
WASHOUGAL HATCHERY

A COMPILATION AND SUMMARY OF IHOT AUDITS FOR COHO TYPE N, AND TULE FALL CHINOOK.

JULY, 1998

**HATCHERY EVALUATION REPORT
SUMMARY FOR**

washougal Hatchery
- **Coho (Type N)**
- **Tule Fall Chinook**

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

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CONTENTS

Section 1 Executive Summary 1

Section 2 Facility Description 4

Section 3 Remedial Actions 5

Section 4 Hatchery Contribution to Fisheries, Spawning Grounds and Hatcheries

Section 5 Annual Operating Expenditures 16

Executive Summary

This report compiles a summary of the findings of two separate Hatchery Evaluation Reports for Coho (Type N), and Fall Chinook Washougal Hatchery. The hatchery is located along the Washougal River about 16 miles north of the town of Washougal, Washington. The hatchery is used for adult collection, incubation, and rearing of tule fall chinook and late coho (N type).

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.

Washougal Hatchery - Tule Fall Chinook Results

The Washougal facility includes one pond for adult holding, 24 concrete raceways, 3 earthen ponds, and incubation facilities. The Washougal Hatchery was authorized under the Mitchell Act and began operating in 1959 as part of the Columbia River Fisheries Development Program - a program to mitigate for fishery losses caused by hydroelectric system development. The goal of the hatchery is to produce lower river fall chinook and coho that will contribute to NE Pacific and Columbia River Basin commercial and sports fisheries while providing adequate escapement for hatchery production.

The Washougal Hatchery - Tule 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 document smolt-to-adult survival. 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 in compliance with the feed preparation tests, flow for incubation criteria, and loading criteria for rearing. The hatchery needed to develop specific incubation and rearing standards for the IHOT Operations Plan. The hatchery did not have a Genetics Monitoring and Evaluation Program.

The specific areas in which the Washougal Hatchery - Tule 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:

- Conduct IHOT QA/QC tests for feed preparation
- Develop an approved genetics M&E plan
- Develop smoltification goal and monitor
- Develop specific incubation and rearing standards for the IHOT Operations Plan
- Improve smolt-to-adult survival
- Document water temperature in the transportation unit
- Follow IHOT criteria for incubation flow or revise criteria
- Follow IHOT protocols for disinfection of vehicle interiors and exteriors
- Monitor TGP and record
- Provide 2,000 gpm more water to earthen ponds 25, 26, and 27
- Provide disease-free water for incubation and early rearing
- Provide telephone pagers for staff
- Review IHOT temperature criteria for spawning and rearing
- Run analysis for water chemistry parameters, turbidity, 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.

Washougal Hatchery - Coho (Type N) Results

The Washougal facility includes one pond for adult holding, 24 concrete raceways, 3 earthen ponds, and incubation facilities. The Washougal Hatchery was authorized under the Mitchell Act and began operating in 1959 as part of the Columbia River Fisheries Development Program - a program to mitigate for fishery losses caused by hydroelectric system development. The goal of the hatchery is to produce lower river fall chinook and coho that will contribute to NE Pacific and Columbia River Basin commercial and sports fisheries while providing adequate escapement for hatchery production.

The Washougal 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 and needed to document its adult contribution and smolt-to-adult survival. The audit found that the hatchery was not in compliance with the temperature criteria, water quality monitoring requirements, acclimation facilities, and pathology-free water criteria, which are all facilities requirements. The hatchery was also not in compliance with the feed preparation tests, flow for incubation criteria, and loading criteria for rearing. The hatchery needed to develop specific incubation and rearing standards for the IHOT Operations Plan. The hatchery did not have a Genetics Monitoring and Evaluation Program.

The specific areas in which the Washougal 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:

- Conduct IHOT QA/QC tests for feed preparation
- Develop an approved genetics M&E plan
- Develop smoltification goal and monitor
- Develop specific incubation and rearing standards for the IHOT Operations Plan
- Document compliance with the adequacy of transportation systems to meet IHOT requirements
- Follow IHOT criteria for incubation flow or revise criteria
- Follow IHOT protocols for disinfection of vehicle interiors and exteriors
- Improve fry-to-smolt survival
- Improve smolt-to-adult survival
- Monitor TGP and record
- Provide 2,000 gpm more water to earthen ponds 25, 26 and 27
- Provide acclimation facilities for fish released in the Klickitat River
- Provide disease-free water for incubation and early rearing
- Provide documentation of water temperature in the transportation unit
- Provide documentation on inspection and service of the transport truck/chassis and tank/unit prior to the release season
- Provide telephone pagers for staff
- Review IHOT temperature criteria for spawning and rearing
- Run analysis for water chemistry parameters, turbidity, 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:	Washougal Fish Hatchery
Stock/Species:	Tule Chinook Coho (Type N)
Operating Agency:	Washington Department of Fish and Wildlife
Funding Agency:	Mitchell Act (NMFS)
Location:	The hatchery is located along the Washougal River about 16 miles north of the town of Washougal, Washington.
Address:	15632 Washougal River Road Washougal, WA 98671
Hatchery Manager:	Mr. John Norton
Phone:	(360) 837-3311
Fax:	(360) 837-3996
Purpose:	The Washougal Hatchery was authorized under the Mitchell Act and began operating in 1959 as part of the Columbia River Fisheries Development Program - a program to mitigate for fishery losses caused by hydroelectric system development. The goal of the hatchery is to produce lower river fall chinook and coho that will contribute to NE Pacific and Columbia River Basin commercial and sports fisheries while providing adequate escapement for hatchery production.

Production Goal:

Tule Fall Chinook

Produce 6 million subyearlings for on-station release.

Provide 500 eggs/fish to co-op programs

Provide eggs/fish to other facilities

Coho (Type N)

Produce 500,000 yearlings for on-station release

Provide 220,000 eggs/fish to co-op programs

Produce 2.5 million yearlings for release into the Klickitat River as per U.S. v. Oregon Agreement

Water Supply:

Water rights total 15,061 gpm from four sources: Washougal River Bob Creek, Boyle Creek, and C-Creek.

Facilities:

Adult Holding:	1 asphalt-lined adult pond - 100,825 cf
Incubation:	72 full stack vertical tray incubators - 1,152 trays 4 deep troughs
Early Rearing:	2 shallow troughs
Raceways:	12 concrete raceways - 5,000 cf each 12 concrete raceways - 8,750 cf each
Rearing Ponds:	1 earthen pond, Pond 25 - 100,000 cf 1 earthen pond, Pond 26 - 120,000 cf 1 earthen pond, Pond 27 - 420,000 cf
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 Washougal Hatchery - Tule Fall Chinook

This section presents the corrective actions required to bring the Washougal Hatchery - Tule Fall Chinook 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 Washougal Hatchery - Tule Fall Chinook

Remedial Action Required	Cost	PMS ¹
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¹ 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.

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 Washougal Hatchery - Coho (Type N)

This section presents the corrective actions required to bring the Washougal Hatchery - Coho (Type N) 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 Washougal 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		
Improve adult returns	----	4c
Install security alarms	----	6
Type 2 - Remedial actions requiring changes in agency policies or procedures		
Improve smolt-to-adult survival	----	4h
Review IHOT temperature criteria for spawning and rearing	----	5a
Conduct IHOT QA/QC tests for feed preparation	----	12
Document compliance with the adequacy of transportation systems to meet IHOT requirements	----	15
Develop specific incubation and rearing standards for the IHOT Operations Plan	----	18-19
Follow IHOT criteria for incubation flow or revise criteria	----	18
Develop smoltification goal and monitor	----	22a1
Follow IHOT protocols for disinfection of vehicle interiors and exteriors	----	23
Provide documentation on inspection and service of the transport truck/chassis and tank/unit prior to the release season	----	23
Provide documentation of water temperature in the transportation unit	----	23

Remedial Action Required	Cost	PMS¹
Type 1 - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery		
Improve adult returns	----	4c
Install security alarms	----	6
Type 2 - Remedial actions requiring changes in agency policies or procedures		
Document adult contribution	----	4a
Improve smolt-to-adult survival	----	4h
Develop an approved genetics M&E plan	----	43

Remedial Action Required	Cost	PMS¹
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Monitor TGP and record	----	5b
Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants	----	5c-5g
Type 4 - Remedial actions requiring significant capital expenditures		
Provide disease-free water for incubation and early rearing (10,000 gpm)	\$5.7 million	5h, 28
Provide telephone pagers for staff	5,000	6
Provide 2,000 gpm more water to earthen ponds 25, 26 and 27	75,000	19
Provide acclimation facilities for fish released in the Klickitat River	\$1.0 million	22b
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Improve fry-to-smolt survival	----	4f

Remedial Action Required	Cost	PMS¹
Review IHOT temperature criteria for spawning and rearing	----	5a
Conduct IHOT QA/QC tests for feed preparation	----	12
Develop specific incubation and rearing standards for the IHOT Operations Plan	----	18-19
Follow IHOT criteria for incubation flow or revise criteria	----	18
Develop smoltification goal and monitor	----	22a1
Develop an approved genetics M&E plan	----	43
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Monitor TGP and record	----	5b
Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants	----	5c-5g

Remedial Action Required	Cost	PMs¹
Type 4 - Remedial actions requiring significant capital expenditures		
Provide disease-free water for incubation and early rearing	\$5,700,000	5h, 28
Provide telephone pagers for staff	\$5,000	6
Provide 2,000 gpm more water to earthen ponds 25, 26, and 27	\$75,000	19
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
None	----	

Remedial Actions at Washougal Hatchery - Coho (Type N)

This section presents the corrective actions required to bring the Washougal Hatchery - Coho (Type N) 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.

¹ 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.

Table 3. Remedial Actions Required at Washougal 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		
Improve adult returns	----	4c
Install security alarms	----	6
Type 2 - Remedial actions requiring changes in agency policies or procedures		
Improve smolt-to-adult survival	----	4h
Review IHOT temperature criteria for spawning and rearing	----	5a
Conduct IHOT QA/QC tests for feed preparation	----	12
Document compliance with the adequacy of transportation systems to meet IHOT requirements	----	15
Develop specific incubation and rearing standards for the IHOT Operations Plan	----	18-19
Follow IHOT criteria for incubation flow or revise criteria	----	18
Develop smoltification goal and monitor	----	22a1
Follow IHOT protocols for disinfection of vehicle interiors and exteriors	----	23
Provide documentation on inspection and service of the transport truck/chassis and tank/unit prior to the release season	----	23
Provide documentation of water temperature in the transportation unit	----	23
Develop an approved genetics M&E plan	----	43

¹ 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.

Remedial Action Required	Cost	PMS¹
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Monitor TGP and record	----	5b
Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants	----	5c-5g
Type 4 - Remedial actions requiring significant capital expenditures		
Provide disease-free water for incubation and early rearing (10,000 gpm)	\$5.7 million	5h, 28
Provide telephone pagers for staff	5,000	6
Provide 2,000 gpm more water to earthen ponds 25, 26 and 27	75,000	19
Provide acclimation facilities for fish released in the Klickitat River	\$1.0 million	22b
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Improve fry-to-smolt survival	----	4f

¹ 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 Washougal Hatchery - Tule Fall Chinook 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:
Washougal Hatchery - Tule Fall Chinook**

Year	Fisheries ¹ (Broodyear)	Spawning Grounds ¹ (Broodyear)	Hatchery ¹ (Broodyear)	Total Combined Contribution ² (Broodyear)	Smolt to Adult Survival (percent)
1982					
1983					
1984					
1985	2,743	563	831	4,137	0.83%
1986	237	82	82	401	0.19%
1987	264	78	101	443	0.21%
1988	No information provided	No information provided	No information provided	No information provided	No information provided
1989	110	33	32	175	0.19%
1990					
1991					

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.

1992					
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This section presents the audit findings for the Washougal Hatchery - Coho (Type N) 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:
Washougal Hatchery - Coho (Type N)**

Year	Fisheries ¹ (Broodyear)	Spawning Grounds ¹ (Broodyear)	Hatchery ¹ (Broodyear)	Total Combined Contribution ² (Broodyear)	Smolt to Adult Survival (percent)
1982					
1983					
1984					
1985					
1986					
1987					
1988	2,022	No information provided	342	2,364	2.57%
1989	746	No information provided	311	1,057	1.18%
1990	91	No information provided	23	114	0.12%
1991	19	No information provided	43	62	0.07%
1992					

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

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

Annual Operating Expenditures

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

Table 6. Annual Operating Expenses - Washougal Hatchery

Program	1994	1995	1996
1. Tule Fall Chinook	\$196,832	\$224,623	\$195,399
2. Coho (N type)	\$416,351	\$411,703	\$424,914
3.			
4.			
5.			
Total Hatchery Costs	\$613,183	\$636,326	\$620,313

Table 6a. Detailed Expenditures at Washougal Hatchery by Program

Tule Fall Chinook

Component	1994	1995	1996
Personnel Costs	\$141,319	\$147,013	\$148,792
Operational Costs	\$187,137	\$192,625	\$164,700
Capital Costs	\$210,000	\$210,000	\$210,000
Indirect Costs	\$74,727	\$86,688	\$96,821
Lumped Hatchery Costs ¹			
Lumped Third-Party Costs			
Total Hatchery Costs	\$613,183	\$636,326	\$620,313
Source of Funds			
NMFS	100%	100%	100%
Program Production (lb)	70,625	79,337	81,627
Total Production (lb)	219,881	242,920	259,156
Program as Percent of Total	32.1%	35.3%	31.5%
Program Costs	\$196,832	\$224,623	\$195,399

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 Washougal Hatchery by Program

Coho (N Type)

Component	1994	1995	1996
Personnel Costs	\$141,319	\$147,013	\$148,792
Operational Costs	\$187,137	\$192,625	\$164,700
Capital Costs	\$210,000	\$210,000	\$210,000
Indirect Costs	\$74,727	\$86,688	\$96,821
Lumped Hatchery Costs ¹			
Lumped Third-Party Costs			
Total Hatchery Costs	\$613,183	\$636,326	\$620,313
Source of Funds			
NMFS	100%	100%	100%
Program Production (lb)	149,256	163,583	177,529
Total Production (lb)	219,881	242,920	259,156
Program as Percent of Total	32.1%	35.3%	31.5%
Program Costs	\$416,351	\$411,703	\$424,914

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