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# **HATCHERY EVALUATION REPORT**

**Wallowa Hatchery - Summer Steelhead (Grande  
Ronde Stock**

**September 1996)**

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**Integrated Hatchery Operations Team (IHOT)**

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## **Wallowa Hatchery - Summer Steelhead (Grande Ronde 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 Wallowa Hatchery - Summer Steelhead (Grande Ronde Stock) program. The hatchery is located along Spring Creek, a tributary of the Wallowa River, 1 mile east of Enterprise, Oregon. Site elevation is 3,700 feet above sea level. Big Canyon and Little Sheep Creek acclimation facilities are operated as facilities. The hatchery is used for adult collection, egg incubation, and acclimation of Summer Steelhead (Grande Ronde Stock) and Summer Steelhead (Imnaha Stock).

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.

## Wallowa Hatchery - Summer Steelhead (Grande Ronde Stock) Results

The Wallowa Hatchery facility includes one pond for adult holding, 2 acclimation ponds, and 2 separate incubation facilities. The satellite facilities include adult holding and acclimation ponds. The hatchery was renovated in 1985 as part of the Lower Snake River Compensation Program (LSRCP) - a program to mitigate for spring chinook and summer steelhead losses caused by the four federal dams constructed on the lower Snake River.

The hatchery 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 following facilities requirements: predation control, alarm annunciator system, and water quality monitoring. The hatchery needs to develop incubation and rearing standards, smoltification goals, and follow the IHOT fertilization standards. In the compliance area for fish health policy, the hatchery was not using footbaths in the incubation area.

The specific areas in which the Wallowa Hatchery - Summer Steelhead (Grande Ronde 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:

- Begin routine testing of alarms using IHOT recommendations
- Conduct IHOT feed QA/QC testing
- Cover 2 acclimation ponds at Wallowa Hatchery with bird netting
- Develop green-egg to eyed survival goal
- Develop specific acclimation standards for the Operation Plan
- Develop specific incubation standards for the Operation Plan
- Develop genetics M&E program for IHOT.
- Follow IHOT and LSRCP fertilization protocols
- Follow IHOT disinfection policies for transportation
- Improve communication between evaluation biologists and hatchery manager
- Install footbaths in incubation areas
- Monitor DO and TGP
- Replace annunciator panel for hatchery alarms
- Review density and loading criteria or change hatchery operations
- Review smoltification goal and monitoring plan
- Run analysis for alkalinity and hardness
- Run analysis for chemistry parameters
- Run analysis for contaminants
- Run analysis for nitrite
- Run analysis for turbidity

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

<b>Name:</b>	Wallowa Hatchery
<b>Stock/Species:</b>	Summer Steelhead, Grande Ronde Stock Summer Steelhead, Imnaha Stock Rainbow trout
<b>Operating Agency:</b>	Oregon Department of Fish and Wildlife
<b>Funding Agency:</b>	Lower Snake River Compensation Program (Steelhead only) ODF&W (Rainbow Trout)
<b>Location:</b>	Enterprise, Oregon
<b>Address:</b>	Wallowa Hatchery 82199 Wallowa Fish Hatchery Lane Enterprise, OR 97828
<b>Hatchery Manager:</b>	Mr. Greg Davis
<b>Phone:</b>	(541) 426-4467
<b>Fax:</b>	(541) 426-8029
<b>Purpose:</b>	<p>Wallowa Hatchery began operation in 1920 as a resident trout hatchery. In 1985, the hatchery was renovated as part of the Lower Snake River Compensation Program (LSRCP) - a program to mitigate for spring chinook and summer steelhead losses caused by the four federal dams constructed on the lower Snake River.</p> <p>This hatchery provides fish for ocean and river fisheries and eggs to other programs.</p>
<b>Production Goal:</b>	<p><b>Summer Steelhead (Grande Ronde Stock)</b> Collect 2,33 million eggs for transfer to Irrigon Hatchery Collect 425,000 eggs for transfer to Lyons Ferry Hatchery Acclimate 612,500 smolts (122,500 pounds) from Irrigon Hatchery for on-station release. Acclimate 375,000 smolts (75,000 pounds) from Irrigon Hatchery release into Deer Creek (Big Canyon facility)</p> <p><b>Summer Steelhead (Imnaha Stock)</b> Collect 480,000 eggs for transfer to Irrigon Hatchery Acclimate 200,000 smolts (40,000 pounds) from Irrigon Hatchery release into Little Sheep Creek (Little Sheep Creek facility)</p>

**Rainbow Trout**

Produce 118,000 legal-sized fish for release into Imnaha system and 5,000 fingerlings for release into lakes

Total steelhead production: 125,500 pounds

**Water Supply:**

Gravity water supply from Wallowa River and Spring Creek  
Two wells  
Two springs (upper and lower)  
Water rights for the entire hatchery totals 23,813 gpm

**Facilities:**

Incubation: 57 4-stack vertical tray (Grande Ronde Stock)  
15 4-stack vertical tray (Imnaha Stock)

Adult Holding: 1 concrete pond - 1350 cf

Raceways: none used for steelhead

Rearing Ponds: 2 concrete acclimation ponds - 50,400 cf each

Satellite Facilities: Big Canyon  
1 adult holding pond - 1,350 cf  
2 concrete acclimation ponds - 18,000 cf each

Little Sheep Creek  
1 adult holding pond - 2880 cf  
1 concrete acclimation ponds - 39,000 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).<sup>1</sup> The purpose of the performance measures is to implement new basinwide policies that provide regional guidelines for operating anadromous hatcheries in the Columbia Basin.

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

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

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

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

### The Hatchery Audit Process

The hatchery audit will be conducted over a 2-year period that concludes in 1997. At each hatchery, a five-step process was used to complete the overall hatchery audit. This process consisted of research and onsite visits. The site visit at the Wallowa Hatchery was conducted on September 9, 1996.

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

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. This information 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 Wallowa Hatchery - Summer Steelhead (Grande Ronde 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 Wallowa Hatchery - Summer Steelhead (Grande Ronde Stock). 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 Wallowa Hatchery - Summer Steelhead (Grande Ronde Stock)**

Component	Location of Adult Holding, Spawning, Incubation, and Rearing					
	Wallowa Hatchery	Big Canyon Facility	Irrigon Hatchery			
Adult Collection	✓	✓				
Adult Holding	✓	✓ (short-term)				
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 LSRCP Annual Operation Plan	
<p>Is the hatchery operating under a current hatchery operational plan?</p> <p>Is it understood by staff?</p> <p>Is it being followed?</p>		<p>✓</p> <p>✓</p> <p>✓</p>			IHOT Operations Plan and LSRCP Annual Operation Plan	
<p>Is a hatchery monitoring and evaluation plan in place?</p> <p>Do you have a written monitoring and evaluation plan?</p>		<p>✓</p> <p>✓</p>			LSRCP	
Does the hatchery contribute to fisheries, spawning grounds, and hatchery	✓				Contribution data reported at Irrigon Hatchery	
Does the hatchery meet pre-spawning survival as compared with established goal		✓			In compliance 3 out of last 3 years	
Does the hatchery meet adult take as compared with established hatchery goal				✓	In compliance 2 out of last 3 years	Improve adult return
Does the hatchery meet green-egg to eyed-egg survival as compared with established goal		✓			In compliance 3 out of last 3 years; No goal listed in IHOT Operation Plan	Develop green-egg to eyed-egg goal for IHOT Operations Plan
Does the hatchery meet eyed-egg to fry survival as compared with established goal	✓				Eyed eggs transferred to Irrigon Hatchery	
Does the hatchery meet smolt to survival as compared with established goal	✓				Fish reared at Irrigon Hatchery	
Does the hatchery meet production as compared with established goal				✓	In compliance 2 out of last 3 years	Improve adult return
Does the hatchery meet percent survival (smolt to adult) as compared with established goal				✓	In compliance 3 out of last 5 years	Improve adult return
Does the hatchery meet number of eggs, fry, fingerlings, smolts, and/or adults meet basinwide needs	✓					

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Temperature</b>						
Does your water temperature meet the criteria for spawning?				✓	Review of records/Discussion. Range a few degrees too high.	Does not appear to be a problem
Does your water temperature meet the criteria for incubation?				✓	Review of records/Discussion. Spring OK, well is 1° F too high.	Does not appear to be a problem
Does your water temperature meet the criteria for rearing?				✓	Review of records/Discussion. Can be a little too cold and warm.	Does not appear to be a problem
<b>Dissolved gases</b>						
Is the oxygen level near saturation?			✓		No data provided to team	Measure and record DO
Is the dissolved nitrogen level less than saturation?			✓		No data provided to team	Obtain satumeter; measure and record TGP
<b>Chemistry</b>						
Ammonia (un-ionized)			✓		No data provided to team	Run analysis for each water chemistry parameters
Carbon Dioxide			✓		No data provided to team	
Chlorine			✓		No data provided to team	
pH			✓		No data provided to team	
Copper			✓		No data provided to team	
Hydrogen Sulfide			✓		No data provided to team	
Iron			✓		No data provided to team	
Zinc			✓		No data provided to team	
<b>Turbidity</b>						
Does your turbidity meet the criteria?			✓		No data provided to team	Run analysis for turbidity
<b>Alkalinity and hardness</b>						
Does your alkalinity and hardness meet the criteria?			✓		No data provided to team	Run analysis for alkalinity and hardness
<b>Nitrite</b>						
Does your nitrite meet the criteria?			✓		No data provided to team	Run analysis for nitrite



Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Alarm Systems</b>						
Do the following areas have alarms?						
Intake		✓			Inspection of facilities/ Discussion	
Large rearing ponds and adult holding ponds		✓			Inspection of facilities/ Discussion	
Raceway headboxes and rearing ponds	✓	✓			Inspection of facilities/ Discussion	
Incubation facilities		✓			Inspection of facilities/ Discussion	
Quarantine areas and facilities	✓	✓			Inspection of facilities/ Discussion	
Water treatment systems	✓	✓			Inspection of facilities/ Discussion	
Security						
Are there outside systems and buzzers in on-site residences?		✓			Discussion	
Are water flow alarms checked daily?				✓	Review of records /Discussion	Begin routine testing of alarms
Are all other alarms checked weekly?				✓	Review of records /Discussion	Begin routine testing of alarms
Is there a log of alarms for emergencies, tests, and maintenance requirements?				✓	Review of records/Discussion	Current annunciator panel is not working and needs to be replaced
Are telephone pagers used?		✓			Discussion	
<b>Adult Holding Facilities</b>						
Do you meet the adult holding criteria?		✓			Review of records/Discussion	
<b>Incubation Facilities</b>						
Type 1: Vertical Tray Do you have an adequate number of units for the overall program?		✓			Inspection of facilities/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>ring facilities</b>						
Type 1: Concrete acclimation ponds (Wallowa) Do you have an adequate number of units for the overall program?		✓			Inspection of facilities/Discussion	
Type 2: Concrete acclimation ponds (Big Canyon) Do you have an adequate number of units for the overall program?		✓			Inspection of facilities/Discussion	
<b>rearing facilities</b>						
Do you meet the approach velocity criteria?		✓			Inspection of facilities/Discussion	
Are the fish screens regularly cleaned?		✓			Inspection of facilities/Discussion	
Does the screen mesh meet screen opening criteria?		✓			Inspection of facilities/Discussion	
Are rearing containers double screened for fish that should not be released to adjacent water?		✓			Inspection of facilities/Discussion	
<b>predator control facilities</b>						
Are your predation control facilities effective?				✓	Inspection of facilities/Discussion	Need birdnetting for Wallowa Hatchery acclimation ponds

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>d storage facilities and quality control</b>						
Does the storage of dry/semi-moist/moist foods (dry<12%; semi-moist 12-20%; moist >20% moisture) follow food manufacturer's recommendations?	✓				Discussion; dry feed only	Conduct IHOT feed QA/QC tests
Does a regional quality control officer oversee production procedures and monitor:					Jean Paul Lagesse at Clackamas Hatchery monitors feed quality using feeding trials only	
Verification by feed manufacturer that ingredients meet specifications?				✓	Discussion	
Ensure feed does not contain unwanted drugs or other additives?				✓	Discussion	
Analyze ingredients contained in the final food product to ensure that feed specifications have been met?				✓	Discussion	
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 one to two 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).	✓				Discussion	
<b>ease facilities</b>						
Do the release facilities ensure that fish are not subjected to adverse conditions?		✓			Inspection of facilities/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>ution abatement facilities</b></p> <p>Do the pollution abatement facilities meet all federal and state regulations (or good engineering practice)?</p> <p>Are pollution abatement facilities operated correctly?</p>		✓		✓	<p>Inspection of facilities/Discussion; out of compliance due to high sediment loads in influent water</p> <p>Discussion</p>	<p>New permits will allow subtraction of influent concentrations from effluent levels</p>
<p><b>nsportation facilities</b></p> <p>Are the transport systems adequate to meet IHOT performance measures for transportation practices?</p>		✓			<p>Inspection of facilities/Discussion</p>	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>broodstock selection practices</b>						
Is the donor selection process document attached?	✓				Existing program; does not apply	
Was the donor selection outline followed in selecting the hatchery broodstock?	✓				Existing program; does not apply	
to PM #40 in Genetics						
<b>spawning practices</b>						
Were the appropriate number of spawners, male/female ratios, and fertilization protocols used?				✓	Review of records/Discussion; use a pooled 3x3 matrix rather than true 3x3 matrix. Not in compliance with IHOT or LSRCP Annual Operation Plan	Follow IHOT and LSRCP protocols for fertilization
to PM #42 in Genetics Section						
<b>incubation practices</b>						
Are specific incubation standards listed in the hatchery operations plan?				✓	Not in IHOT Operations Plan or LSRCP Annual Operation Plan	Develop incubation standards for IHOT
Are incubation practices written?				✓	None supplied	See above
Incubation Type 1: 4-stack vertical stack (see PM #8)					Review of records/Discussion	Develop incubation standards for IHOT
Do you meet the loading and flow criteria?				✓	Review of records/Discussion	No criteria listed for 4-stack vertical incubators; develop criteria
<b>rearing practices (Acclimation only)</b>						
Are specific rearing standards listed in the hatchery operations plan?				✓	None listed in IHOT Operations Plan or LSRCP Annual Operation Plan	Develop acclimation standards for IHOT
Are rearing practices written?				✓	Review of Hatchery Operation Plan	Develop acclimation standards for IHOT
Rearing Unit Type 1: Concrete ponds (see PM #9)						
Do you meet the density and DI criteria?				✓	Review of records/Discussion	Review criteria and hatchery operations
Do you meet the Loading and FI 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		
<b>Rearing density (prior to release)</b>  Did you meet the rearing density criteria just prior to release?				✓	Review of records/Discussion  Out of compliance 1 out last 2 years at Wallowa Hatchery  Out of compliance 2 out last 2 years at Big Canyon	Review criteria and operations
<b>Disease condition (at release)</b>  Did you meet all disease regulations just prior to release?		✓			Review of records/Discussion	
<b>Release number (at release)</b>  Did you meet the release number goal?		✓			Review of records/Discussion	
<b>Release size (at release)</b>  Did you meet the size goal?		✓			Review of records/Discussion	
<b>Release date (at release)</b>  Did you meet the release date goal?		✓			Review of records/Discussion	
<b>Release location (at release)</b>  Did you release the fish at the specified location?		✓			Review of records/Discussion	
<b>Rearing location (at release)</b>  Are the fish reared in the subbasin?  Are the fish acclimated in the subbasin?				✓	Discussion  Discussion	Reared at Irrigon Hatchery because of the lack of water in Grande Ronde basin
<b>Release strategy (at release)</b>  Is the release strategy appropriate for the program?		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>nsportation facilities</b>						
Do transportation equipment and personnel receive disinfection before and after use?				✓	Discussion; do not disinfect when hauling adults from Big Canyon or outplanting adults	Follow IHOT disinfection policy
Is the fish tank interior disinfected using a solution of 200 ppm active chlorine for 30 minutes minimum or formaldehyde gas generation method (relative humidity of 60% for 2 hrs)?				✓	Discussion; do not disinfect when hauling adults from Big Canyon or outplanting adults	Follow IHOT disinfection policy
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 disinfection policy
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 disinfection policy
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		
<b>nsportation facilities</b>						
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	
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		
<p><b>monthly hatchery monitoring visits being conducted by a qualified fish health specialist as described below?</b></p> <p>Conduct visit at least monthly</p> <p>Monitoring conducted by qualified fish health specialist</p> <p>Examine a representative sample of healthy and moribund fish from each lot.</p> <p>Review fish culture practices with hatchery manager.</p> <p>Report finding and results of necropsies on standard form.</p> <p>Recommend appropriate drug or chemical treatment.</p> <p>Summarize fish health status or stock prior to release or transfer to another facility.</p>		<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>			<p>Review of records/Discussion</p>	
<p><b>all of the functions of the hatchery yearly monitoring visits being completed as described below?</b></p> <p>usually examine each broodstock for the presence of detectable viral pathogens.</p> <p>usually screen each salmon broodstock for the presence of <i>Aeromonas salmonicida</i>.</p> <p>conduct inspection by or under the supervision of qualified health specialist.</p>		<p>✓</p> <p>✓</p> <p>✓</p>			<p>Review of records/Discussion</p> <p>Review of records/Discussion</p> <p>Review of records/Discussion</p>	

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

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>water quality parameters being followed?</b></p> <p>Are the following water quality parameters within criteria? (PM #5a-5h)</p> <p>Water temperature Dissolved gases Chemistry Turbidity Alkalinity and hardness Nitrite Contaminants</p> <p>to PM #21</p>			✓ ✓ ✓ ✓ ✓ ✓ ✓	✓	<p>See PM #5a No data supplied to team No data supplied to team No data supplied to team No data supplied to team No data supplied to team</p>	Run analysis for water quality parameters
<p><b>incubation and rearing standards being followed?</b></p> <p>Are the incubation practices following the IHOT incubation criteria? (PM #18)</p> <p>Are the rearing practices following the IHOT criteria? (see PM #19)</p> <p>to rearing practices PM #18-PM #19</p>				<p>✓ ✓</p>	<p>Review of records/Discussion Review of records/Discussion</p>	<p>No criteria listed in IHOT for 4- stack vertical tray incubators; develop criteria</p> <p>Loading and densities greater than criteria for some years; review criteria or change acclimation procedures</p>
<p><b>egg and fish transfer/release requirements met?</b></p>		✓			Discussion	



Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>Do the hatchery's performance meet requirements defined in the regional hatchery policies and in the Grande Ronde basin and hatchery plans for the following areas: percent smoltification, rearing density, disease condition, and the number, size date(s), and location of release?</b></p> <p>Percent smoltification (PM #22a1)</p> <p>Rearing density (PM #22a2)</p> <p>Disease condition (PM #22a3)</p> <p>Number at release (PM #22a4)</p> <p>Size at release (PM #22a5)</p> <p>Date of release (PM #22a6)</p> <p>Location of release (PM #22a7)</p>				<p>✓</p> <p>✓</p>	<p>Goal 100%</p> <p>Loading and density greater than criteria for some years</p> <p>Review of records/Discussion</p>	<p>Review goal</p> <p>Review goal and hatchery operations</p>
<p><b>Are fish reared in the subbasin or acclimated in the Grande Ronde basin?</b></p> <p>PM #22b</p>		✓			<p>Fish reared at Irrigon due to lack of water in Grande Ronde basin but all are acclimated in the subbasin</p>	
<p><b>Is the release strategy appropriate for the program?</b></p> <p>PM #22c</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><b>new programs, has a broodstock collection plan developed?</b></p> <p>Is the broodstock collection plan written?</p> <p>For a non-captive broodstock program:</p> <p>Was an unbiased, representative sample collected?</p> <p>Was the recommended number of broodstock collected?</p> <p>For a captive broodstock program:</p> <p>Were captive brood progeny excluded as donors for propagating the next generation of the captive broodstock program?</p> <p>Were full-sib crosses avoided?</p> <p>Is the broodstock collection plan understood and being followed by staff?</p>	<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>				<p>Existing Program; does not apply</p>	
<p><b>a new program, was the donor selection outlined in selecting the hatchery broodstock?</b></p> <p>Is a donor selection plan written?</p> <p>Was the donor selection outline followed in selecting the broodstock?</p> <p>Was the target stock recommended in the donor selection process actually used?</p>	<p>✓</p> <p>✓</p> <p>✓</p>				<p>Existing Program; does not apply</p> <p>Existing Program; does not apply</p> <p>Existing Program; does not apply</p>	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>existing programs, were the broodstock collection cedures followed?</b></p> <p>Is the broodstock collection plan written?</p> <p>Does the broodstock collection plan follow the guideline:</p> <p>    Was an unbiased, representative sample collected?</p> <p>    Was the recommended number of broodstock collected?</p> <p>    Were the broodstock collection procedures in hatchery operation plan understood and followed?</p> <p>    Were the broodstock collection procedures in hatchery operation plan understood and followed?</p>		<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>			<p>Review broodstock collection plan in LSRCF Annual Operation Plan</p> <p>Discussion</p> <p>Discussion</p> <p>Discussion</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><b>s the appropriate number of spawners, male/female os, and fertilization protocols used?</b></p> <p>Are the spawning protocols written?</p> <p>Are daily or weekly spawning logs available?</p> <p>Was the appropriate number of spawners used?</p> <p>Did you attempt to spawn all collected broodstock and randomize mating with respect to age class, and other traits?</p> <p>Was the sex-ratio within the limits given in the performance standards?</p> <p>Were the fertilization protocols followed?</p> <p>If the hatchery needed to reduce the number of eggs retained, was this done by representative sampling of each male/female cross?</p>		<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>		<p>✓</p>	<p>Review spawning protocols in LSRCP Annual Operation Plan</p> <p>Review of records</p> <p>Review of records</p> <p>Discussion</p> <p>Discussion</p> <p>Not in compliance with IHOT or with LSRCP Annual Operation Plan; using a 3 X 3 pooled fertilization matrix</p> <p>Discussion</p>	<p>Follow IHOT and LSRCP protocols for fertilization</p>

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>Where a genetics monitoring and evaluation program in place?</b></p> <p>Is a genetics monitoring and evaluation program available?</p> <p>Does the plan address the following elements listed in IHOT:</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>None available</p> <p>See above</p> <p>See above</p> <p>See above</p> <p>See above</p> <p>See above</p>	<p>Develop genetics M&amp;E program for IHOT.</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 Wallowa Hatchery - Summer Steelhead (Grande Ronde Stock)

This section presents the corrective actions required to bring the Wallowa Hatchery - Summer Steelhead (Grande Ronde 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.

**Table 3. Remedial Actions Required at Wallowa Hatchery - Summer Steelhead (Grande Ronde Stock)**

Remedial Action Required	Cost	PMs <sup>1</sup>
<b>Type 1</b> - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery		
Improve adult return	---	4c,4g,4h
Modify temperature of hatchery water supply	---	5a
Modify NPDES permits to consider influent concentrations	---	14
<b>Type 2</b> - Remedial actions requiring changes in agency policies or procedures		
Develop green-egg to eyed survival goal	---	4d
Begin routine testing of alarms using IHOT recommendations	---	6
Follow IHOT and LSRCP protocols for fertilization	---	17,42
Develop specific incubation standards for the Operation Plan	---	18
Develop specific acclimation standards for the Operation Plan	---	19
Change density and loading criteria or change hatchery operations	---	19,22a2
Develop smoltification goal and monitoring plan	---	22a1
Follow IHOT disinfection policies for transportation	---	23
Install footbaths in incubation areas	---	28
Develop genetics M&E program for IHOT	---	43

<sup>1</sup> PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.

Remedial Action Required	Cost	PMs <sup>1</sup>
<b>Type 3</b> - Remedial actions requiring changes in monitoring coverage or interval  Monitor DO and TGP  Run analysis for chemistry parameters  Run analysis for turbidity  Run analysis for alkalinity and hardness  Run analysis for nitrite  Run analysis for contaminants  Conduct IHOT feed QA/QC testing	  ---  ---  ---  ---  ---  ---  ---	  5b  5c  5d  5e  5f  5g  14
<b>Type 4</b> - Remedial actions requiring significant capital expenditures  Replace annunciator panel for hatchery alarms  Cover 2 acclimation ponds at Wallowa Hatchery with bird netting 25,200 sf @ \$1.50/sf	  \$45,000  \$40,000	  6  11
<b>Type 5</b> - Remedial actions that may require significant capital expenditures but are not clearly definable at this time  None	  ---	

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

This section presents the audit findings for the Wallowa Hatchery - Summer Steelhead (Grande Ronde 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:  
Wallowa Hatchery - Summer Steelhead (Grande Ronde Stock)**

Year	Fisheries <sup>1</sup> (Broodyear)	Spawning Grounds <sup>1</sup> (Broodyear)	Hatchery <sup>1</sup> (Broodyear)	Total Combined Contribution <sup>2</sup> (Broodyear)	Smolt to Adult Survival (percent)
1981	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery
1982	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery
1983	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery
1984	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery
1985	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery
1986	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery
1987	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery
1988	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery
1989	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery
1990	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery
1991	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery
1992	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery	see Irrigon Hatchery

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

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

## Annual Operating Expenditures

The level and detail of annual operating expenditures varies widely depending on hatchery, operating agency, and funding source. When provided, expenditures were presented in terms of personnel costs, operating costs (power, feed, supplies), capital costs, indirect costs charged to the federal government, third-party costs, and other costs. These cost components were summed to determine a total hatchery annual cost. Based on discussion with the hatchery manager, the percent of total hatchery costs allocated to a given program was estimated. The total hatchery costs and the percent of hatchery costs allocated to a given program were used to compute the cost of a given program. Table 5 shows the annual operating expenses for the overall Wallowa Hatchery Summer Steelhead, Grande Ronde 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 hatchery is presented in a separate table (Table 5a).

**Table 5. Annual Operating Expenses: Wallowa Hatchery - Summer Steelhead (Grande Ronde Stock)**

Hatchery	1994	1995	1996
1. Wallowa Hatchery	\$169,000	\$176,206	\$187,643
2.			
3.			
4.			
5.			
<b>Total Program Costs</b>	See Irrigon Hatchery	See Irrigon Hatchery	See Irrigon Hatchery

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

**Table 6. Annual Operating Expenses - Wallowa Hatchery**

Program	1994	1995	1996
1. Summer Steelhead, Grande Ronde Stock	\$169,000	\$176,206	\$187,643
2. Summer Steelhead, Imnaha Stock	\$53,496	\$38,679	\$49,880
3. Rainbow Trout (State Funds)	\$111,108	\$111,108	\$97,125
4.			
5.			
<b>Total Hatchery Costs</b>	\$333,604	\$325,993	\$334,648

**Table 5a. Annual Operating Expenses: Wallowa Hatchery - Summer Steelhead  
(Grande Ronde Stock)**

**Expenditure Occurring at  
Wallowa Hatchery**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
Personnel Costs	\$103,082	\$107,313	\$121,879
Operational Costs	\$61,469	\$64,275	\$75,634
Capital Costs	\$24,518	\$8,173	0
Indirect Costs	\$33,831	\$35,124	\$40,010
Lumped Hatchery Costs <sup>1</sup>			
Lumped Third-Party Costs	0	0	0
<b>Total Hatchery Costs</b>	<b>\$222,900</b>	<b>\$214,885</b>	<b>\$237,523</b>
<b>Source of Funds</b>			
100% LSRCP			
Program Production (#)	812,000	1,037,000	1,029,000
Total Production (#)	1,0650,000	1,268,000	1,298,000
Program as Percent of Total	76%	82%	79%
<b>Program Costs</b>	<b>\$169,000</b>	<b>\$176,206</b>	<b>\$187,643</b>

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

**Table 6a. Detailed Expenditures at Wallowa Hatchery by Program  
Summer Steelhead, Grande Ronde Stock**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
Personnel Costs	\$103,082	\$107,313	\$121,879
Operational Costs	\$61,469	\$64,275	\$75,634
Capital Costs	\$24,518	\$8,173	0
Indirect Costs	\$33,831	\$35,124	\$40,010
Lumped Hatchery Costs <sup>1</sup>			
Lumped Third-Party Costs	0	0	0
<b>Total Hatchery Costs</b>	<b>\$222,900</b>	<b>\$214,885</b>	<b>\$237,523</b>
<b>Source of Funds</b>			
100% LSRCP			
Program Production (#)	812,000	1,037,000	1,029,000
Total Production (#)	1,0650,000	1,268,000	1,298,000
Program as Percent of Total	76%	82%	79%
<b>Program Costs</b>	<b>\$169,000</b>	<b>\$176,206</b>	<b>\$187,643</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 Wallowa Hatchery by Program  
Summer Steelhead, Imnaha Stock**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
Personnel Costs	\$103,082	\$107,313	\$121,879
Operational Costs	\$61,469	\$64,275	\$75,634
Capital Costs	\$24,518	\$8,173	0
Indirect Costs	\$33,831	\$35,124	\$40,010
Lumped Hatchery Costs <sup>1</sup>			
Lumped Third-Party Costs	0	0	0
<b>Total Hatchery Costs</b>	<b>\$222,900</b>	<b>\$214,885</b>	<b>\$237,523</b>
<b>Source of Funds</b>			
Program Production (#)	253,000	231,000	269,00
Total Production (#)	1,0650,000	1,268,000	1,298,000
Program as Percent of Total	24%	18%	21%
<b>Program Costs</b>	<b>\$53,496</b>	<b>\$38,679</b>	<b>\$49,880</b>

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

**Table 6c. Detailed Expenditures at Wallowa Hatchery by Program  
Rainbow Trout (State Program)**

<b>Component</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
Personnel Costs	\$79,661	\$79,661	\$70,463
Operational Costs	\$31,447	\$31,447	\$26,662
Capital Costs	0	0	0
Indirect Costs	0	0	0
Lumped Hatchery Costs <sup>1</sup>			
Lumped Third-Party Costs	0	0	0
<b>Total Hatchery Costs</b>	<b>\$111,108</b>	<b>\$111,108</b>	<b>\$97,125</b>
<b>Source of Funds</b>			
State of Oregon			
Program Production (#)			
Total Production (#)			
Program as Percent of Total	100%	100%	100%
<b>Program Costs</b>	<b>\$111,108</b>	<b>\$111,108</b>	<b>\$97,125</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.