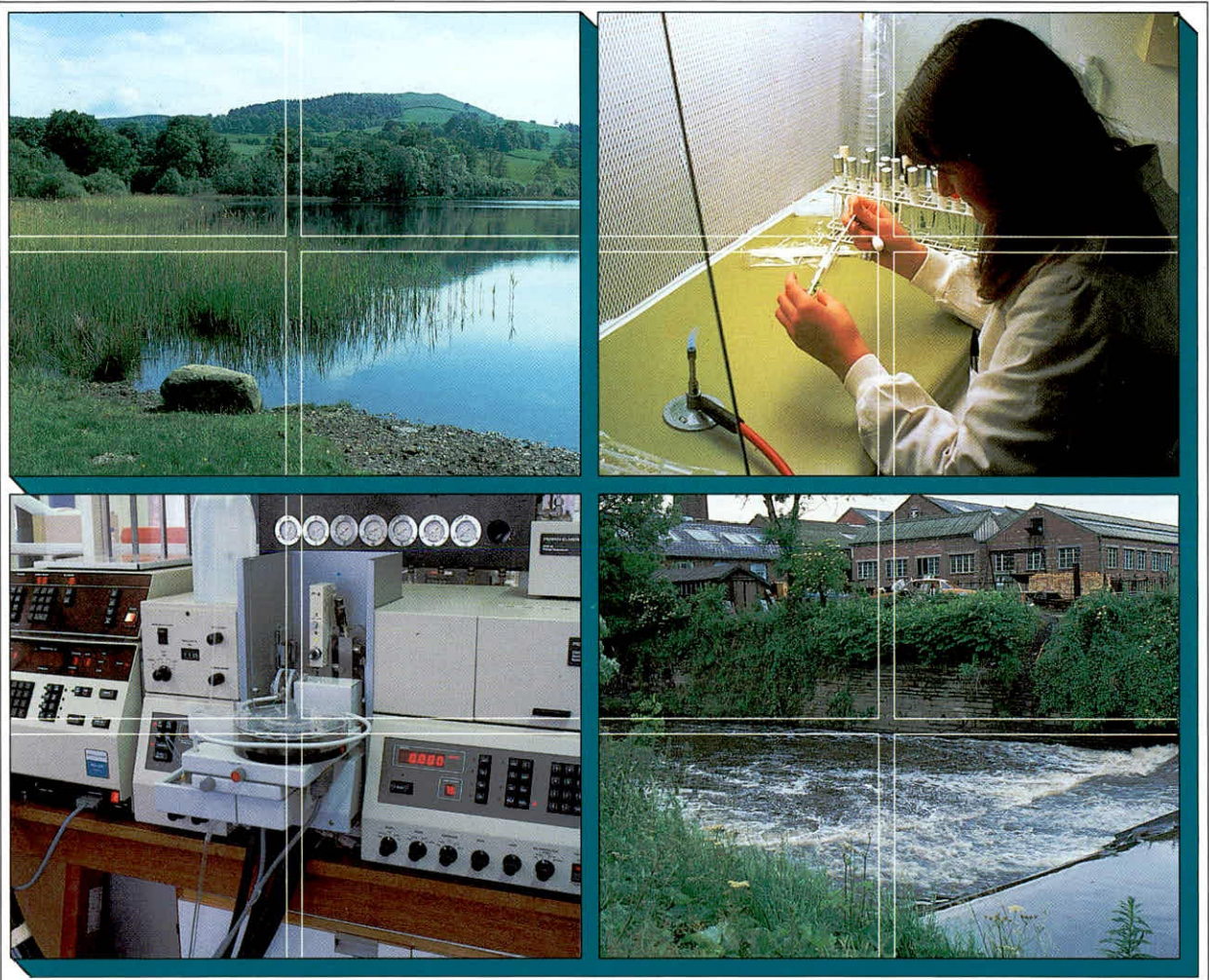




**Institute of
Freshwater
Ecology**

An audit of performance in the processing of macro-invertebrate samples in 1993. NRA Northumbria Area of Northumbria & Yorkshire Region

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NRA Northumbria Area of Northumbria & Yorkshire Region

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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 40 samples audited for Northumbria Area of the NRA. 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 NRA listing of families and those identified from the vial by IFE
- d) A comparison was made between the NRA listing of families and those found in the sample by IFE
- e) "Losses" or "gains" from the NRA 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 NRA 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 NRA data sheet. Families not on the NRA 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 NRA 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 NRA list but present in the sample were listed in box B under "additional families" as before. Families recorded on the NRA 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 NRA, entries in this box could include the sole representative of a family which was removed by the NRA, a family seen at the site which escaped or was released (without mention being made on the NRA data sheet), inaccurate identification, the wrong family box being ticked on the NRA 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 Valerie Palmer for typing the manuscript.

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

7

B. IN SAMPLE

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

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

11

NET GAINS

11

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TABLE 2. The 10 spring samples audited for Northumbria Area

River	Site	Sorter	Losses	Gains	Omissions
Sleek Burn	Choppington	RJ/SS	0	0	0
Hetton Burn	Hazelrigg Mill	VW	0	1	0
Bell Burn	Dinchester	SS	0	0	0
Chevington Burn	Red Row	RJ	0	0	0
Browney	Malton	EC	0	2	1
Greatham Beck	Greatham	SS	0	0	0
Greta	Greta Bridge	VW	1	1	0
North Burn	u/s Ntn. Maz.	SS	0	0	0
Devils Water	Dilston	SS	0	1	0
Tees	Barnard Castle	RJ	0	0	0

TABLE 3. The 10 summer samples audited for Northumbria Area

River	Site	Sorter	Losses	Gains	Omissions
Summerhouse Beck	Carlbury	JH	0	2	1
Chirdon Burn	Chirdon Hill	SS	0	0	0
Old Durham Burn	B1283 Bridge	EC	0	1	0
Alwin	Alwinton	RJ	1	1	0
Morton Beck	Slip Inn	EC	0	0	0
Browney	u/s STW	VW/SS	0	0	0
Barrasford	d/s Gravel Pit	VW	1	3	0
Rede	Rochester	SS/RJ	0	0	0
Swarland Burn	New Moor House	VW	0	1	0
Coquet	Shaperton	RJ	0	0	0

TABLE 4. The 20 autumn samples audited for Northumbria Area

River	Site	Sorter	Losses	Gains	Omissions
Alum	Low Farm	SS/RJ	0	1	0
Pont Burn	B6320 Bridge	VW	0	1	0
South Tyne	Warden	RJ	0	0	0
Durtrees Burn	Shittleheugh	RJ	0	1	0
How Burn	u/s Wansbeck	JH	0	1	0
Swarland Burn	Swarland Fence	VW	0	0	0
Elsdon Burn	A696 Bridge	RJ	0	1	0
Derwent	Eddys Bridge	VW/RJ	0	3	0
Skills Burn	Rochester	RJ	1	0	0
Whiteadder	Newmills	VW/RJ	1	0	1
Wansbeck	Middleton Manor	RJ	1	0	0
Wreigh Burn	Thropton	VW	0	0	0
Glen	Ewart	VW/RJ	0	0	0
Hetton Burn	Hetton House	SS/VW	0	1	0
Middlehope Burn	Westgate	JH	0	1	0
Rede	Redesmouth	EC	0	2	0
Tyne	Wylam	EC	0	1	0
Rede	Byreness	SS	1	0	0
Millstone Burn	Canada	VW	0	0	0
Westerhope Burn	Westerhope	JH/EC	0	0	0

APPENDIX
Results of individual sample audits

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Sleek Burn
DATE	29.4.93	SITE	Choppington
SORTER	RJ/SS	SAMPLE CODE	NRA02 0961

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
	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:

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EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Hetton Burn
DATE	24.3.93	SITE	Hazelrigg Mill
SORTER	VW	SAMPLE CODE	NRA02 0150

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
	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 Lepidostomatidae

NET LOSSES NET GAINS

NOTES:

1 *Lepidostoma hirtum*

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Bell Burn
DATE	9.3.93	SITE	Dinchester
SORTER	SS	SAMPLE CODE	NRA02 2640

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
	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:

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EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Chevington Burn
DATE	19.5.93	SITE	Red Row
SORTER	RJ	SAMPLE CODE	NRA02 0700

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
	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	Northumbria	RIVER	Brownney
DATE	15.4.93	SITE	Malton
SORTER	EC	SAMPLE CODE	NRA02 2500

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 Leptoceridae*	None

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)	2 Caenidae 3 Leptoceridae* 4 Simuliidae

NET LOSSES

0

NET GAINS

2

NOTES:

2 Caenis rivulorum 1 only
 3 Mystacides azurea
 4 Simulium (Nevermannia) sp. 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Greatham Beck
DATE	28.4.93	SITE	Greatham
SORTER	SS	SAMPLE CODE	NRA02 3060

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
	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:

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EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Greta
DATE	24.3.93	SITE	Greta Bridge
SORTER	VW	SAMPLE CODE	NRA02 3830

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 Erpobdellidae	2 Glossiphoniidae

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)	None

NET LOSSES NET GAINS

NOTES:

2 Helobdella stagnalis

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	North Burn
DATE	28.4.93	SITE	u/s Ntn Maz
SORTER	SS	SAMPLE CODE	NRA02 3090

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
	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:

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EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Devils Water
DATE	23.2.93	SITE	Dilston
SORTER	SS	SAMPLE CODE	NRA02 1570

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
	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

0

NET GAINS

1

NOTES:

1 Potamopyrgus jenkinsi 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Tees
DATE	24.3.93	SITE	Barnard Castle
SORTER	RJ	SAMPLE CODE	NRA02 2990

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
	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:

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EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Summerhouse Beck
DATE	30.8.93	SITE	Carlbury
SORTER	JH	SAMPLE CODE	NRA02 3770

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*	None

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)	2 Glossiphoniidae* 3 Leuctridae 4 Psychomyiidae

NET LOSSES

NET GAINS

NOTES:

2 Glossiphonia complanata
3 Leuctra geniculata
4 Tinodes unicolor 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Chirdon Burn
DATE	20.7.93	SITE	Chirdon Hill
SORTER	SS	SAMPLE CODE	NRA02 2020

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
	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	Northumbria	RIVER	Old Durham Burn
DATE	12.8.93	SITE	B1283 Bridge
SORTER	EC	SAMPLE CODE	NRA02 2360

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
	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 Elmidae

NET LOSSES NET GAINS

NOTES:

1 Elmis aenea (larva) 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Alwin
DATE	30.6.93	SITE	Alwinton
SORTER	RJ	SAMPLE CODE	NRA02 0670

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 Scirtidae	None

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)	2 Psychomyiidae

NET LOSSES

1

NET GAINS

1

NOTES:

2 Psychomyia pusilla 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Morton Beck
DATE	4.8.93	SITE	Slip Inn
SORTER	EC	SAMPLE CODE	NRA02 3180

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
	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	Northumbria	RIVER	Browney
DATE	12.8.93	SITE	u/s STW
SORTER	VW/SS	SAMPLE CODE	NRA02 2485

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
	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	Northumbria	RIVER	Barrasford
DATE	6.7.93	SITE	d/s Gravel pit
SORTER	VW	SAMPLE CODE	NRA02 1830

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 Sialidae	None

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)	2 Haliplidae 3 Hydrophilidae 4 Elmidae

NET LOSSES

1

NET GAINS

3

NOTES:

2 Halipus sp. (larva), H.lineatocollis (adult)
 3 Indet Hydrophilid (larva), Anacaena globulus (adult)
 4 Elmis aenea (larva) 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Rede
DATE	17.6.93	SITE	Rochester
SORTER	SS/RJ	SAMPLE CODE	NRA02 1930

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
	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	Northumbria	RIVER	Swarland Burn
DATE	8.6.93	SITE	New Moor House
SORTER	VW	SAMPLE CODE	NRA02 0590

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
	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 Sphaeriidae

NET LOSSES NET GAINS

NOTES:

1 Pisidium sp. 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Coquet
DATE	2.7.93	SITE	Shaperton
SORTER	RJ	SAMPLE CODE	NRA02 0470

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
	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	Northumbria	RIVER	Alum
DATE	7.9.93	SITE	Low Farm
SORTER	SS/RJ	SAMPLE CODE	NRA02 3470

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
	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 Ephemerellidae

NET LOSSES

NET GAINS

NOTES:

1 Ephemerella ignita 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Pont Burn
DATE	20.9.93	SITE	B6320 Bridge
SORTER	VW	SAMPLE CODE	NRA02 1430

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
	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 Ephemerellidae

NET LOSSES

NET GAINS

NOTES:

1 Ephemerella ignita 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	South Tyne
DATE	28.10.93	SITE	Warden
SORTER	RJ	SAMPLE CODE	NRA02 1580

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
	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:

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EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Durtrees Burn
DATE	7.9.93	SITE	Shittleheugh
SORTER	RJ	SAMPLE CODE	NRA02 1990

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
	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 Hydroptilidae

NET LOSSES

NET GAINS

NOTES:

1 Hydroptila sp. 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	How Burn
DATE	18.10.93	SITE	u/s Wansbeck
SORTER	JH	SAMPLE CODE	NRA02 0840

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
	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

0

NET GAINS

1

NOTES:

1 Simulium ornatum group 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbrian	RIVER	Swarland Burn
DATE	20.9.93	SITE	Swarland Fence
SORTER	VW	SAMPLE CODE	NRA02 0580

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
	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:

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EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Elsdon Burn
DATE	19.10.93	SITE	A696 Bridge
SORTER	RJ	SAMPLE CODE	NRA02 1960

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
	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 Lymnaeidae

NET LOSSES NET GAINS

NOTES:

1 Lymnaea peregra 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Derwent
DATE	20.9.93	SITE	Eddys Bridge
SORTER	VW/RJ	SAMPLE CODE	NRA02 1390

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
	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 Glossiphoniidae 2 Hydrophilidae 3 Lepidostomatidae

NET LOSSES NET GAINS

NOTES:

1 Glossiphonia complanata 1 only
 2 Hydraena gracilis (adult) 1 only
 3 Lepidostoma hirtum

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Skills Burn
DATE	7.9.93	SITE	Rochester
SORTER	RJ	SAMPLE CODE	NRA02 2000

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 Capniidae	None

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)	None

NET LOSSES

NET GAINS

NOTES:

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Whiteadder
DATE	23.9.93	SITE	Newmills
SORTER	VW/RJ	SAMPLE CODE	NRA02 0030

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 Planariidae* 2 Limnephilidae	None

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 Planariidae*

NET LOSSES NET GAINS

NOTES:

2 Empty cases found by IFE in sample
3 Polycelis nigra/tenuis

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Wansbeck
DATE	18.10.93	SITE	Middleton Manor
SORTER	RJ	SAMPLE CODE	NRA02 0820

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 Scirtidae	None

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)	None

NET LOSSES

NET GAINS

NOTES:

1 Cast skin in vial

Note on data sheet that Astacidae "released". Not found by IFE in vial or sample.

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Wreigh Burn
DATE	20.10.93	SITE	Thropton
SORTER	VW	SAMPLE CODE	NRA02 0640

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:

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EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Glen
DATE	28.9.93	SITE	Ewart
SORTER	VW/RJ	SAMPLE CODE	NRA02 0090

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:

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EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Hetton Burn
DATE	27.9.93	SITE	Hetton House
SORTER	SS/VW	SAMPLE CODE	NRA02 0147

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
	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 Caenidae

NET LOSSES NET GAINS

NOTES:

1 Caenis sp. 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Middlehope Burn
DATE	22.9.93	SITE	Westgate
SORTER	JH	SAMPLE CODE	NRA02 2810

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 Caenidae

NET LOSSES NET GAINS

NOTES:

1 Caenis rivulorum 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Rede
DATE	19.10.93	SITE	Redesmouth
SORTER	EC	SAMPLE CODE	NRA02 1890

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
	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 Sialidae 2 Hydroptilidae

NET LOSSES NET GAINS

NOTES:

1 Sialis lutaria 1 only
2 Hydroptila sp., Ithytrichia sp.

Entry made on data sheet in box below Planariidae. This assumed to relate to Dendrocoelidae, which was found by IFE in vial. No gain recorded for this taxon.

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Tyne
DATE	19.10.93	SITE	Wylam
SORTER	EC	SAMPLE CODE	NRA02 1140

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
	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 Perlidae

NET LOSSES NET GAINS

NOTES:

1 Perla bipunctata 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Rede
DATE	7.9.93	SITE	Byreness
SORTER	SS	SAMPLE CODE	NRA02 1940

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

NET GAINS

NOTES:

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1993

REGION	Northumbria	RIVER	Millstone Burn
DATE	20.9.93	SITE	Canada
SORTER	VW	SAMPLE CODE	NRA02 0620

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
	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	Northumbria	RIVER	Westerhope Burn
DATE	22.9.93	SITE	Westerhope
SORTER	JH/EC	SAMPLE CODE	NRA02 2790

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:

Dryopidae entered on data sheet but does not appear to have been included in total of taxa for the sample. Not found by IFE in vial or sample but not recorded as a loss.