



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

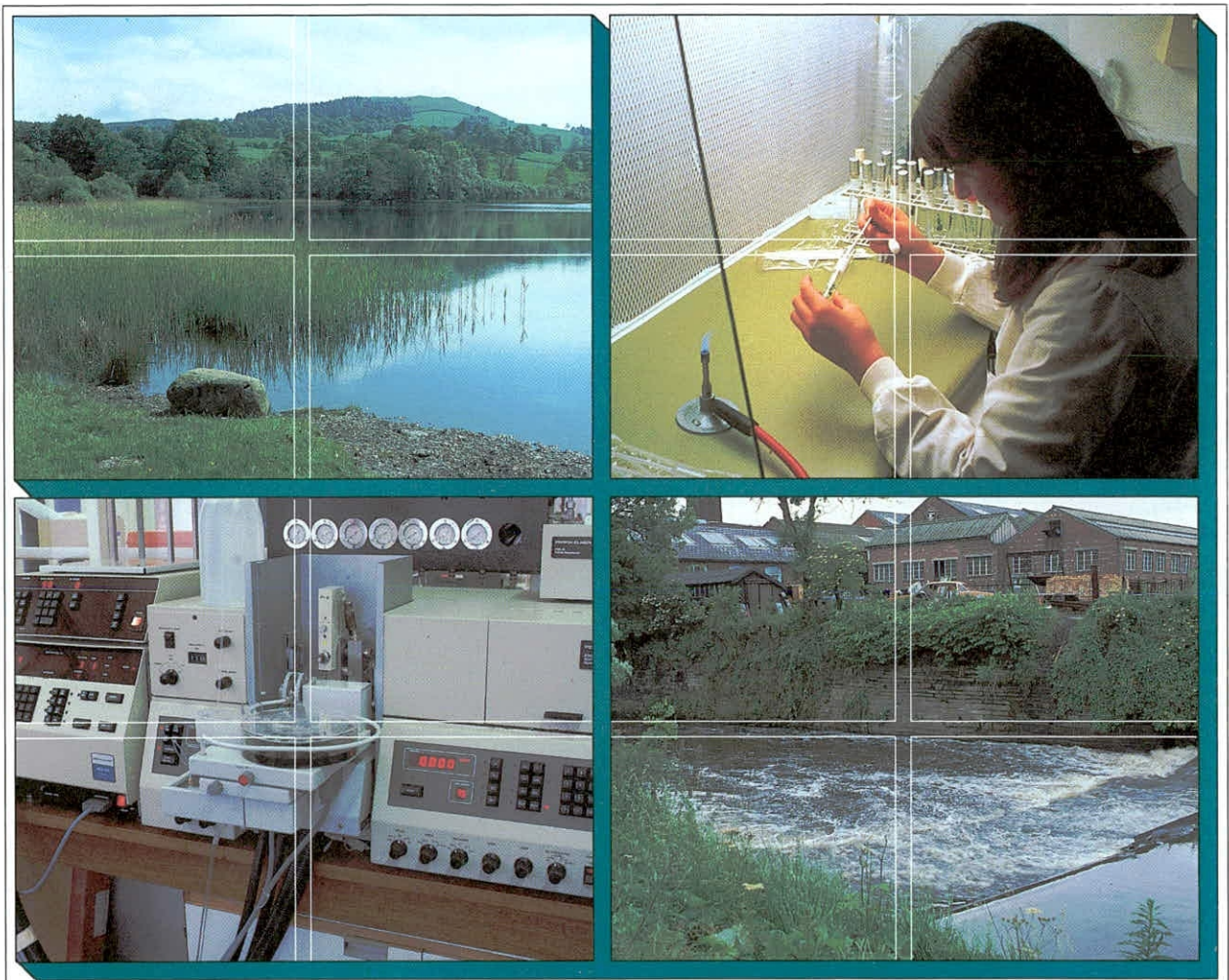
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Report To:
IFE Report Ref. No:

North East River Purification Board
RL/T04071h1/15





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An audit of performance in the processing of macro-invertebrate samples in 1994.

North East River Purification Board

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Project Leader:
Report Date:
Report To:
IFE Report Ref. No:

R.J.M. Gunn
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North East River Purification Board
RL/T04071h1/15

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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 30 samples audited for North East 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.

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 3 spring samples audited for North East RPB.

| River | Site | Sorter | Losses | Gains | Omissions |
|--------------|----------------|---------------|---------------|--------------|------------------|
| Dinnet Burn | Mill of Dinnet | DH | 0 | 5 | 1 |
| Bronie Burn | A947 Bridge | LC | 0 | 4 | 0 |
| Bronie Burn | d/s Pitmedden | LC | 0 | 2 | 0 |

TABLE 3 The 8 summer samples audited for North East RPB.

| River | Site | Sorter | Losses | Gains | Omissions |
|----------------|-----------------------|---------------|---------------|--------------|------------------|
| Truim | d/s Dalwhinnie | JP | 0 | 2 | 0 |
| Deveron | Muiresk | MAD | 0 | 3 | 0 |
| Livet | Downan | LC | 0 | 6 | 0 |
| Cromdale Burn | Lethendry | JP | 0 | 2 | 0 |
| Doval Burn | d/s Dallas | KR | 0 | 1 | 0 |
| Kings Burn | u/s Westertown | KJR | 0 | 4 | 0 |
| Lhanbryde Burn | Woodpark | MAD | 0 | 1 | 0 |
| Knockando Burn | u/s Tamdhu Distillery | JP | 0 | 0 | 0 |

TABLE 4 The 19 autumn samples audited for North East RPB.

| River | Site | Sorter | Losses | Gains | Omissions |
|-----------------|-----------------------|--------|--------|-------|-----------|
| Lochter Burn | Fingask | MAD | 0 | 2 | 0 |
| Invernetie Burn | d/s Outlet C | LC | 0 | 3 | 0 |
| Arkland Burn | u/s Aberchirder | JP | 0 | 1 | 0 |
| Todlachie Burn | u/s Moneymusk STW | MAD | 0 | 4 | 0 |
| Youlie Burn | u/s Tarves STW | MAD | 0 | 2 | 0 |
| Fiddich | d/s Dufftown | LC | 0 | 4 | 0 |
| Scatter Burn | u/s Don confluence | MAD | 0 | 1 | 0 |
| Avon | Ballcorach | DH | 0 | 5 | 0 |
| Green Burn | A95 Bridge | DH | 0 | 7 | 0 |
| Rathven Burn | d/s Rathven PS | JP | 0 | 3 | 0 |
| Keithney Burn | Inverkeithney | JP | 0 | 1 | 0 |
| Dee | Banchory | MAD | 0 | 1 | 1 |
| Catterline Burn | Catterline | MAD | 0 | 0 | 0 |
| Eigie Burn | d/s Balmedie STW | DH | 1 | 2 | 0 |
| Black Burn | d/s Burnside | JP | 0 | 0 | 0 |
| Cardow Burn | d/s Cardhu Distillery | DH | 2 | 1 | 0 |
| Cairngall Burn | d/s Longside STW | LC | 0 | 1 | 0 |
| Keithfield Burn | u/s Woodlands Quarry | DH | 0 | 5 | 0 |
| Ugie | Inverugie | MAD | 0 | 5 | 0 |

APPENDIX

Results of individual sample audits

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|----------------|
| REGION | North East RPB | RIVER | Dinnet Burn |
| DATE | 26.5.94 | SITE | Mill of Dinnet |
| SORTER | DH | CODE | E05/34 |

| 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 Heptageniidae* | 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 Hydrobiidae 3 Heptageniidae* 4 Cordulegasteridae 5 Dytiscidae 6 Odontoceridae 7 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 Potamopyrgus jenkinsi
- 3 Ecdyonurus sp., Rhithrogena semicolorata/germanica
- 4 Cordulegaster boltoni 1 only
- 5 Oreodytes sanmarkii
- 6 Odontocerum albicorne
- 7 Tanyptodinae, Chironomini, Tanytarsini

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|-------------|
| REGION | North East RPB | RIVER | Bronie Burn |
| DATE | 30.5.94 | SITE | A947 Bridge |
| SORTER | LC | CODE | E02/68 |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 Heptageniidae 2 Chloroperlidae 3 Hydrophilidae 4 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 Rhithrogena semicolorata/germanica 1 only 2 Chloroperla torrentium 3 Indet Hydrophilid (larva) 1 only 4 Dicranota sp. 1 only |
|---|

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|---------------|
| REGION | North East RPB | RIVER | Bronie Burn |
| DATE | 30.5.94 | SITE | d/s Pitmedden |
| SORTER | LC | CODE | E15/72 |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 2 Lymnaeidae |

* 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
2 Lymnaea peregra 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|----------------|
| REGION | North East RPB | RIVER | Truim |
| DATE | 6.6.94 | SITE | d/s Dalwhinnie |
| SORTER | JP | CODE | 05J/115 |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 Oligochaeta 2 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:

1 Nais sp. 1 only
2 Caenis rivulorum 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|---------|
| REGION | North East RPB | RIVER | Deveron |
| DATE | 20.6.94 | SITE | Muiresk |
| SORTER | MAD | CODE | A45/103 |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 Tipulidae 3 Simuliidae |

* 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 Lymnaea peregra 1 only
- 2 Antocha vitripennis
- 3 Simulium ornatum group, S.cryophilum group

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|---------|
| REGION | North East RPB | RIVER | Livet |
| DATE | 24.8.94 | SITE | Downan |
| SORTER | LC | CODE | C70/166 |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 2 Lymnaeidae 3 Caenidae 4 Dytiscidae 5 Hydrophilidae 6 Goeridae |

* 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 Polycelis felina 1 only
- 2 Lymnaea peregra
- 3 Caenis rivulorum 1 only
- 4 Oreodytes sanmarkii (adult) 1 only
- 5 Hydraena gracilis (adults)
- 6 Silo pallipes 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|---------------|
| REGION | North East RPB | RIVER | Cromdale Burn |
| DATE | 4.7.94 | SITE | Lethendry |
| SORTER | JP | CODE | 40N/142 |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 2 Lepidostomatidae |

* 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 Athripsodes albifrons/bilineatus 1 only
2 Lepidostoma hirtum 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|------------|
| REGION | North East RPB | RIVER | Doval Burn |
| DATE | 16.8.94 | SITE | d/s Dallas |
| SORTER | KR | CODE | 10P/54 |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 Sphaeriidae |

* 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 Pisidium sp.

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|----------------|
| REGION | North East RPB | RIVER | Kings Burn |
| DATE | 26.7.94 | SITE | u/s Westertown |
| SORTER | KJR | CODE | 70E/140 |

| | | | |
|---|--|--------------------------------|----------------------------------|
| 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 Ephemerellidae 2 Nemouridae 3 Elmidae 4 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 Ephemerella ignita 1 only
- 2 Nemurella picteti
- 3 Elmis aenea 1 only
- 4 Rhyacophila dorsalis 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|----------------|
| REGION | North East RPB | RIVER | Lhanbryde Burn |
| DATE | 16.8.94 | SITE | Woodpark |
| SORTER | MAD | CODE | 60K/61 |

| | | | |
|---|--|--------------------------------|----------------------------------|
| 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 |

* 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 Dendrocoelum lacteum 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|-----------------------|
| REGION | North East RPB | RIVER | Knockando Burn |
| DATE | 30.8.94 | SITE | u/s Tamdhu Distillery |
| SORTER | JP | CODE | 50P |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 | North East RPB | RIVER | Lochter Burn |
| DATE | 25.10.94 | SITE | Fingask |
| SORTER | MAD | CODE | K05 |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 Ephemerellidae 2 Hydrophilidae |

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

NET LOSSES

0

NET GAINS

2

OMISSIONS

0

NOTES:

1 Ephemerella ignita
2 Hydraena gracilis (adults)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|------------------|
| REGION | North East RPB | RIVER | Invernettie Burn |
| DATE | 29.9.94 | SITE | d/s Outlet C |
| SORTER | LC | CODE | 112 |

| | | | |
|---|--|--------------------------------|----------------------------------|
| 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 2 Perlodidae 3 Tipulidae |

* 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 Potamopyrgus jenkinsi
2 Isoperla grammatica 1 only
3 Tipula montium group 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|-----------------|
| REGION | North East RPB | RIVER | Arkland Burn |
| DATE | 27.9.94 | SITE | u/s Aberchirder |
| SORTER | JP | CODE | 65L |

| | | | |
|---|--|-----------------------------------|-------------------------------------|
| 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 |
| | | None | 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) | 1 Rhyacophilidae |

* 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 Rhyacophila dorsalis, Agapetus sp.

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|------------------|
| REGION | North East RPB | RIVER | Todlachie Burn |
| DATE | 3.10.94 | SITE | u/s Monymusk STW |
| SORTER | MAD | CODE | 50J |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 Nemouridae |

| | | | |
|---|---|--|--|
| 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 Planariidae 3 Taeniopterygidae 4 Hydrophilidae |

* 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 Nemoura avicularis, Protonemura meyeri
- 2 Polycelis felina 1 only
- 3 Taeniopteryx nebulosa
- 4 Hydraena gracilis (adult) 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|----------------|
| REGION | North East RPB | RIVER | Youlie Burn |
| DATE | 14.9.94 | SITE | u/s Tarves STW |
| SORTER | MAD | CODE | G05 |

| | | | |
|---|--|-----------------------------------|-------------------------------------|
| 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 |
| | | None | 1 Rhyacophilidae |

| | | | |
|---|--|--|-------------------------------------|
| 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 Goeridae |

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

NET LOSSES

0

NET GAINS

2

OMISSIONS

0

NOTES:

1 Rhyacophila dorsalis
2 Silo pallipes 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|--------------|
| REGION | North East RPB | RIVER | Fiddich |
| DATE | 13.10.94 | SITE | d/s Dufftown |
| SORTER | LC | CODE | E50 |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 Caenidae 2 Psychomyiidae 3 Goeridae 4 Lepidostomatidae |

* 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 Caenis rivulorum 1 only
2 Psychomyia pusilla
3 Silo pallipes 1 only
4 Lepidostoma hirtum

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|--------------------|
| REGION | North East RPB | RIVER | Scatter Burn |
| DATE | 7.11.94 | SITE | u/s Don confluence |
| SORTER | MAD | CODE | 97X |

| | | | |
|---|--|-----------------------------------|-------------------------------------|
| 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 |
| | | None | 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) | 1 Physidae |

* 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 Physa acuta/heterostropha 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|------------|
| REGION | North East RPB | RIVER | Avon |
| DATE | 13.10.94 | SITE | Ballcorach |
| SORTER | DH | CODE | B30 |

| | | | |
|---|------|-----------------------------------|-------------------------------------|
| A | VIAL | BMWP FAMILIES NOT FOUND BY IFE | ADDITIONAL FAMILIES FOUND BY IFE |
| | | None | 1 Perlidae |
| 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) | 2 Ancyliidae 3 Hydrophilidae 4 Hydroptilidae 5 Limnephilidae |
| 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

0

NET GAINS

5

OMISSIONS

0

NOTES:

- 1 Perla bipunctata
- 2 Ancylus fluviatilis 1 only
- 3 Hydraena gracilis (adult) 1 only
- 4 Hydroptila sp. 1 only
- 5 Ecclisopteryx guttulata 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|------------|
| REGION | North East RPB | RIVER | Green Burn |
| DATE | 1.9.94 | SITE | A95 Bridge |
| SORTER | DH | CODE | 60N |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 Nemouridae |

| | | | |
|---|---|--|--|
| 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 Ancyliidae 3 Sphaeriidae 4 Hydrophilidae 5 Scirtidae 6 Hydroptilidae 7 Goeridae |

* 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 Protonemura sp.
- 2 Ancylos fluviatilis 1 only
- 3 Pisidium sp. 1 only
- 4 Helophorus brevipalpis (adult) 1 only
- 5 Elodes sp. (larva) 1 only
- 6 Hydroptila sp.
- 7 Silo pallipes 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|----------------|
| REGION | North East RPB | RIVER | Rathven Burn |
| DATE | 12.12.94 | SITE | d/s Rathven PS |
| SORTER | JP | CODE | 30J |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 Rhyacophilidae 3 Lepidostomatidae |

* 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 Indet Hydrophilid (larva) 1 only
- 2 Glossosoma sp.
- 3 Crunoecia irrorata 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|---------------|
| REGION | North East RPB | RIVER | Keithney Burn |
| DATE | 20.10.94 | SITE | Inverkeithney |
| SORTER | JP | CODE | 70T |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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

0

NET GAINS

1

OMISSIONS

0

NOTES:

1 Hydraena gracilis (adult) 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|----------|
| REGION | North East RPB | RIVER | Dee |
| DATE | 30.1.95 | SITE | Banchory |
| SORTER | MAD | CODE | A28 |

| | | | |
|---|--|---|---|
| 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 Chironomidae* | 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 Caenidae 3 Chironomidae* |

* 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

1

NOTES:

2 Caenis rivulorum 1 only
3 Tanypodinae, Orthocladiinae, Chironomini

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|-----------------|
| REGION | North East RPB | RIVER | Catterline Burn |
| DATE | 21.12.94 | SITE | Catterline |
| SORTER | MAD | CODE | F15 |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 | North East RPB | RIVER | Eigie Burn |
| DATE | 14.12.94 | SITE | d/s Balmedie STW |
| SORTER | DH | CODE | K10 |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 Hemiptera | 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 Lymnaeidae 3 Elmidae |

* 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:

- 1 The number of scoring taxa recorded on the data sheet suggest that Hemiptera is included as a taxon. A terrestrial Hemipteran (Jassidae) was present in the vial
2 Lymnaea peregra
3 Elmis aenea (adult + larva)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|--------------|
| REGION | North East RPB | RIVER | Black Burn |
| DATE | 21.11.94 | SITE | d/s Burnside |
| SORTER | JP | CODE | 30F |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 | North East RPB | RIVER | Cardow Burn |
| DATE | 25.10.94 | SITE | d/s Cardhu Distillery |
| SORTER | DH | CODE | 50T |

| | | | |
|---|--|------------------------------------|----------------------------------|
| 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 2 Polycentropodidae | 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) | 3 Lymnaeidae |

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

NET LOSSES

2

NET GAINS

1

OMISSIONS

0

NOTES:

3 Lymnaea peregra 1 only

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|------------------|
| REGION | North East RPB | RIVER | Cairngall Burn |
| DATE | 7.12.94 | SITE | d/s Longside STW |
| SORTER | LC | CODE | L10 |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 Taeniopterygidae |

* 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 Taeniopteryx nebulosa

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|----------------------|
| REGION | North East RPB | RIVER | Keithfield Burn |
| DATE | 7.12.94 | SITE | u/s Woodlands Quarry |
| SORTER | DH | CODE | P20 |

| | | | |
|---|---|-----------------------------------|-------------------------------------|
| 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 Sphaeriidae 3 Perlodidae 4 Rhyacophilidae 5 Simuliidae |

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

NET LOSSES

0

NET GAINS

5

OMISSIONS

0

NOTES:

- 1 Lymnaea peregra
- 2 Pisidium sp.
- 3 Isoperla grammatica 1 only
- 4 Agapetus sp. 1 only
- 5 Simulium cryophilum group, S.ornatum group

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES - 1994

| | | | |
|--------|----------------|-------|-----------|
| REGION | North East RPB | RIVER | Ugie |
| DATE | 1.12.94 | SITE | Inverugie |
| SORTER | MAD | CODE | U05 |

| | | | |
|---|---|--------------------------------|----------------------------------|
| 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 |
| | | None | 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) | 1 Erpobdellidae 2 Caenidae 3 Dytiscidae 4 Hydroptilidae 5 Lepidostomatidae |

* 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 Erpobdella octoculata
- 2 Caenis rivulorum 1 only
- 3 Oreodytes sanmarkii (adult) 1 only
- 4 Hydroptila sp.
- 5 Lepidostoma hirtum 1 only