
HATCHERY EVALUATION REPORT

**Eastbank Hatchery - Summer Chinook (Wells Stock)
December 1996**

Integrated Hatchery Operations Team (IHOT)

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Eastbank Hatchery - Summer Chinook (Wells Stock)

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

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Executive Summary

This report presents the findings of the independent audit of the Eastbank Hatchery - Summer Chinook (Wells Stock) program. Eastbank Hatchery is located on the east side of the Columbia River near Rocky Reach Dam, 7 miles north of Wenatchee, Washington. Five satellite facilities are located on four different rivers (Wenatchee, Chiwawa, Methow, and Similkameen). The hatchery is used for incubation and rearing of Steelhead; Spring Chinook, Summer Chinook, and Sockeye.

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.

Eastbank Hatchery - Summer Chinook (Wells Stock) Results

The Eastbank facility includes three ponds for adult holding, 12 concrete raceways, 32 rearing ponds, and incubation facilities. The five satellite facilities consist of 7 ponds and 8 net pens. The hatchery was built to mitigate for smolt losses at Rock Island Dam and began operation in 1989.

The Eastbank Hatchery - Summer Chinook (Wells Stock) program was in general compliance with many of the performance measures. In the area of program objectives, the hatchery did not have a Monitoring and Evaluation Plan in place and the required documentation on many of egg, fry, and adult production goals. The audit found that the hatchery was not in compliance with the water quality monitoring requirements, alarm and security alarm requirements, rearing requirements, and pathology-free water criteria, which are all facilities requirements. The hatchery was not following the IHOT protocols for feed production, vehicle disinfection, and transportation. The hatchery needed to develop specific incubation and rearing standards, a smoltification goal and monitoring program, and conduct fisheries contribution studies. The hatchery did not have a Genetics Monitoring and Evaluation Program in place.

The specific areas in which the Eastbank Hatchery - Summer Chinook (Wells Stock) program requires remedial actions based on the IHOT performance measures are listed below. These remedial actions are listed in alphabetical order without intent of ranking or otherwise assigning priority:

- Change hauling temperature or review IHOT temperature criteria for hauling
- Change volitional release procedures
- Conduct fish contribution studies
- Construct two additional raceways and one super-raceway
- Decrease turbidity at Similkameen Satellite
- Develop genetics monitoring and evaluation program
- Develop monitoring and evaluation plan
- Develop smoltification goal and monitor
- Develop specific incubation and rearing standards for IHOT Operations Plan
- Develop IHOT criteria for Isoflow incubators
- Discuss IHOT Operations Plan with staff
- Review release procedures as they relate to overall program
- Document adult contribution
- Document DO and TGP levels
- Develop eyed-egg to fry survival goal for IHOT
- Document fry-to-smolt survival
- Document green-egg to eyed-egg survival
- Document smolt production
- Document smolt-to-adult survival
- Follow IHOT QA/QC protocols for feed production

- Follow IHOT requirements for exterior and interior vehicle disinfection
- Install alarms in quarantine areas
- Install bird netting over raceways
- Install second set of screens to raceways
- Install security alarms
- Need 50 additional half stack incubators for full program
- Review IHOT incubation and rearing temperature criteria
- Discuss IHOT Operations Plan with staff
- Review release procedures as they relate to overall program
- Run analysis for water chemistry parameters, 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:	Eastbank Fish Hatchery
Stock/Species:	Summer Chinook (Wenatchee Stock) Summer Chinook (Wells Stock) Sockeye (Lake Wenatchee Stock) Spring Chinook (Chiwawa Stock) Steelhead
Operating Agency:	Washington Department of Fish and Wildlife
Funding Agency:	Chelan PUD
Location:	Eastbank Hatchery is located on the east side of the Columbia River near Rocky Reach Dam, 7 miles north of Wenatchee, Washington. Five satellite facilities are located on four different rivers (Wenatchee, Chiwawa, Methow, and Similkameen).
Address:	Eastbank Fish Hatchery Washington Department of Fish and Wildlife 13246 Lincoln Rock Road E East Wenatchee, WA 98802
Hatchery Manager:	Mr. Steve Robards
Phone:	(509) 884-8301
Fax:	(509) 886-0823
Purpose:	The hatchery was built to mitigate for smolt losses at Rock Island Dam and began operation in 1989.
Production Goal:	<p>Summer Chinook (Wenatchee Stock) Produce 864,000 yearling spring chinook for release in the Wenatchee River.</p> <p>Summer Chinook (Wells Stock) Produce 400,000 yearling summer chinook for release into the Methow River</p> <p>Produce 576,000 yearling summer chinook for release into the Similkameen River.</p> <p>Sockeye (Lake Wenatchee Stock) Produce 200,000 subyearling sockeye for release into Lake Wenatchee from Lake Wenatchee net pens.</p>

Spring Chinook (Chiwawa Stock)

Produce 672,000 yearlings spring chinook for release into the Chiwawa River.

Steelhead

Produce 200,000 summer steelhead smolts for off-station release.

Water Supply:

Four deep aquifer wells provide up to 53 cfs of water at a relatively constant temperature. The five satellites are supplied with approximately 89 cfs of river water.

Facilities:

Adult Holding:

2 adult salmon holding raceways

1 adult steelhead raceways - 3,760 cf

Incubation:

29 8 stacks (232 trays)

Early Rearing:

6 shallow troughs - 30 cf each

Raceways:

5 concrete raceways - 22,000 cf each

7 concrete raceways - 3,700 cf each

Rearing Ponds:

2 concrete ponds - 52,000 cf each

30 concrete ponds - 36,000 cf each

Satellite Facilities:

Similkameen Satellite Facility

1 rearing pond - 2,386 cf

2 concrete raceways - 168 cf each

Chiwawa Satellite Facility

2 rearing ponds - 75,000 cf each

Lake Wenatchee Satellite Facility

8 net pens - 7,400 cf each

Dryden Satellite Facility

1 lined rearing pond - 115,200 cf

Carlton Satellite Facility

1 lined rearing pond - 53,400 cf

Compliance Status

The hatchery audits are based on compliance with written IHOT performance measures. These performance measures are documented in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (referred to as *IHOT 1995* in this report).¹ The purpose of the performance measures is to implement new basinwide policies that provide regional guidelines for operating anadromous hatcheries in the Columbia Basin.

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

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

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

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

The Hatchery Audit Process

The hatchery audit will be conducted over a 2-year period that concludes in 1997. At each hatchery, a five-step process was used to complete the overall hatchery audit. This process

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

consisted of research and onsite visits. The site visit at the Eastbank Hatchery was conducted on October 30-31, 1996.

The following is the five-step audit process:

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

Compliance Status of Eastbank Hatchery - Summer Chinook (Wells Stock)

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

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

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

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

Table 1 Summary Program Information for Eastbank Hatchery - Summer Chinook (Wells Stock)

Component	Location of Adult Holding, Spawning, Incubation, and Rearing					
	Wells Hatchery	Eastbank Hatchery	Similkameen Satellite	Carlton Satellite		
Adult Collection	✓					
Adult Holding	✓					
Spawning	✓					
Fertilization	✓					
Incubation						
green-to-eyed		✓				
eyed-to-hatch		✓				
Rearing						
fry		✓				
fingerlings		✓				
smolts		✓				
Acclimation/release			✓	✓		

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
the hatchery programs outlined in a subbasin management plan?		✓			Columbia Basin System Planning Production Plan and FERC License	
Is the hatchery operating under a current hatchery operational plan?		✓			IHOT Operations Plan	
Is it understood by staff?				✓	Interview	Discuss Operations Plan with staff
Is it being followed?				✓	Interview	Discuss Operations Plan with staff
Is a hatchery monitoring and evaluation plan in place?						
Do you have a written monitoring and evaluation plan?				✓	Interview	Develop monitoring and evaluation plan
What is the hatchery's contribution to fisheries, spawning grounds, and hatchery production?				✓	Review of records; 1 year only	Document adult contribution
What is the hatchery's contribution to pre-spawning survival as compared with established goal?	✓				Holding at Wells Hatchery	
What is the hatchery's contribution to post-spawning survival as compared with established hatchery goal?	✓				Spawning at Wells Hatchery	
What is the hatchery's contribution to green-egg to eyed-egg survival as compared with established goal?			✓		No data provided	Document green-egg to eyed-egg survival
What is the hatchery's contribution to eyed-egg to fry survival as compared with established goal?			✓		No goal provided	Develop IHOT goal for eyed-egg to fry survival
What is the hatchery's contribution to fry-to-smolt survival as compared with established goal?			✓		No data provided	Document fry-to-smolt survival
What is the hatchery's contribution to smolt production as compared with established goal?			✓		No data provided	Document smolt production
What is the hatchery's contribution to smolt-to-adult survival (smolt to adult) as compared with established goal?			✓		No data provided	Document smolt-to-adult survival
What is the hatchery's contribution to the number of eggs, fry, fingerlings, smolts, and/or adults that meet basinwide needs?	✓				Review of records/Discussion Partial data provided	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Temperature						
Does your water temperature meet the criteria for spawning?	✓				At Wells Hatchery	
Does your water temperature meet the criteria for incubation?				✓	Review of Data. IHOT criteria may be too narrow.	Review IHOT incubation temperature criteria
Does your water temperature meet the criteria for rearing?				✓	Review of Data. IHOT criteria may be too narrow.	Review IHOT rearing temperature criteria
Dissolved gases						
Is the oxygen level near saturation?			✓		Design of system to meet criteria	Document DO levels
Is the dissolved nitrogen level less than saturation?			✓		See above	Document TGP levels
Chemistry						
Ammonia (un-ionized)			✓		No data collected	Run analysis
Carbon Dioxide			✓		No data collected	Run analysis
Chlorine			✓		No data collected	Run analysis
H			✓		No data collected	Run analysis
Copper			✓		No data collected	Run analysis
Hydrogen Sulfide			✓		No data collected	Run analysis
Iron			✓		No data collected	Run analysis
Zinc			✓		No data collected	Run analysis
Turbidity						
Does your turbidity meet the criteria?						
Eastbank Hatchery		✓			Observations	
Similkameen Satellite				✓	Observations	Decrease turbidity at Similkameen Satellite

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Alkalinity and hardness						
Does your alkalinity and hardness meet the criteria?		✓			Interview	
Nitrite						
Does your nitrite meet the criteria?			✓		No data	Run analysis
Pesticide Contaminants						
Aldrin			✓		No data provided	Run analysis
Dieldrin			✓		No data provided	See above
Heptachlor			✓		No data provided	See above
Chlordane			✓		No data provided	See above
Methoxychlor			✓		No data provided	See above
Endosulfan			✓		No data provided	See above
Malathion			✓		No data provided	See above
Parathion			✓		No data provided	See above
Disease						
What portions of the hatchery have disease-free water?						
Adult holding	✓				No adults for this program held at hatchery	
Incubation		✓			Well water	
Early rearing		✓			Well water	
Rearing		✓			Well water	
Acclimation ponds				✓	River water	None

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Alarm Systems						
Do the following areas have alarms?						
Intake		✓			Inspection of facilities/Interview	
Large rearing ponds and adult holding ponds		✓			Inspection of facilities/Interview	
Raceway headboxes and rearing ponds		✓			Inspection of facilities/Interview	
Incubation facilities		✓			Inspection of facilities/Interview	
Quarantine areas and facilities				✓	Inspection of facilities/Interview	Install alarms in quarantine areas
Water treatment systems		✓			Inspection of facilities/Interview	
Security				✓	Inspection of facilities/Interview	Install security alarms
Are there outside systems and buzzers in onsite residences?		✓			Interview	
Are water flow alarms checked daily?		✓			Interview/Data	
Are all other alarms checked weekly?		✓			Interview	
Is there a log of alarms for emergencies, tests, and maintenance requirements?		✓			Interview	
Are telephone pagers used?		✓			Interview	
Adult collection and holding facilities						
Do you meet the adult holding criteria?		✓			Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>Abatement facilities</p> <p>Type 1: vertical tray Do you have an adequate number of units for the overall program?</p> <p>Type 2: _____ Do you have an adequate number of units for the overall program?</p>				✓	Discussion	Need 50 half stacks for full program
<p>Rearing facilities</p> <p>Type 1: Raceway Do you have an adequate number of units for the overall program?</p> <p>Type 2: Super raceway Do you have an adequate number of units for the overall program?</p> <p>Type 3: Rearing at Carlton Do you have an adequate number of units for the overall program?</p> <p>Type 4: rearing at Similkameen Do you have an adequate number of units for the overall program?</p>				✓ ✓ ✓ ✓	Data/Interview Inspection of facilities/Discussion Inspection of facilities/Discussion Discussion	Construct two more raceways Construct one more super raceway
<p>Screening facilities</p> <p>Do you meet the approach velocity criteria?</p> <p>Are the fish screens regularly cleaned?</p> <p>Does the screen mesh meet screen opening criteria?</p> <p>Are rearing containers double screened for fish that should not be released to adjacent water?</p>		✓ ✓		✓	Discussion/Review of engineering plans Submerged "T" intake Discussion/Review Inspection/Discussion	Add second screens to raceways

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>predator control facilities</p> <p>Are your predation control facilities effective?</p>				✓	Discussion	Add bird netting to raceways

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
d storage facilities and quality control						
Does the storage of dry/semi-moist/moist foods (dry <12%; semi-moist 12-20%; moist >20% moisture) follow food manufacturer's recommendations?		✓			Discussion	
Does a regional quality control officer oversee production procedures and monitor:						
Verification by feed manufacturer that ingredients meet specifications?				✓	Discussion	Follow IHOT QA/QC protocols for feed production
Ensure feed does not contain unwanted drugs or other additives?				✓	Discussion	See above
Analyze ingredients contained in the final food product to ensure that feed specifications have been met?				✓	Discussion	See above
Are the foods stored and handled according to the following criteria?						
Moist pellets should not exceed 10°F at point of delivery.		✓			Discussion	
Moist pellets should be removed from freezer just prior to feeding.		✓			Discussion	
Do not leave buckets of feed or feed containers outside exposed to light or heat.		✓			Discussion	
Open bags of feed should be fed within 1 to 2 days except when feeding small groups of fish.		✓			Discussion	
Automatic feeder hoppers and bulk storage facilities should be insulated against excessive temperatures (80°F and above).	✓				Not used for this program	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Release facilities Do the release facilities ensure that fish are not subjected to adverse conditions?				✓	Discussion of release procedure. Current practice forces fish through narrow opening.	Change volitional release procedure
Pollution abatement facilities Do the pollution abatement facilities meet all federal and state regulations (or good engineering practice)?		✓			Discussion/Inspection	
Are pollution abatement facilities operated correctly?		✓			Discussion/Inspection	
Transportation facilities Are the transport systems adequate to meet IHOT performance measures for transportation practices?		✓			Discussion	

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

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
rearing practices						
specific rearing standards listed in the hatchery operations plan?				✓	Review of IHOT Hatchery Operations Plan	Develop specific rearing standards for IHOT Operations Plan
rearing practices written?				✓	No written plan	See above
Rearing Unit Type 1: Raceway (see PM #9)						
Do you meet the density and DI criteria?		✓			Review of records/Discussion - related to Piper's indices	
Do you meet the Loading and FI criteria?		✓				
Rearing Unit Type 2: Super raceway (see PM #9)						
Do you meet the density and DI criteria?		✓			Review of records/Discussion - related to Piper's indices	
Do you meet the Loading and FI criteria?		✓				
Rearing Unit Type 3: Ponds (see PM #9)						
Do you meet the density and DI criteria?		✓			Review of records/Discussion - related to Piper's indices	
Do you meet the Loading and FI criteria?		✓				
smolt quality						
Do you produce a high quality smolt?		✓			Discussion	

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

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>Do hatchery performance meet requirements defined in the regional hatchery policies and in basin and hatchery plans for the following areas?</p> <p>Percent smoltification</p> <p>Do you measure percent smoltification?</p> <p>Did you meet the smoltification criteria?</p>			✓	✓	<p>Discussion</p> <p>Discussion</p>	<p>Develop smoltification goal and monitor</p> <p>See above</p>
<p>Rearing density (prior to release)</p> <p>Did you meet the rearing density criteria just prior to release?</p>		✓			Data	
<p>Disease condition (at release)</p> <p>Did you meet all disease regulations just prior to release?</p>		✓			Discussion	
<p>Release number (at release)</p> <p>Did you meet the release number goal?</p>		✓			Discussion	
<p>Release size (at release)</p> <p>Did you meet the size goal?</p>		✓			Data	
<p>Release dates of release</p> <p>Did you meet the release date goal?</p>		✓			Data	
<p>Release location of release</p> <p>Did you release the fish at the specified location?</p>		✓			Data	
<p>Release location of fish reared in the subbasin or acclimated in the basin?</p> <p>Are the fish reared in the subbasin?</p> <p>Are the fish acclimated in the subbasin?</p>		✓			<p>Discussion</p> <p>Discussion</p>	
<p>Is the release strategy appropriate for the program?</p>			✓		Discussion	Review release procedures as they relate to overall program

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Transportation facilities						
Do transportation equipment and personnel receive disinfection before and after use?		✓			Discussion	
Is the fish tank interior disinfected using a solution of 100 ppm active chlorine for 30 minutes minimum or formaldehyde gas generation method (relative humidity of 60% for 2 hrs)?		✓			Discussion	
Is the exterior of the fish transport vehicle disinfected using high pressure steam (115-130°C), high temperature acid, or with 200 ppm chlorine for 30 minutes?				✓	Discussion	Follow IHOT requirements for exterior and interior vehicle disinfection
Is the fish transport vehicle (cab) disinfected using 600 ppm quaternary ammonia compounds (1.5 ml of 50% stock solution/liter water)?				✓	Discussion	Follow IHOT requirements for exterior and interior vehicle disinfection
Is other equipment disinfected including fish pumps, nets, egg sorters, waders, boots, rain gear, hoses and other equipment using one of the following solutions? 200 ppm chlorine for 30 minutes 600 ppm quaternary ammonia compound for 30 minutes 200 ppm iodophor solution for 10 minutes		✓			Discussion	
Do personnel wear protective garments when handling fish eggs or cultural water?		✓			Discussion	
Do the fish transport truck/chassis and tank/unit receive an inspection and service prior to the release season?		✓			Discussion	
Is a daily service inspection completed before starting up and leaving for the day?		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Transportation facilities						
Does the fish transport unit receive an inspection prior to loading?		✓			Discussion	
Does a pre-loading inspection covering tank water level, pumps or aerators, oxygen injection system settings, displacement gauge, and truck loading/hauling density tables checked and reviewed occur prior to loading fish in the transport unit?		✓			Discussion	
Do hauling criteria include checking the fish 45 minutes to 1 hour after loading?		✓			Discussion	
When fish are active and systems are functioning properly, is the oxygen concentration reduced and maintained at approximately 8 ppm?		✓			Discussion	
Is water temperature in the transportation unit maintained within the 42-48 °F range?				✓	Discussion	Change hauling temperature or review IHOT temperature criteria for hauling
Do fish releasing procedures include the following criteria?						
Releasing the fish at the correct release site or into the correct water body.		✓			Discussion	
Tempering or the difference between the liberation tank and the target water body should not exceed 10°F.		✓			Discussion	
The liberation hose should be angled so that fish gently hit the water. Using a tripod is a method of ensuring the hose will stay at the proper angle.		✓			Discussion	

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

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

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
monthly hatchery monitoring visits being conducted by a qualified fish health specialist as described below?						
Conduct visit at least monthly		✓			Review of records/Discussion	
Monitoring conducted by qualified fish health specialist		✓			Review of records/Discussion	
Examine a representative sample of healthy and moribund fish from each lot.		✓			Review of records/Discussion	
Review fish culture practices with hatchery manager.		✓			Review of records/Discussion	
Report finding and results of necropsies on standard form.		✓			Review of records/Discussion	
Recommend appropriate drug or chemical treatment.		✓			Review of records/Discussion	
Summarize fish health status or stock prior to release or transfer to another facility.		✓			Review of records/Discussion	
all of the functions of the hatchery yearly monitoring visits being completed as described below?						
Annually examine each broodstock for the presence of reportable viral pathogens.	✓				Discussion. Done at Wells Hatchery.	
Annually screen each salmon broodstock for the presence of <i>Renibacterium salmoninarum</i> .	✓				See above	
Conduct inspection by or under the supervision of qualified fish health specialist.	✓				See above	

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

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>Is the hatchery's program outlined in a subbasin management plan?</p> <p>Refer to subbasin plan PM #1</p>		✓			Columbia Basin System Planning Production Plan and FERC License	
<p>Is the hatchery operating under a current hatchery operational plan?</p> <p>Refer to operational plan PM #2</p>				✓	Have IHOT Operations Plan but not using it	See PM #2
<p>Is a hatchery monitoring and evaluation plan in place?</p> <p>Refer to hatchery monitoring and evaluation plan PM #3</p>				✓	None provided	See PM # 3

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

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Do the hatchery's performance meet requirements defined in the regional hatchery policies and in the subbasin and hatchery plans for the following areas: percent smoltification, rearing density, disease condition, and the number, size date(s), and location of release?						
Percent smoltification (PM #22a1)			✓		Review of records/Discussion	See PM #22a1
Rearing density (PM #22a2)		✓			Review of records/Discussion	
Disease condition (PM #22a3)		✓			Review of records/Discussion	
Number at release (PM #22a4)		✓			Review of records/Discussion	
Size at release (PM #22a5)		✓			Review of records/Discussion	
Date of release (PM #22a6)		✓			Review of records/Discussion	
Location of release (PM #22a7)		✓			Review of records/Discussion	
Are fish reared in the subbasin or acclimated in the subbasin?		✓			Discussion	
PM #22b						
Is the release strategy appropriate for the program?				✓	Discussion	See PM #22c
PM #22c						

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

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

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

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

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 Eastbank Hatchery - Summer Chinook (Wells Stock) program

This section presents the corrective actions required to bring the Eastbank Hatchery - Summer Chinook (Wells Stock) program into compliance with IHOT performance measures. The remedial actions suggested here are just that, suggestions developed by the Montgomery Watson Audit Team. For some non-compliance areas, other remedial actions could be proposed. The required remedial actions are cross-referenced to each IHOT performance measure that was not in compliance. Where appropriate, the costs associated with the remedial actions are also presented (Table 3).

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

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

Remedial Action Required	Cost	PMs¹
Type 2 (Continued) - Remedial actions requiring changes in agency policies or procedures		
Conduct fish contribution studies	----	24
Develop genetics monitoring and evaluation program	----	43
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Document DO and TGP levels	----	5b
Run analysis for water chemistry parameters, nitrite, and contaminants	----	5c, 5f, 5g
Type 4 - Remedial actions requiring significant capital expenditures		
Install alarms in quarantine areas	\$5,000	6
Install security alarms	\$5,000	6
Need 50 additional half stack incubators for full program	\$45,000	8
Construct two additional raceways and one super-raceway	\$350,000	9
Install second set of screens to raceways	\$5,500	10
Install bird netting over raceways	\$55,000	11
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Decrease turbidity at Similkameen Satellite	----	5d

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 Eastbank Hatchery - Summer Chinook (Wells Stock) program contribution of adult fish to fisheries, local fisheries, spawning grounds, and hatcheries. Data is reported by broodyear. A broodyear refers to the adult contribution from the eggs produced from a single group of spawning adults. For some species, this may include fish caught as 2-, 3-, 4-, 5-, and 6-year old fish. Because of the return distribution and data processing delays, the complete adult contribution for a given broodyear may not be available until 4 to 5 years after the fish have been released from the hatchery.

**Table 4. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries:
Eastbank Hatchery - Summer Chinook (Wells Stock)**

Year	Fisheries ¹ (Broodyear)	Spawning Grounds ¹ (Broodyear)	Hatchery ¹ (Broodyear)	Total Combined Contribution ² (Broodyear)	Smolt to Adult Survival (percent)
1983					
1984					
1985					
1986					
1987					
1988					
1989	1,375	487	0	1,862	0.52%
1990					
1991					
1992					
1993					

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

Table 5. Annual Operating Expenses: Eastbank Hatchery - Summer Chinook (Wells Stock)

Hatchery	1994	1995	1996
1. Eastbank Hatchery	Information missing	\$575,034	\$644,359
2. Wells Hatchery (a)	Information not available	Information not available	Information not available
3.			
4.			
5.			
Total Program Costs	Information missing	\$575,034	\$644,359

(a) Breakout of costs for Wells Hatchery component is not available.

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

Table 6. Annual Operating Expenses - Eastbank Hatchery

Program	1994	1995	1996
1. Summer Chinook (Wenatchee Stock)	Information missing	\$508,736	\$544,347
2. Summer Chinook (Wells Stock)	Information missing	\$575,034	\$644,359
3. Sockeye (Lake Wenatchee Stock)	Information missing	\$142,067	\$102,869
4. Spring Chinook (Chiwawa Stock)	Information missing	\$125,831	\$18,574
5. Steelhead	\$109,636	\$139,123	\$118,585
Total Hatchery Costs	Information missing	\$1,353,022	\$1,428,733

Table 5a. Annual Operating Expenses: Eastbank Hatchery - Summer Chinook (Wells Stock)

Expenditure Occurring at Eastbank Hatchery

Component	1994	1995	1996
Personnel Costs			
Operational Costs			
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs ¹	Information missing	\$1,166,322	\$1,242,033
Lumped Third-Party Costs	\$186,700	\$186,700	\$186,700
Total Hatchery Costs	Information missing	\$1,353,022	\$1,428,733
Source of Funds			
Program Production (#)	950,823	1,019,375	942,859
Total Production (#)	1,853,710	2,396,273	2,092,377
Program as Percent of Total	51.3%	42.5%	45.1%
Program Costs	Information missing	\$575,034	\$644,359

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 6a. Detailed Expenditures at Eastbank Hatchery by Program
Summer Chinook (Wenatchee Stock)**

Component	1994	1995	1996
Personnel Costs			
Operational Costs			
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs ¹	Information missing	\$1,166,322	\$1,242,033
Lumped Third-Party Costs	\$186,700	\$186,700	\$186,700
Total Hatchery Costs	Information missing	\$1,353,022	\$1,428,733
Source of Funds			
Program Production (#)	627,331	900,429	797,350
Total Production (#)	1,853,710	2,396,273	2,092,377
Program as Percent of Total	33.8%	37.6%	38.1
Program Costs	Information missing	\$508,736	\$544,347

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 Eastbank Hatchery by Program
Summer Chinook (Wells Stock)**

Component	1994	1995	1996
Personnel Costs			
Operational Costs			
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs ¹	Information missing	\$1,166,322	\$1,242,033
Lumped Third-Party Costs	\$186,700	\$186,700	\$186,700
Total Hatchery Costs	Information missing	\$1,353,022	\$1,428,733
Source of Funds			
Program Production (#)	950,823	1,019,375	942,859
Total Production (#)	1,853,710	2,396,273	2,092,377
Program as Percent of Total	51.3%	42.5%	45.1%
Program Costs	Information missing	\$575,034	\$644,359

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 Eastbank Hatchery by Program
Sockeye (Lake Wenatchee Stock)**

Component	1994	1995	1996
Personnel Costs			
Operational Costs			
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs ¹	Information missing	\$1,166,322	\$1,242,033
Lumped Third-Party Costs	\$186,700	\$186,700	\$186,700
Total Hatchery Costs	Information missing	\$1,353,022	\$1,428,733
Source of Funds			
I			
Program Production (#)	190,443	252,859	150,800
Total Production (#)	1,853,710	2,396,273	2,092,377
Program as Percent of Total	10.3%	10.5%	7.2%
Program Costs	Information missing	\$142,067	\$102,869

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 Eastbank Hatchery by Program
Spring Chinook (Chiwawa Stock)**

Component	1994	1995	1996
Personnel Costs			
Operational Costs			
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs ¹	Information missing	\$1,166,322	\$1,242,033
Lumped Third-Party Costs	\$186,700	\$186,700	\$186,700
Total Hatchery Costs	Information missing	\$1,353,022	\$1,428,733
Source of Funds			
I			
Program Production (#)	85,113	223,610	27,226
Total Production (#)	1,853,710	2,396,273	2,092,377
Program as Percent of Total	4.6%	9.3%	1.3%
Program Costs	Information missing	\$125,831	\$18,574

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 6e. Detailed Expenditures at Eastbank Hatchery by Program

Steelhead

Component	1994	1995	1996
Personnel Costs			
Operational Costs			
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs ¹	\$109,636	\$104,123	\$1,242,033
Lumped Third-Party Costs	\$35,000	\$35,000	\$186,700
Total Hatchery Costs	\$144,636	\$139,123	\$1,428,733
Source of Funds			
I			
Program Production (#)			
Total Production (#)			
Program as Percent of Total	100%	100%	8.3%
Program Costs	\$144,636	\$139,123	\$118,585

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