



An audit of performance in the processing of macro-invertebrate samples in 1994. Clyde River Purification Board

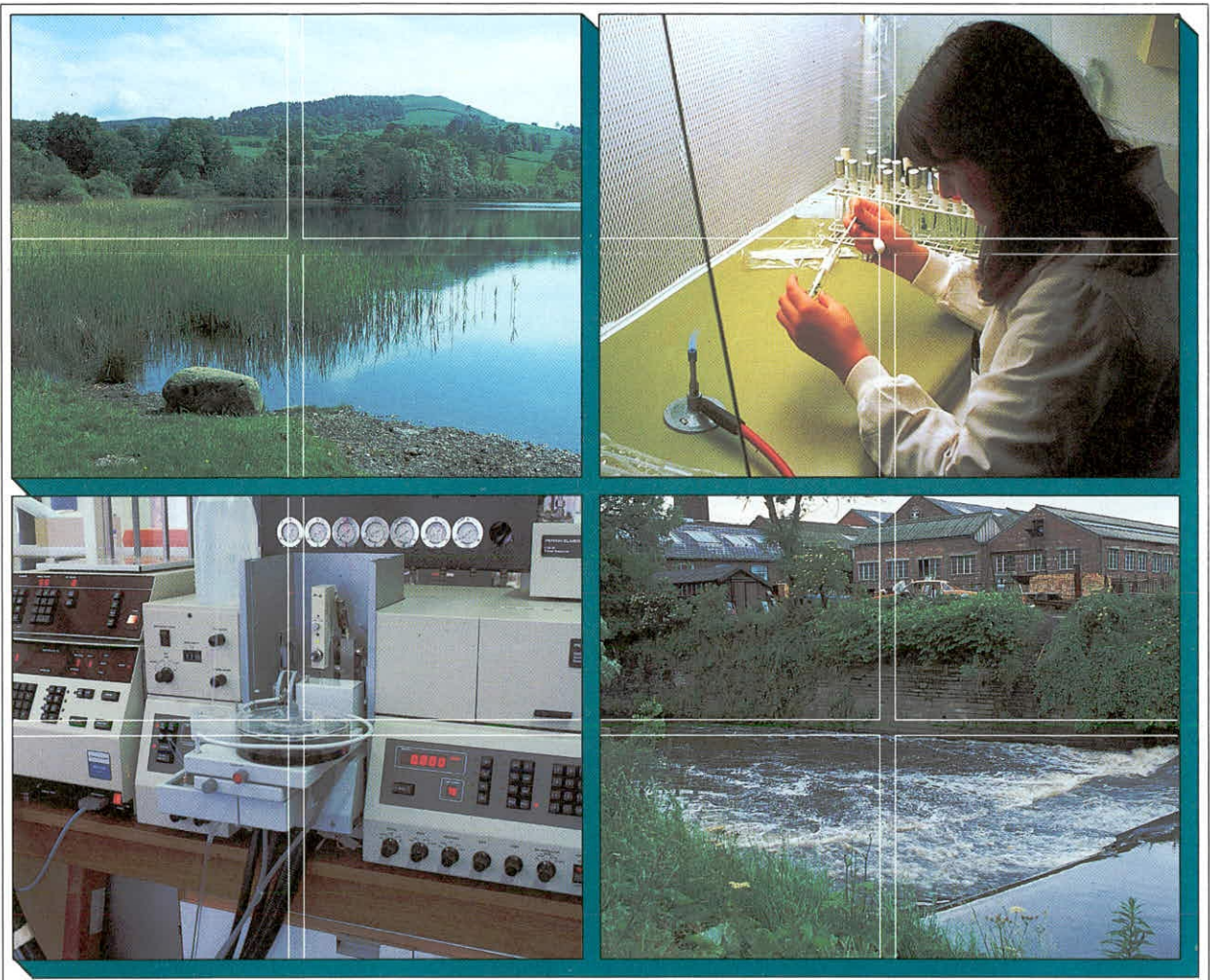
R.J.M. Gunn, BA
N.J. Grieve, BSc

J.H. Blackburn, BSc
J.F. Wright, PhD

J.M. Winder, PhD
K.L. Symes, HND

Report To:
IFE Report Ref. No:

Clyde River Purification Board
RL/T04071h1/12



MAY

1995



**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 1994. Clyde River Purification Board

**R.J.M. Gunn; J.H. Blackburn; J.M. Winder; N.J. Grieve;
J.F. Wright; K.L. Symes**

Project Leader:	R.J.M. Gunn
Report Date:	May 1995
Report To:	Clyde River Purification Board
IFE Report Ref. No:	RL/T04071h1/12

INTELLECTUAL PROPERTY RIGHTS

CONFIDENTIALITY STATEMENT

'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.'

1. INTRODUCTION

In 1994 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 31 samples audited for Clyde 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 and 3).

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.

TABLE 1. The IFE Report form

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

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

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		

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 is only completed when no vial is supplied with the sample)	

* Taxa recorded on data sheet but absent from vial and found by I.F.E.
in sample (omissions)

NET LOSSES

NET GAINS

OMISSIONS

NOTES:

--

TABLE 2. The 21 spring samples audited for Clyde RPB.

River	Site	Sorter	Losses	Gains	Omissions
Noddesdale Water	A78 Bridge	DG	0	1	0
Stinchar	High Bridge	MK	0	1	0
Strae	B8077 Bridge	SD	0	2	0
Chiscan Water	B843 Bridge	MT	0	1	0
South Calder	u/s Ravenscraig	MK	0	2	0
Clyde	Bothwell Bridge	MT	0	0	0
Clyde	Highlees	ST	0	1	0
Machrihanish Water	Aros Bridge	ST	0	0	0
Clyde	Dalmarnock Rail Bridge	DG	0	0	0
Clyde	d/s Elvanfoot	SD	0	1	0
Water of Girvan	Dailly Bowling Club	MK	0	1	0
Avon Water	Haughead	LM	0	1	1
Levern Water	Neilston Mill	RW	0	2	0
Endrick	d/s Fintry STW	MT	1	2	0
Water of Girvan	u/s Dowhail	MT	0	1	1
Kilmarnock Water	d/s Kilmarnock	SD	0	1	0
Fenwick Water	Assloss Bridge	SD	0	1	0
Brock Burn	Waterfoot Avenue	DG	0	0	0
Sorn	u/s Roundpool	MK	0	1	0
Torra/Duich	Drochaid Bheach	RW	0	4	0
Levern Water	Gateside	LM	0	2	0

TABLE 3 The 10 summer samples audited for Clyde RPB.

River	Site	Sorter	Losses	Gains	Omissions
Water of Coyle	Littlemill Bridge	RW	1	0	1
Water of Coyle	Bridgend Mains	MK	0	1	0
Allander Water	d/s Milngavie STW	KA	1	4	0
Glaisnock Water	u/s Lugar confluence	LM	0	0	0
White Cart Water	Millhouse	RW	0	0	0
White Cart Water	Busby Park	DG	0	3	0
Douglas Water	Sandilands	MT	0	1	0
Water of Coyle	d/s Drongan STW	LM	0	0	0
White Cart Water	Battlefield	SD	0	1	0
Ayr	Mainholm Ford	DG	1	1	0

APPENDIX

Results of individual sample audits

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Noddesdale Water
DATE	21.4.94	SITE	u/s A78 Bridge
SORTER	DG	CODE	94/207

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 is only completed when no vial is supplied with the sample)	1 Polycentropodidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E.
in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

1 Polycentropus flavomaculatus/kingi

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Stinchar
DATE	13.4.94	SITE	High Bridge
SORTER	MK	CODE	94/110

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 is only completed when no vial is supplied with the sample)	1 Baetidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

1 Baetis rhodani 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Strae
DATE	20.4.94	SITE	B8077 Bridge
SORTER	SD	CODE	94/209

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 is only completed when no vial is supplied with the sample)	1 Hydrophilidae 2 Hydroptilidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

1 Hydraena gracilis (adult) 1 only
2 Hydroptila sp. 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Chiscan Water
DATE	14.4.94	SITE	B843 Bridge
SORTER	MT	CODE	94/154

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 is only completed when no vial is supplied with the sample)	1 Hydrophilidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E.
in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

1 Hydraena gracilis (adults)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	South Calder
DATE	12.4.94	SITE	u/s Ravenscraig
SORTER	MK	CODE	94/96

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 is only completed when no vial is supplied with the sample)	1 Lymnaeidae 2 Leptophlebiidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

1 Lymnaea peregra, L.truncatula/palustris (juvenile)
2 Paraleptophlebia sp. (juvenile)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Clyde
DATE	15.4.94	SITE	Bothwell Bridge
SORTER	MT	CODE	94/170

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 is only completed when no vial is supplied with the sample)	None

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Clyde
DATE	15.4.94	SITE	Highlees
SORTER	ST	CODE	94/168

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 is only completed when no vial is supplied with the sample)	1 Tipulidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E.
in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

1 Antocha vitripennis

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Machrihanish
DATE	14.4.94	SITE	Aros Bridge
SORTER	ST	CODE	94/151

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 is only completed when no vial is supplied with the sample)	None

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Clyde
DATE	15.4.94	SITE	Dalmarnock Rail Bridge
SORTER	DG	CODE	94/173

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 is only completed when no vial is supplied with the sample)	None

* Taxa recorded on data sheet but absent from vial and found by I.F.E.
in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Clyde
DATE	15.4.94	SITE	d/s Elvanfoot
SORTER	SD	CODE	94/162

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 is only completed when no vial is supplied with the sample)	1 Hydroptilidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E.
in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

1 Hydroptila sp. 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Water of Girvan
DATE	13.5.94	SITE	Dailly Bowling Club
SORTER	MK	CODE	94/359

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 is only completed when no vial is supplied with the sample)	1 Glossiphoniidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

1 Glossiphonia complanata 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Avon Water
DATE	3.5.94	SITE	Haughead
SORTER	LM	CODE	94/271

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

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

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

2 Asellus aquaticus
3 Caenis rivulorum

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Levern Water
DATE	25.5.94	SITE	Neilston Mill
SORTER	RW	CODE	94/402

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	1 Polycentropodidae

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 is only completed when no vial is supplied with the sample)	2 Ephemerellidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

1 Plectrocnemia conspersa
2 Ephemerella ignita 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Endrick
DATE	10.5.94	SITE	d/s Fintry STW
SORTER	MT	CODE	94/316

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	Lid separated from vial in transit. Identification check not possible.	N/a

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 is only completed when no vial is supplied with the sample) 1 Perlidae	2 Taeniopterygidae 3 Hydrophilidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES

1

NET GAINS

2

OMISSIONS

0

NOTES:

2 Brachyptera risi 1 only
3 Hydraena gracilis (adults)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Water of Girvan
DATE	13.5.94	SITE	u/s Dowhail
SORTER	MT	CODE	94/358

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 Chironomidae*	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 is only completed when no vial is supplied with the sample)	2 Tipulidae 3 Chironomidae*

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

2 Dicranota sp. 1 only
3 Tanypodinae, Diamesinae, Orthocladiinae, Chironomini

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Kilmarnock Water
DATE	10.5.94	SITE	d/s Kilmarnock
SORTER	SD	CODE	94/314

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 is only completed when no vial is supplied with the sample)	1 Rhyacophilidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E.
in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

1 Glossosoma sp. (pupa) 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Fenwick Water
DATE	10.5.94	SITE	Assloss Bridge
SORTER	SD	CODE	94/313

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 is only completed when no vial is supplied with the sample)	1 Hydrobiidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

1 Potamopyrgus jenkinsi 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Brock Burn
DATE	13.5.94	SITE	Waterfoot Avenue
SORTER	DG	CODE	94/354

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 is only completed when no vial is supplied with the sample)	None

* Taxa recorded on data sheet but absent from vial and found by I.F.E.
in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Sorn
DATE	17.5.94	SITE	u/s Roundpool
SORTER	MK	CODE	94/371

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 is only completed when no vial is supplied with the sample)	1 Leptoceridae

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES

0

NET GAINS

1

OMISSIONS

0

NOTES:

1 Athripsodes sp. (juvenile) 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Torra/Duich
DATE	17.5.94	SITE	Drochaid Bheach
SORTER	RW	CODE	94/377

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 is only completed when no vial is supplied with the sample)	1 Ancylidae 2 Leuctridae 3 Perlodidae 4 Rhyacophilidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES

0

NET GAINS

4

OMISSIONS

0

NOTES:

- 1 Ancylus fluviatilis 1 only
- 2 Leuctra sp. (juvenile) 1 only
- 3 Isoperla grammatica
- 4 Rhyacophila sp. (juvenile) 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Levern Water
DATE	25.5.94	SITE	Gateside
SORTER	LM	CODE	94/403

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 is only completed when no vial is supplied with the sample)	1 Leptophlebiidae 2 Ephemerellidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

1 Paraleptophlebia submarginata 1 only
2 Ephemerella ignita

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Water of Coyle
DATE	8.6.94	SITE	Littlemill Bridge
SORTER	RW	CODE	94/504

A	VIAL Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
		1 Chloroperlidae* 2 Psychomyiidae	None

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

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES

1

NET GAINS

0

OMISSIONS

1

NOTES:

3 Chloroperla torrentium

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Water of Coyle
DATE	8.6.94	SITE	Bridgend Mains
SORTER	MK	CODE	94/507

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 is only completed when no vial is supplied with the sample)	1 Tipulidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E.
in sample (omissions)

NET LOSSES

0

NET GAINS

1

OMISSIONS

0

NOTES:

1 Antocha vitripennis 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Allander Water
DATE	6.6.94	SITE	d/s Milngavie STW
SORTER	KA	CODE	94/481

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

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

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES 1 NET GAINS 4 OMISSIONS 0

NOTES:

2 Physa sp. (decalcified specimen)
3 Dendrocoelum lacteum 1 only
4 Ephemerella ignita 1 only
5 Sericostoma personatum 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Glaisnock Water
DATE	8.6.94	SITE	u/s Lugar confluence
SORTER	LM	CODE	94/503

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 is only completed when no vial is supplied with the sample)	None

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES

0

NET GAINS

0

OMISSIONS

0

NOTES:

--

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	White Cart Water
DATE	23.6.94	SITE	Millhouse
SORTER	RW	CODE	94/537

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 is only completed when no vial is supplied with the sample)	None

* Taxa recorded on data sheet but absent from vial and found by I.F.E.
in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	White Cart Water
DATE	23.6.94	SITE	Busby Park
SORTER	DG	CODE	94/540

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 is only completed when no vial is supplied with the sample)	1 Dendrocoelidae 2 Asellidae 3 Psychomyiidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES

0

NET GAINS

3

OMISSIONS

0

NOTES:

1 Dendrocoelum lacteum 1 only
2 Asellus aquaticus 1 only
3 Psychomyia pusilla

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Douglas Water
DATE	13.6.94	SITE	Sandilands
SORTER	MT	CODE	94/514

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 is only completed when no vial is supplied with the sample)	1 Siphonuridae

* Taxa recorded on data sheet but absent from vial and found by I.F.E.
in sample (omissions)

NET LOSSES

0

NET GAINS

1

OMISSIONS

0

NOTES:

1 Siphonurus lacustris 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Water of Coyle
DATE	8.6.94	SITE	d/s Drongan STW
SORTER	LM	CODE	94/506

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 is only completed when no vial is supplied with the sample)	None

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES NET GAINS OMISSIONS

NOTES:

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	White Cart Water
DATE	23.6.94	SITE	Battlefield
SORTER	SD	CODE	94/543

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 is only completed when no vial is supplied with the sample)	1 Planariidae

* Taxa recorded on data sheet but absent from vial and found by I.F.E.
in sample (omissions)

NET LOSSES

0

NET GAINS

1

OMISSIONS

0

NOTES:

1 Polycelis nigra/tenuis 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

REGION	Clyde RPB	RIVER	Ayr
DATE	7.6.94	SITE	Mainholm Ford
SORTER	DG	CODE	94/497

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

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

* Taxa recorded on data sheet but absent from vial and found by I.F.E. in sample (omissions)

NET LOSSES 1 NET GAINS 1 OMISSIONS 0

NOTES:

2 Chloroperla torrentium 1 only

DISTRIBUTION SHEET

To be completed by all Project Leaders completing commissioned research project reports. Please bind a copy of this distribution sheet as the final page in all internal (IFE) copies of the report.

1.	Authors: R.J.M. Gunn, J.H. Blackburn, J.M. Winder, N.J. Grieve, J.F. Wright & K.L. Symes Title: An audit of performance in the processing of macro-invertebrate samples in 1994. Clyde River Purification Board Report ref: RL/T04071h1/12 Master copy held by: D.M. Morton Report access code (assign a suitable code from list below): S		
2.	DISTRIBUTION LIST [A)-I) standard, I) other]	No.copies	Date
A)	Contract customer: Clyde River Purification Board	2	May 95
B)	IFE Director (c/o Margaret Thompson) (title page and abstract only)		
C)	Asst Director - Central (Dr A.D. Pickering)	1	May 95
D)	Asst Director - Regional (Dr J. Hilton) (title page and abstract only)		
E)	Internal Coordinator for Commissioned Research (Dr F.H. Dawson)/River Laboratory Library	1	May 95
F)	Diana Morton (title page only + no.pages for adding to publication list)		
G)	Project leader: R.J.M. Gunn	1	May 95
H)	FBA Library, Windermere	1	May 95
I)	Other (list below and indicate no. copies in RH column)		
1.			
2.			
3.			
	Total number of copies made	6	

REPORT ACCESS CODES

- S** In strict confidence - restricted access - Access to named customer(s) - (could be named restricted access individuals), IFE Directorate, Project Leader and all authors.
- C** In confidence - restricted access - Access to customer, IFE Directorate, Project Leader, all authors, and IFE staff with permission of Project Leader.
- N** 'Normal' access - Access to customer and all IFE staff. Access to visitors and general public with permission of Project Leader.
- G** General access - General access to anyone as required.

