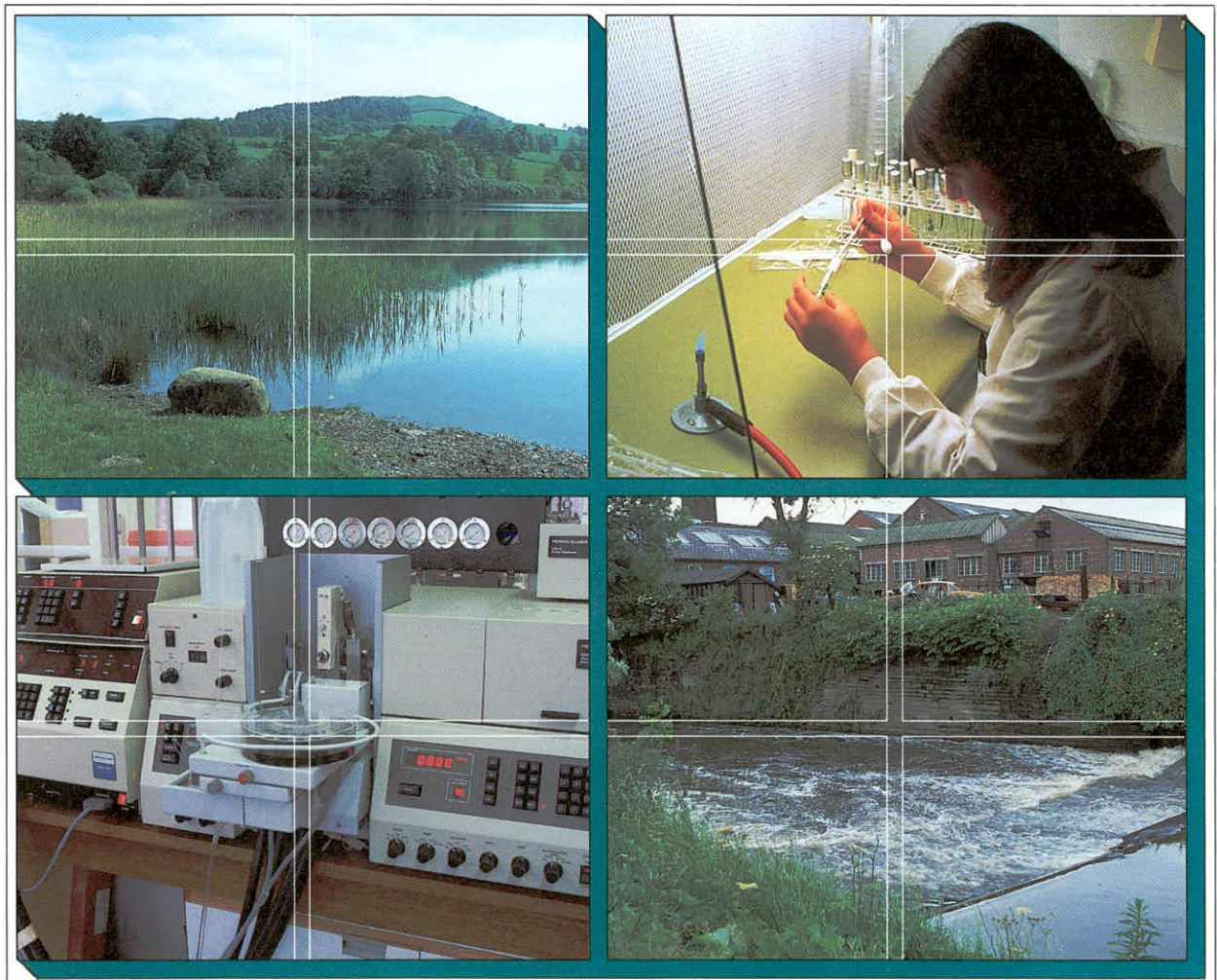


# An audit of performance in the processing of macro-invertebrate samples in 1993. Highland River Purification Board

R.J.M Gunn, BA  
J.M. Winder, PhD  
N.J. Grieve, BSc  
J.H. Blackburn, BSc  
J.F. Wright, PhD  
K.L. Symes, HNC





**INSTITUTE OF FRESHWATER ECOLOGY**  
**River Laboratory, East Stoke, Wareham, Dorset BH20 6BB**

Tel: 0929 462314  
Fax: 0929 462180

**An audit of performance in the processing  
of macro-invertebrate samples in 1993.  
Highland River Purification Board**

R.J.M. Gunn, J.M. Winder, N.J. Grieve,  
J.H. Blackburn, J.F. Wright & K.L. Symes

Project leader:	R J M Gunn
Report date:	March 1994
Report to:	Highland River Purification Board
IFE Report Ref:	RL/T04071e1/14
TFS Project No:	T04071e1

In accordance with our normal practice, this report is for the use only of the party to whom it is addressed, and no responsibility is accepted to any third party for the whole or any part of its contents. Neither the whole nor any part of this report or any reference thereto may be included in any published document, circular or statement, nor published or referred to in any way without our written approval of the form and context in which it may appear.

The Institute of Freshwater Ecology is part of the Terrestrial and Freshwater Sciences Directorate of the Natural Environment Research Council.

## **1. INTRODUCTION**

In 1993 the sampling of aquatic macro-invertebrates for the biological assessment of river quality continued throughout the United Kingdom. This task was undertaken by the National Rivers Authority (NRA) in England and Wales, the River Purification Boards (RPBs) in Scotland and the Industrial Research & Technology Unit (IRTU) in Northern Ireland.

In view of the number of staff involved and the variability of sample processing techniques, it was recognised that an independent quality control exercise was necessary to promote a consistently high level of reliability. The IFE was contracted to undertake an audit of the sample sorting and identification performance of each NRA region, several RPBs and the IRTU. This report presents the results of six samples audited for Highland River Purification Board. The IFE was not required to perform any statistical analyses nor interpretation of the results of the audit.

Each organisation employed standard collection procedures, as used in the 1990 River Quality Survey, and the sampling strategy was therefore compatible with RIVPACS (River InVertebrate Prediction And Classification System), which has been developed by the Institute of Freshwater Ecology (IFE).

Samples were sorted by NRA, RPB and IRTU personnel for the families of macro-invertebrates included in the Biological Monitoring Working Party (BMWP) system. Taxa present were recorded on site data sheets. Sample processing and recording techniques varied from region to region.

## **2. SAMPLE SELECTION**

Samples for audit were selected internally by each of the agencies being monitored. The biologists processing these samples had no prior knowledge of the samples to be audited.

The manner of sample selection, which biologists would be monitored and the number of audit samples from each season, were left to the discretion of the agency, within the limits of the total number of samples that IFE was contracted to audit.

## **3. SAMPLE PROCESSING**

The normal protocol for NRA, RPB and IRTU biologists was to sort their samples within the laboratory and to select examples of each scoring taxon within the BMWP system. In most cases, the invertebrates were placed in a vial of preservative (4% formaldehyde solution or 70% industrial alcohol) and the BMWP taxa were listed on a data sheet. The vial of animals and the sorted material were then returned to the sample container and preservative added. Thus, each sample available to IFE for audit should have included:

- i) a list of the BMWP families found in the sample
- ii) a vial containing representatives from each family
- iii) the preserved sample

When these three elements were present, the sequence of operations at IFE was as follows:

- a) The remainder of the sample was sorted and the BMWP families listed
- b) The families contained within the vial were identified and listed
- c) A comparison was made between the RPB listing of families and those identified from the vial by IFE
- d) A comparison was made between the RPB listing of families and those found in the sample by IFE
- e) "Losses" or "gains" from the RPB listing of families were noted. In the case of "gains", each additional family was identified, where possible, to species level, in order to clarify any specific repetitive errors.

For a number of different reasons, some samples did not include a vial containing representative examples of the families listed on the data sheet. Others arrived with the vial damaged in transit such that the representative examples were no longer separated. For these samples, only operations a), d) and e) above were appropriate.

Several directives were issued to IFE relating to the treatment of BMWP taxa. Terrestrial representatives of BMWP scoring families, animals deemed to have been dead at the time of sampling, cast insect skins, pupal exuviae, empty mollusc shells and posterior ends of "living" specimens were to be excluded from the listing of families present. Chrysomelidae and Curculionidae, which appear in the BMWP list, were also to be excluded for the purposes of the audit. Trichopteran pupae, although not routinely identified by many biologists, were to be included in the listing of families.

#### **4. REPORTING**

The results of each sample audit were recorded on a standard report form (Table 1). For audit samples where a vial of animals was included, the comparison between the RPB listing and the taxa found in the vial by IFE was shown in box A of the report form. Discrepancies could be due to carelessness, misidentifications or errors in completing the RPB data sheet. Families not on the RPB listing but found by IFE in the remainder of the sample were entered in box B of the report form under "additional families". When the families listed as "losses" in section A of the report form were compared with the full list of families recorded in the sample by IFE, some apparent losses from the vial were offset by the presence of those families in the remainder of the sample. These taxa were therefore listed in the "losses" box of section A and the "gains" box of section B and were neither a net loss nor a net gain. In these cases, the families were marked with an asterisk in both boxes. Such errors are noted as "omissions" in the Tables which summarise the results for each season (Tables 2, 3 and 4).

Species identifications, state of development (eg adult or larval coleopterans) and the presence of a single representative of a family within the remainder of the sample were recorded in the notes section of the report form. Where the RPB data sheet indicated that a family was noted and released at the site, this was recorded in the notes section but not included as a "loss", even though the family was not found in the vial.

For those samples in which the vial of animals was damaged or missing, box A of the report form was not applicable (N/a). Families not on the list but present in the sample were entered in box B under "additional families" as before. Families recorded on the list but not found by IFE were indicated on the left hand side of box B. If the vial of animals was retained by the sorter, entries in this box could include the sole representative of a family which was removed, a family seen at the site which escaped or was released (without mention being made on the data sheet), inaccurate identification, the wrong family box being ticked on the data sheet or the family being present in the sample but missed by IFE.

Results of the audits of individual samples are presented in the Appendix.

## **ACKNOWLEDGEMENTS**

Thanks to Diana Morton for typing the report.

TABLE 1. The IFE Report form

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	<input type="text"/>	RIVER	<input type="text"/>
DATE	<input type="text"/>	SITE	<input type="text"/>
SORTER	<input type="text"/>	SAMPLE CODE	<input type="text"/>

AQC OF BMWP FAMILIES A. IN VIAL ☐ B. IN SAMPLE ☐

A	VIAL	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE		

D	SAMPLE	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial is supplied with sample)	

NOTES: NET LOSSES ☐ NET GAINS ☐

TABLE 2. The 6 samples audited for Highland RPB.

River	Site	Sorter	Losses	Gains	Omissions
Balmacara Burn	d/s Septic Tank	JH/EG	0	0	0
Moidart	d/s McConnel Fish Farm	EG/JH	1	4	0
Acharacle Burn	d/s Septic Tank	JH	0	4	0
Coe Tributary	u/s Clachaig Inn	JH	0	0	0
Polla	u/s Fish Farm	EG	1	3	0
Little River	Peat Workings	EG	2	5	0

## **APPENDIX**

### **Results of individual sample audits**

## EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Highland RPB	RIVER	Balmacara Burn
DATE	27.4.93	SITE	d/s Septic Tank
SORTER	JH/EG	SAMPLE CODE	

AQC OF BMWP FAMILIES    A. IN VIAL            B. IN SAMPLE   

A	VIAL	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	None	None

B	SAMPLE	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial is supplied with sample)	None

NET LOSSES

NET GAINS

NOTES:

## EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Highland RPB	RIVER	Moidart
DATE	27.4.93	SITE	d/s McConnel Fish Farm
SORTER	EG/JH	SAMPLE CODE	

AQC OF BMWP FAMILIES A. IN VIAL

+

B. IN SAMPLE

+

A	VIAL	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	1 Glossiphoniidae	2 Erpobdellidae

B	SAMPLE	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial is supplied with sample)	3 Taeniopterygidae 4 Leuctridae 5 Scirtidae

NET LOSSES

1

NET GAINS

4

NOTES:

2 Erpobdella octoculata  
3 Brachyptera risi  
4 Leuctra sp. (juveniles)  
5 Hydrocyphon deflexicollis (larvae)

Jaera nordmanni found by IFE in sample.

## EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Highland RPB	RIVER	Acharacle Burn
DATE	19.8.93	SITE	d/s Septic Tank
SORTER	JH	SAMPLE CODE	

AQC OF BMWP FAMILIES A. IN VIAL  B. IN SAMPLE

A	VIAL	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	None	None

B	SAMPLE	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial is supplied with sample)	1 Hydrophilidae 2 Dryopidae 3 Leptoceridae 4 Goeridae

NET LOSSES

NET GAINS

NOTES:

1 Hydraena gracilis (adults)  
2 Dryops sp. (larva) 1 only  
3 Adicella reducta 1 only  
4 Silo sp. (juvenile) 1 only

## EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION Highland RPB

RIVER Coe Tributary

DATE 3.8.93

SITE u/s Clachaig Inn

SORTER JH

SAMPLE CODE

AQC OF BMWP FAMILIES A. IN VIAL +

B. IN SAMPLE +

A	VIAL	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	None	None

B	SAMPLE	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial is supplied with sample)	None

NET LOSSES 0

NET GAINS 0

NOTES:

## EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Highland RPB	RIVER	Polla
DATE	13.8.93	SITE	u/s Fish Farm
SORTER	EG	SAMPLE CODE	

AQC OF BMWP FAMILIES A. IN VIAL B. IN SAMPLE 

A	VIAL	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	1 Limnephilidae	2 Lepidostomatidae

B	SAMPLE	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial is supplied with sample)	3 Caenidae 4 Brachycentridae

NET LOSSES

NET GAINS

NOTES:

2 Crunoecia irrorata  
 3 Caenis rivulorum 1 only  
 4 Brachycentrus subnubilus 1 only

## EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Highland RPB	RIVER	Little River
DATE	9.8.93	SITE	Peat Workings
SORTER	EG	SAMPLE CODE	

AQC OF BMWP FAMILIES A. IN VIAL

+

B. IN SAMPLE

+

A	VIAL	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	1 Ancylidae 2 Asellidae	3 Erpobdellidae

B	SAMPLE	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial is supplied with sample)	4 Hydrophilidae 5 Philopotamidae 6 Polycentropodidae 7 Lepidostomatidae

NET LOSSES

2

NET GAINS

5

## NOTES:

1 Empty shell in vial  
 2 Jaera nordmanni in vial and sample  
 3 Dina lineata  
 4 Hydraena gracilis (adult) 1 only  
 5 Wormaldia sp.  
 6 Polycentropus flavomaculatus  
 7 Lepidostoma hirtum 1 only  
 Note on data sheet says "2 unidentified small caddis". Juvenile Agapetus sp. and Hydropsyche sp. found in vial.

