25,000      | 6                |
| Purchase telephone pagers for 8 staff   | \$5,000       | 6                |
| Replace screens at Speelyai Hatchery (20.5 cfs)   | \$200,000     | 10               |
| Reduce program at Speelyai Hatchery or revise piping system to provide more water to the raceways                             | \$100,000     |                  |
| Reduce program at Lewis River Hatchery or revise piping system to provide more water to the rearing ponds                     | \$75,000      | 19               |
| Build acclimation ponds for fish released in upper Columbia River Basin   | \$1.0 million | 22b              |
| <b>Type 5</b> - Remedial actions that may require significant capital expenditures but are not clearly definable at this time |               |                  |
| None  | ----          |                  |

**Table 3c. Remedial Actions Required at Lewis River/Speelyai Hatcheries - Coho (Type N)**

| Remedial Action Required   | Cost | PMS <sup>2</sup> |
|--|------|------------------|
| <b>Type 1</b> - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery |      |                  |
| Improve adult returns  | ---- | 4c. 4h           |
| <b>Type 2</b> - Remedial actions requiring changes in agency policies or procedures  |      |                  |
| Check flow alarms daily  | ---- | 6                |
| Conduct IHOT QA/QC tests for feed preparation  | ---- | 12               |
| Follow IHOT incubation flow criteria or revise   | ---- | 18               |
| Develop specific incubation and rearing standards for the IHOT Operations Plan   | ---- | 18-19            |

<sup>1</sup> PMS are performance measures that were extracted from the IHOT 1995 report.

<sup>2</sup> PMS are performance measures that were extracted from the IHOT 1995 report.



| <b>Remedial Action Required</b>  | <b>Cost</b> | <b>PMS<sup>2</sup></b> |
|--|-------------|------------------------|
| Develop smoltification goal and monitor  | ----        | 22a1                   |
| Follow IHOT protocols for disinfection of fish tank interiors and interiors and exteriors of transport vehicle                       | ----        | 23                     |
| Monitor DO during transport  | ----        | 23                     |
| Sanitize equipment and rain gear utilized in broodstock handling or spawning prior to its use elsewhere in the hatchery              | ----        | 28                     |
| Sanitize rearing vessels after fish are removed and prior to introducing a new fish lot or stock (rearing pond at Speelyai hatchery) | ----        | 28                     |
| Develop approved genetics M&E plan   | ----        | 43                     |
| <b>Type 3</b> – Remedial actions requiring changes in monitoring coverage or interval  |             |                        |
| Run analysis for water quality parameters, turbidity, alkalinity, hardness, nitrite, and contaminants                                | ----        | 5c-5g                  |

| Remedial Action Required   | Cost                            | PMs <sup>1</sup> |
|--|---------------------------------|------------------|
| <b>Type 4</b> - Remedial actions requiring significant capital expenditures<br>Install security alarms at Lewis River Hatchery<br>Purchase telephone pagers for 8 staff<br>Reduce program at Lewis River Hatchery or revise piping system to provide more water to the rearing ponds | \$10,000<br>\$5,000<br>\$75,000 | 6<br>6<br>19     |
| <b>Type 5</b> - Remedial actions that may require significant capital expenditures but are not clearly definable at this time<br>None  | ----                            |                  |

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<sup>1</sup> PMs are performance measures that were extracted from the IHOT 1995 report.

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

This section presents the audit findings for the Lewis River/Speelyai Hatcheries - Spring Chinook, Coho (S), and Coho (N) 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:  
Lewis River/Speelyai Hatcheries - Spring Chinook**

| Year | Fisheries <sup>1</sup><br>(Broodyear) | Spawning<br>Grounds <sup>1</sup><br>(Broodyear) | Hatchery <sup>1</sup><br>(Broodyear) | Total<br>Combined<br>Contribution <sup>2</sup><br>(Broodyear) | Smolt to Adult<br>Survival<br>(percent) |
|------|---------------------------------------|---|--------------------------------------|---|---|
| 1981 |                                       |   |                                      |   |   |
| 1982 |                                       |   |                                      |   |   |
| 1983 |                                       |   |                                      |   |   |
| 1984 |                                       |   |                                      |   |   |
| 1985 |                                       |   |                                      |   |   |
| 1986 |                                       |   |                                      |   |   |
| 1987 |                                       |   |                                      |   |   |
| 1988 | 1,855                                 | 287   | 220                                  | 2,362   | 2.07%                                   |
| 1989 | 439                                   | 92  | 68                                   | 599   | 0.43%                                   |
| 1990 |                                       |   |                                      |   |   |
| 1991 |                                       |   |                                      |   |   |
| 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.

**Table 4b. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries:  
Lewis River/Speelyai Hatcheries - Coho (Type S)**

| <b>Year</b> | <b>Fisheries<sup>1</sup><br/>(Broodyear)</b> | <b>Spawning<br/>Grounds<sup>1</sup><br/>(Broodyear)</b> | <b>Hatchery<sup>1</sup><br/>(Broodyear)</b> | <b>Total<br/>Combined<br/>Contribution<sup>2</sup><br/>(Broodyear)</b> | <b>Smolt to Adult<br/>Survival<br/>(percent)</b> |
|-------------|--|---|---|--|--|
| 1981        |  |   |   |  |  |
| 1982        |  |   |   |  |  |
| 1983        |  |   |   |  |  |
| 1984        |  |   |   |  |  |
| 1985        |  |   |   |  |  |
| 1986        |  |   |   |  |  |
| 1987        | 765  | 9   | 250   | 1,024  | 1.39%  |
| 1988        | 2,479  | 29  | 1,587                                       | 4,095  | 5.57%  |
| 1989        | 546  | 2   | 219   | 767  | 1.02%  |
| 1990        | 160  | 2   | 80  | 242  | 0.32%  |
| 1991        | 3  | 3   | 224   | 230  | 0.32%  |
| 1992        |  |   |   |  |  |

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<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.

**Table 4c. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries:  
Lewis River/Speelyai Hatcheries - Coho (Type N)**

| <b>Year</b> | <b>Fisheries<sup>1</sup><br/>(Broodyear)</b> | <b>Spawning<br/>Grounds<sup>1</sup><br/>(Broodyear)</b> | <b>Hatchery<sup>1</sup><br/>(Broodyear)</b> | <b>Total<br/>Combined<br/>Contribution<sup>2</sup><br/>(Broodyear)</b> | <b>Smolt to Adult<br/>Survival<br/>(percent)</b> |
|-------------|--|---|---|--|--|
| 1981        |  |   |   |  |  |
| 1982        |  |   |   |  |  |
| 1983        |  |   |   |  |  |
| 1984        |  |   |   |  |  |
| 1985        |  |   |   |  |  |
| 1986        |  |   |   |  |  |
| 1987        |  |   |   |  |  |
| 1988        | 3,518  | 23  | 1,323                                       | 4,864  | 6.68%  |
| 1989        | 969  | 5   | 322   | 1,296  | 1.75%  |
| 1990        | 415  | 3   | 172   | 590  | 0.77%  |
| 1991        | 129  | 6   | 239   | 374  | 0.60%  |
| 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, 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 Lewis River/Speelyai Hatcheries are presented in Table 5 by program. The detailed breakdown of program expenditures for Spring Chinook, Coho (S), and Coho (N) at this hatchery are presented in separate tables (Tables 6a, 6b, and 6c).

**Table 5. Annual Operating Expenses - Lewis River/Speelyai Hatcheries**

| <b>Program</b>              | <b>1994</b>        | <b>1995</b>        | <b>1996</b>        |
|-----------------------------|--------------------|--------------------|--------------------|
| 1. Spring Chinook           | <b>\$608,316</b>   | <b>\$536,834</b>   | <b>\$566,205</b>   |
| 2. Coho (Type N)            | <b>\$239,421</b>   | <b>\$531,943</b>   | <b>\$548,372</b>   |
| 3. Coho (Type S)            | <b>\$178,795</b>   | <b>\$152,857</b>   | <b>\$368,554</b>   |
| 4.                          |                    |                    |                    |
| 5.                          |                    |                    |                    |
| <b>Total Hatchery Costs</b> | <b>\$1,027,562</b> | <b>\$1,222,858</b> | <b>\$1,486,104</b> |

**Table 6a. Detailed Expenditures at Lewis River/Speelyai Hatcheries by Program**  
**Spring Chinook**

| <b>Component</b>                   | <b>1993</b>        | <b>1994</b>        | <b>1995</b>        |
|------------------------------------|--------------------|--------------------|--------------------|
| Personnel Costs                    | \$242,208          | \$259,378          | \$231,569          |
| Operational Costs                  | \$620,455          | \$536,488          | \$467,759          |
| Capital Costs                      | \$248,000          | \$244,000          | \$600,000          |
| Indirect Costs                     | \$164,899          | \$182,992          | \$186,776          |
| Lumped Hatchery Costs <sup>1</sup> |                    |                    |                    |
| Lumped Third-Party Costs           |                    |                    |                    |
| <b>Total Hatchery Costs</b>        | <b>\$1,027,562</b> | <b>\$1,222,858</b> | <b>\$1,486,104</b> |
| <b>Source of Funds</b>             |                    |                    |                    |
| PacifiCorp                         | <b>66%</b>         | <b>66%</b>         | <b>66%</b>         |
| NMFS                               | <b>34%</b>         | <b>34%</b>         | <b>34%</b>         |
| Program Production (lb)            | 207,364            | 227,194            | 191,622            |
| Total Production (lb)              | 350,256            | 516,530            | 502,299            |
| Program as Percent of Total        | 59.2%              | 43.9%              | 38.1%              |
| <b>Program Costs</b>               | <b>\$608,316</b>   | <b>\$536,834</b>   | <b>\$566,205</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 Lewis River/Speelyai Hatcheries by Program**

**Coho (Type S)**

| <b>Component</b>                   | <b>1993</b>        | <b>1994</b>        | <b>1995</b>        |
|------------------------------------|--------------------|--------------------|--------------------|
| Personnel Costs                    | \$242,208          | \$259,378          | \$231,569          |
| Operational Costs                  | \$620,455          | \$536,488          | \$467,759          |
| Capital Costs                      | \$248,000          | \$244,000          | \$600,000          |
| Indirect Costs                     | \$164,899          | \$182,992          | \$186,776          |
| Lumped Hatchery Costs <sup>1</sup> |                    |                    |                    |
| Lumped Third-Party Costs           |                    |                    |                    |
| <b>Total Hatchery Costs</b>        | <b>\$1,027,562</b> | <b>\$1,222,858</b> | <b>\$1,486,104</b> |
| <b>Source of Funds</b>             |                    |                    |                    |
| PacifiCorp                         | <b>66%</b>         | <b>66%</b>         | <b>66%</b>         |
| NMFS                               | <b>34%</b>         | <b>34%</b>         | <b>34%</b>         |
| Program Production (lb)            | 61,102             | 64,637             | 124,836            |
| Total Production (lb)              | 350,256            | 516,530            | 502,299            |
| Program as Percent of Total        | 17.4%              | 12.5%              | 24.8%              |
| <b>Program Costs</b>               | <b>\$178,795</b>   | <b>\$152,857</b>   | <b>\$368,554</b>   |

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<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 Lewis River/Speelyai Hatcheries by Program  
Coho (Type N)**

| <b>Component</b>                   | <b>1993</b>        | <b>1994</b>        | <b>1995</b>        |
|------------------------------------|--------------------|--------------------|--------------------|
| Personnel Costs                    | \$242,208          | \$259,378          | \$231,569          |
| Operational Costs                  | \$620,455          | \$536,488          | \$467,759          |
| Capital Costs                      | \$248,000          | \$244,000          | \$600,000          |
| Indirect Costs                     | \$164,899          | \$182,992          | \$186,776          |
| Lumped Hatchery Costs <sup>1</sup> |                    |                    |                    |
| Lumped Third-Party Costs           |                    |                    |                    |
| <b>Total Hatchery Costs</b>        | <b>\$1,027,562</b> | <b>\$1,222,858</b> | <b>\$1,486,104</b> |
| <b>Source of Funds</b>             |                    |                    |                    |
| PacifiCorp                         | <b>66%</b>         | <b>66%</b>         | <b>66%</b>         |
| NMFS                               | <b>34%</b>         | <b>34%</b>         | <b>34%</b>         |
| Program Production (lb)            | 81,790             | 224,699            | 185,841            |
| Total Production (lb)              | 350,256            | 516,530            | 502,299            |
| Program as Percent of Total        | 23.3%              | 43.5%              | 36.9%              |
| <b>Program Costs</b>               | <b>\$239,421</b>   | <b>\$531,943</b>   | <b>\$548,372</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.