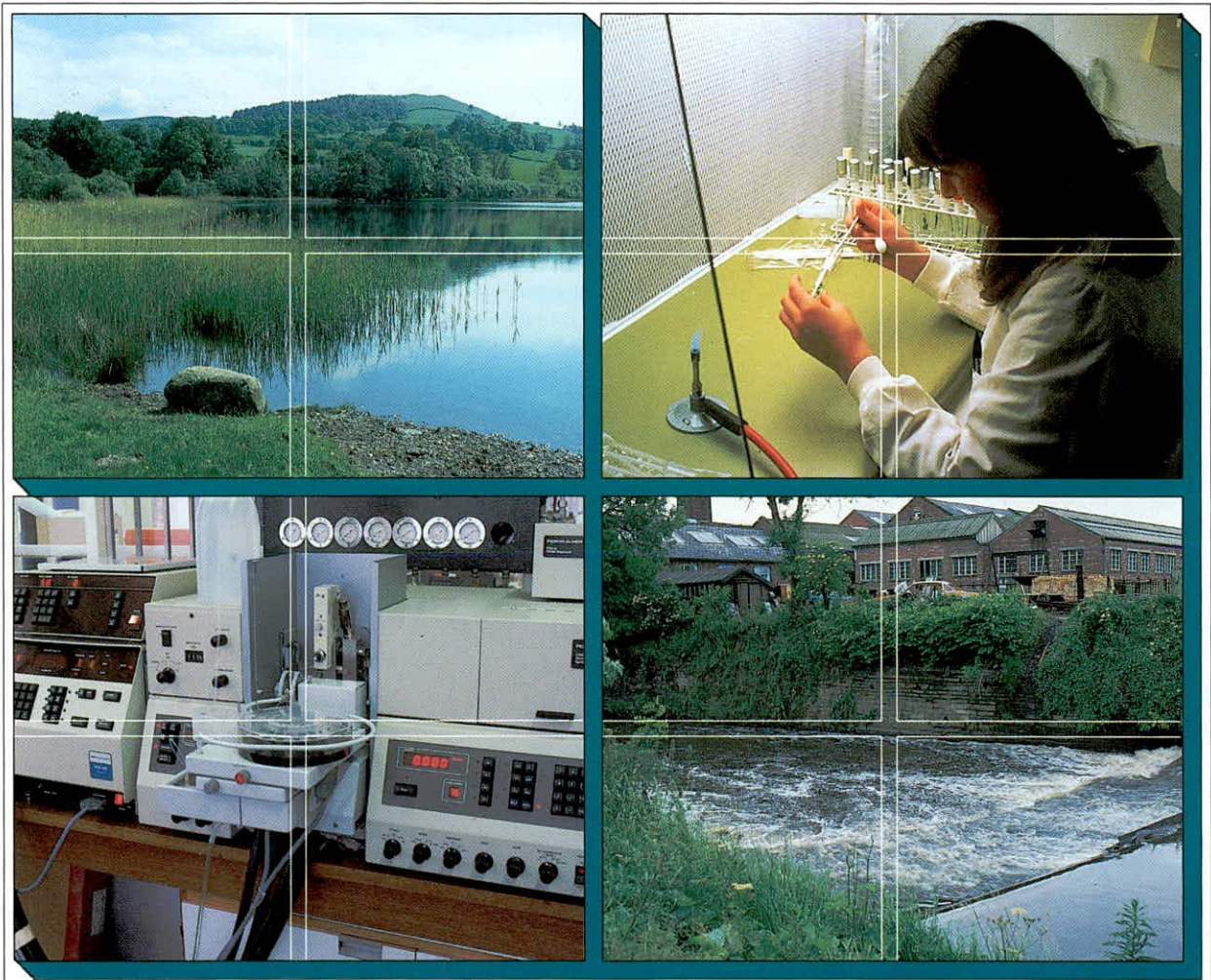




An audit of performance in the processing of macro-invertebrate samples in 1993. Clyde River Purification Board

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Report date:	March 1994
Report to:	Clyde River Purification Board
IFE Report Ref:	RL/T04071e1/12
TFS Project No:	T04071e1

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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 29 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, 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 RIVER

DATE SITE

SORTER 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		

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)	

NOTES: NET LOSSES NET GAINS

TABLE 2. The 10 spring samples audited for Clyde RPB.

River	Site	Sorter	Losses	Gains	Omissions
Calder	d/s Lockwinnoch	MT	1	0	0
Lussa	Strathcoil	MK	0	0	0
Kelvin	Balmuildy Bridge	SD	0	1	0
Garnock	u/s Kilbirnie	SD	0	2	0
Glazert Water	Glazert Foot	SC	0	1	0
Luggie Water	Glenhove	DG	0	0	0
Endrick	Gartcarron Bridge	SC	0	0	1
Capelrig/ Auldhouse	Camwadric	DG	0	0	0
Allander Water	d/s Milngavie STW	MT	0	0	0
Leven	Renton	MK	1	2	0

TABLE 3. The 7 summer samples audited for Clyde RPB

River	Site	Sorter	Losses	Gains	Omissions
Rye Water	B780 Bridge	DG	0	0	0
Lugton Water	A737 Bridge	MT	1	0	0
Mouse Water	Newmill Bridge	MK	1	1	0
Cessnock Water	Aird	SD	0	0	0
Add	Forest Road Bridge	DG	0	1	1
Levern Water	Linthaugh Road	MK	0	0	0
Shellish	Glanbranter	SD	0	0	0

TABLE 4. The 12 autumn samples audited for Clyde RPB

River	Site	Sorter	Losses	Gains	Omissions
Black Cart	Linwood Bridge	DG	0	2	0
Pow Burn	A79 Bridge	SC	0	0	0
Noddesdale Water	A78 Bridge	DG	0	0	0
Craufurdland Water	Assloss Ford	SC	0	0	0
Water of Girvan	Knockdon Bridge	MK	0	0	0
Rotten Calder Water	Generals Bridge	SD	0	0	0
Midton Burn	d/s Enco	SC	0	1	0
Rotten Burn	u/s Rotten Calder confluence	MT	0	1	0
Carmel Water	d/s Cross House	MT	0	0	0
Cloak Burn	Cloak Foot	SD	0	1	0
Kilmarnock Water	d/s Kilmarnock	MT	0	0	0
Rumbling Burn	B749 Bridge	MK	0	0	0

APPENDIX

Results of individual sample audits

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Calder
DATE	30.4.93	SITE	d/s Lockwinnoch
SORTER	MT	SAMPLE CODE	220

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 Hydroptilidae	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 1 NET GAINS 0

NOTES:

1 Empty case in vial

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Lussa
DATE	9.3.93	SITE	Strathcoil
SORTER	MK	SAMPLE CODE	32A

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	Clyde RPB	RIVER	Kelvin
DATE	11.5.93	SITE	Balmuilty Bridge
SORTER	SD	SAMPLE CODE	267

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 Perlodidae

NET LOSSES 0 NET GAINS 1

NOTES:

1 Isoperla grammatica 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Garnock
DATE	23.2.93	SITE	u/s Kilbirnie
SORTER	SD	SAMPLE CODE	99

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 Ancylidae 2 Sphaeriidae

NET LOSSES 0 NET GAINS 2

NOTES:

1 Ancylus fluviatilis 1 only
2 Pisidium sp. 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Glazert Water
DATE	5.5.93	SITE	Glazert Foot
SORTER	SC	SAMPLE CODE	230

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 Nemouridae

NET LOSSES 0 NET GAINS 1

NOTES:

1 Amphinemura sulcicollis 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Luggie Water
DATE	26.3.93	SITE	Glenhove
SORTER	DG	SAMPLE CODE	170

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	Clyde RPB	RIVER	Endrick
DATE	29.4.93	SITE	Gartcarron Bridge
SORTER	SC	SAMPLE CODE	209

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 Gammaridae*	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)	2 Gammaridae*

NET LOSSES 0

NET GAINS 0

NOTES:

2 Gammarus pulex

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Capelrig/Auldhouse
DATE	10.5.93	SITE	Carnwadric
SORTER	DG	SAMPLE CODE	251

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	Clyde RPB	RIVER	Allander Water
DATE	5.5.93	SITE	d/s Milngavie STW
SORTER	MT	SAMPLE CODE	233

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	Clyde RPB	RIVER	Leven
DATE	16.3.93	SITE	Renton
SORTER	MK	SAMPLE CODE	141

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 Chloroperlidae	2 Leuctridae

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)	3 Simuliidae

NET LOSSES 1 NET GAINS 2

NOTES:

2 Leuctra inermis
3 Simulium ornatum group 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Rye Water
DATE	10.8.93	SITE	B780 Bridge
SORTER	DG	SAMPLE CODE	512

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	Clyde RPB	RIVER	Lugton Water
DATE	10.8.93	SITE	A737 Bridge
SORTER	MT	SAMPLE CODE	515

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 Planorbidae	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:

1 Terrestrial snail in vial

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Mouse Water
DATE	24.6.93	SITE	Newmill Bridge
SORTER	MK	SAMPLE CODE	420

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 Lepidostomatidae	2 Brachycentridae

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 1

NET GAINS 1

NOTES:

2 Brachycentrus subnubilus (juveniles)
Note on data sheet says "2 pots". Only 1 pot sent to IFE for audit.

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Cessnock Water
DATE	17.8.93	SITE	Aird
SORTER	SD	SAMPLE CODE	531

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	Clyde RPB	RIVER	Add
DATE	16.6.93	SITE	Forest Road Bridge
SORTER	DG	SAMPLE CODE	381

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*	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)	2 Ancylidae 3 Limnephilidae*

NET LOSSES 0 NET GAINS 1

NOTES:

2 Ancylus fluviatilis 1 only
3 Chaetopteryx villosa 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Levern Water
DATE	22.6.93	SITE	Linthaugh Road
SORTER	MK	SAMPLE CODE	405

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	Clyde RPB	RIVER	Shellish
DATE	29.6.93	SITE	Glanbranter
SORTER	SD	SAMPLE CODE	438

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	Clyde RPB	RIVER	Black Cart
DATE	19.10.93	SITE	Linwood Bridge
SORTER	DG	SAMPLE CODE	714

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 Dendrocoelidae 2 Sericostomatidae

NET LOSSES NET GAINS

NOTES:

1 Dendrocoelum lacteum 1 only
2 Indet Sericostomatid (juvenile) 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Pow Burn
DATE	21.9.93	SITE	A79 Bridge
SORTER	SC	SAMPLE CODE	689

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	Clyde RPB	RIVER	Noddesdale Water
DATE	7.9.93	SITE	A78 Bridge
SORTER	DG	SAMPLE CODE	649

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	Clyde RPB	RIVER	Craufurdland Water
DATE	18.10.93	SITE	Assloss Ford
SORTER	SC	SAMPLE CODE	715

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	Clyde RPB	RIVER	Water of Girvan
DATE	23.9.93	SITE	Knockdon Bridge
SORTER	MK	SAMPLE CODE	692

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	Clyde RPB	RIVER	Rotten Calder Water
DATE	3.9.93	SITE	Generals Bridge
SORTER	SD	SAMPLE CODE	640

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	Clyde RPB	RIVER	Midton Burn
DATE	5.10.93	SITE	d/s Enco
SORTER	SC	SAMPLE CODE	710

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 Simuliidae

NET LOSSES NET GAINS

NOTES:

1 Simulium cryophilum group 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Rotten Burn
DATE	3.9.93	SITE	u/s Rotten Calder confluence
SORTER	MT	SAMPLE CODE	643

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 Simuliidae

NET LOSSES NET GAINS

NOTES:

1 Simulium ornatum group 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Carmel Water
DATE	18.10.93	SITE	d/s Crosshouse
SORTER	MT	SAMPLE CODE	720

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	Clyde RPB	RIVER	Cloak Burn
DATE	7.9.93	SITE	Cloak Foot
SORTER	SD	SAMPLE CODE	645

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 Hydrobiidae

NET LOSSES

NET GAINS

NOTES:

1 Potamopyrgus jenkinsi 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Clyde RPB	RIVER	Kilmarnock Water
DATE	18.10.93	SITE	d/s Kilmarnock
SORTER	MT	SAMPLE CODE	718

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	Clyde RPB	RIVER	Rumbling Burn
DATE	21.9.93	SITE	B749 Bridge
SORTER	MK	SAMPLE CODE	690

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: