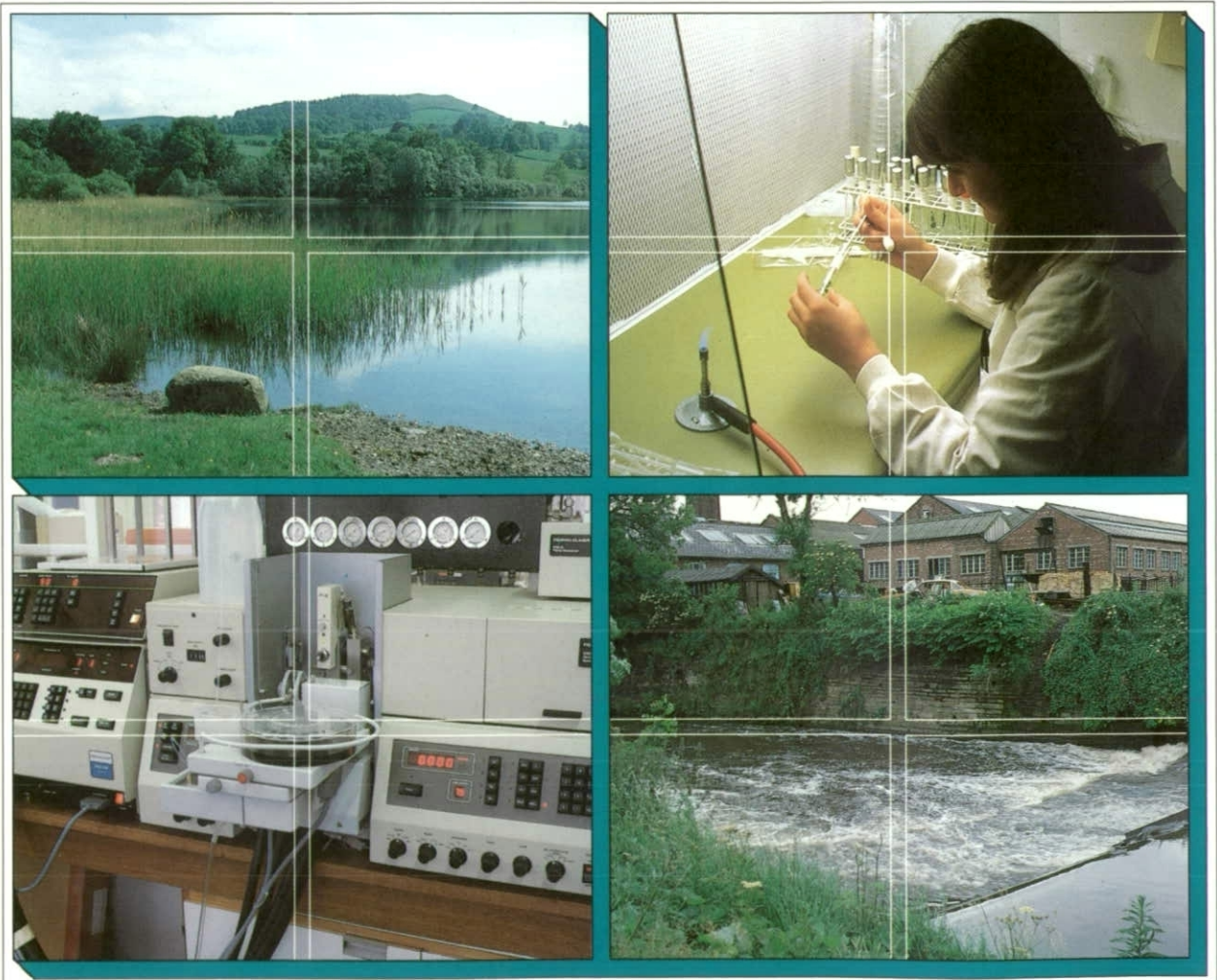




An audit of performance in the processing of macro-invertebrate samples in 1991. North East River Purification Board

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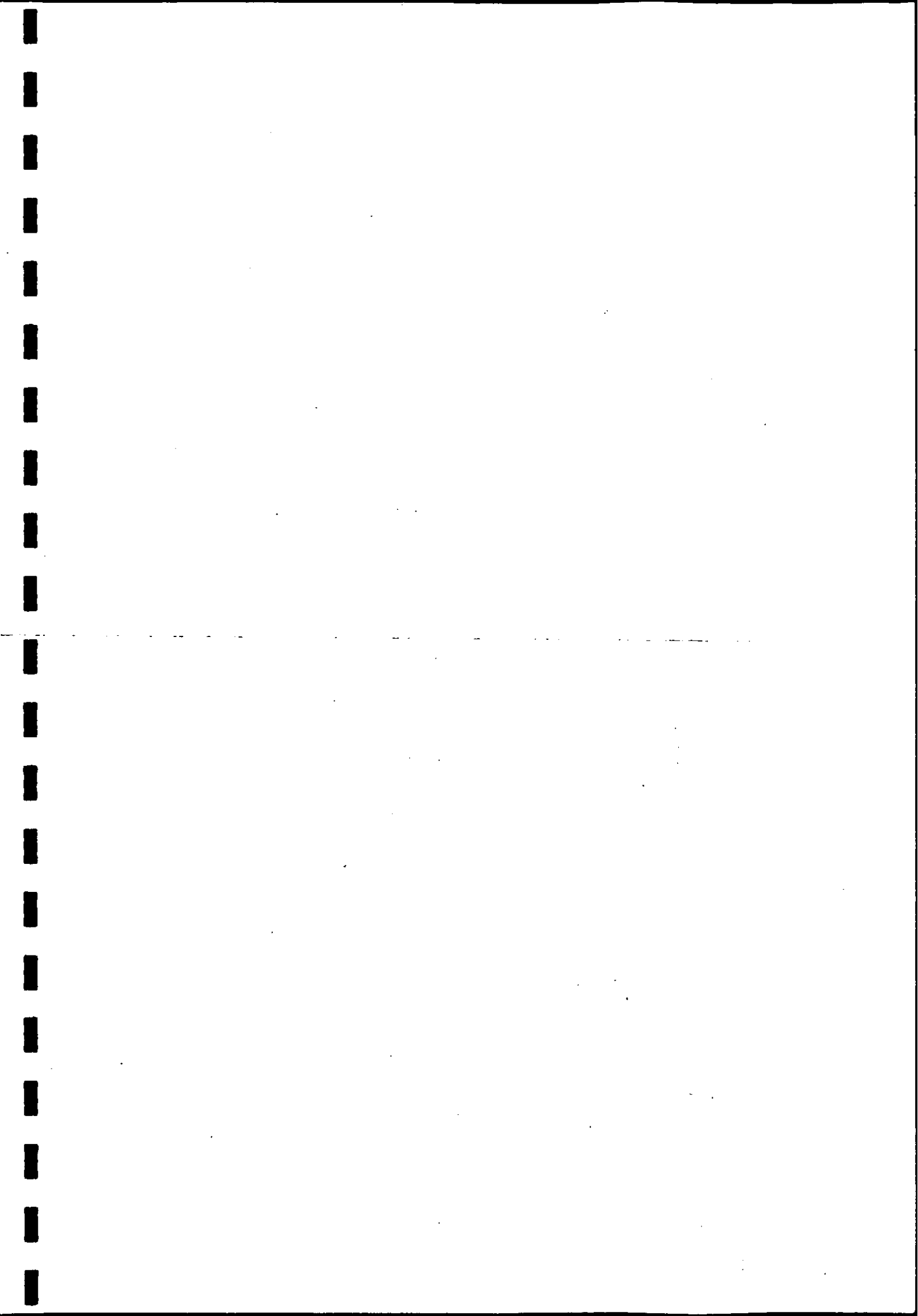
**An audit of performance in the processing
of macro-invertebrate samples in 1991.
North East River Purification Board**

R.J.M. Gunn, J.F. Wright, J.M. Winder & J.H. Blackburn

| | |
|-----------------|-------------------------------------|
| Project leader: | J.F. Wright |
| Report date: | May 1992 |
| Report to: | North East River Purification Board |
| IFE Report Ref: | RL/T04053x1/13 |
| TFS Project No: | T04053x1 |

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



1. INTRODUCTION

In 1991 the sampling of aquatic macro-invertebrates for the biological assessment of river quality continued throughout the United Kingdom. In England and Wales this task was undertaken by the National Rivers Authority (NRA), the River Purification Boards (RPBs) sampled in Scotland and the Department of Economic Development (DED) undertook the work in Northern Ireland.

The majority of sites were sampled in spring, summer and autumn. Standard collection procedures, as used in the 1990 River Quality Survey, were retained 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). For a variety of reasons, a few locations were sampled in just one or two seasons.

Samples were sorted by NRA, RPB and DED 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.

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. As in 1990, the IFE was contracted to undertake an audit of the sample sorting and identification performance of each NRA region, several RPBs and the DED. This report presents the results of 16 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.

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 DED 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. 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 Table 2 which summarises the results.

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 Mike Furse for help and advice, to Kay Symes and Angela Matthews for assistance with cataloguing and storage of samples and to Valerie Palmer and Diana Morton for typing the manuscript.

TABLE 1. The IFE Report form

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

| | |
|--|--|
| REGION <input style="width: 100%;" type="text"/> DATE <input style="width: 100%;" type="text"/> SORTER <input style="width: 100%;" type="text"/> | RIVER <input style="width: 100%;" type="text"/> SITE <input style="width: 100%;" type="text"/> SAMPLE CODE <input style="width: 100%;" type="text"/> |
|--|--|

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

| | LOSSES | GAINS | | | | | | | | |
|--|---|---|---|----------------------------------|--|--|--|--|--|--|
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center; vertical-align: top;">A</td> <td style="width: 30%; text-align: center; vertical-align: top;"> <u>VIAL</u> Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE </td> <td style="width: 30%; text-align: center; vertical-align: top;"> BMWP FAMILIES NOT FOUND BY IFE </td> <td style="width: 35%; text-align: center; vertical-align: top;"> ADDITIONAL FAMILIES FOUND BY IFE </td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table> | A | <u>VIAL</u> 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 | | | | | | |
| A | <u>VIAL</u> 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 | | | | | | | |
| | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center; vertical-align: top;">B</td> <td style="width: 30%; text-align: center; vertical-align: top;"> <u>SAMPLE</u> Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE </td> <td style="width: 30%; text-align: center; vertical-align: top;"> BMWP FAMILIES NOT FOUND BY IFE (This box only completed when no vial supplied with sample) </td> <td style="width: 35%; text-align: center; vertical-align: top;"> ADDITIONAL FAMILIES FOUND BY IFE </td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table> | B | <u>SAMPLE</u> 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 (This box only completed when no vial supplied with sample) | ADDITIONAL FAMILIES FOUND BY IFE | | | | | | |
| B | <u>SAMPLE</u> 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 (This box only completed when no vial supplied with sample) | ADDITIONAL FAMILIES FOUND BY IFE | | | | | | | |
| | | | | | | | | | | |

NET LOSSES NET GAINS

NOTES

TABLE 2. The spring samples audited for Region, with sample sorter initials and numbers of taxa 'lost', 'gained' and 'omitted'

| River | Site | Sorter | Losses | Gains | Omissions |
|-----------------|----------------------|--------|--------|-------|-----------|
| Boyne Burn | Scotsmill | JP | 0 | 3 | 0 |
| Allt an Fhitich | B9102 Bridge | JP | 0 | 0 | 0 |
| Conglass Water | D/s Tomintoul St | JP | 0 | 0 | 0 |
| Old Burn | D/s Ord Dam | LC | 0 | 1 | 0 |
| Catterline Burn | Mill of Uras | MAD | 0 | 1 | 0 |
| Loch na Bo | Loch outlet | LC | 0 | 2 | 0 |
| Water of Cruden | U/s Hatton STW | MAD | 0 | 1 | 0 |
| Brodiach Burn | Mill of Brotherfield | LC | 0 | 0 | 0 |
| North Ugie | Mill Bank | MAD | 0 | 3 | 0 |
| Crynoch Burn | Milton Bridge | LC | 0 | 2 | 1 |
| Corncairn Burn | U/s Cornhill | JP | 0 | 0 | 0 |
| Water of Cruden | Cruden Bay | LC | 0 | 2 | 1 |
| Dour | D/s New Aberdour | MAD | 0 | 2 | 0 |
| *Carron | Stonehaven | MAD | 0 | 1 | 0 |
| Deskford Burn | Seatown | JP | 0 | 0 | 0 |
| Forthie Water | U/s Drumlithie STW | MAD | 0 | 0 | 0 |

* indicates vial damaged in transit

APPENDIX

Results of individual sample audits

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION North East RPB

RIVER Boyne Burn

DATE 8.10.91

SITE Scotsmill

SORTER JP

SAMPLE CODE

AQC OF BMWP FAMILIES A. IN VIAL +

B. IN SAMPLE +

| | | LOSSES | GAINS |
|----------|--|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 | <u>SAMPLE</u> | 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 supplied with sample) | 1 Sphaeriidae 2 Leuctridae 3 Linnephilidae |

NET LOSSES 0

NET GAINS 3

NOTES

- 1 Pisidium sp. 1 only
 - 2 Leuctra hippopus 1 only
 - 3 Indet linnephilids (juveniles)

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

| | | | | |
|--------|----------------|--|-------------|-----------------|
| REGION | North East RPB | | RIVER | Allt an Fhitich |
| DATE | 19.11.91 | | SITE | B9102 Bridge |
| SORTER | JP | | SAMPLE CODE | |

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

| | | LOSSES | GAINS |
|--|---------------|---|----------------------------------|
| A | <u>VIAL</u> | 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 | <u>SAMPLE</u> | 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 supplied with sample) | None |

NET LOSSES

NET GAINS

NOTES

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

| | | | |
|--------|----------------|-------------|------------------|
| REGION | North East RPB | RIVER | Conglass Water |
| DATE | 31.10.91 | SITE | D/s Tomintoul St |
| SORTER | JP | SAMPLE CODE | |

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

| | | LOSSES | GAINS |
|---|--|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 | <u>SAMPLE</u> | 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 supplied with sample) | None |

NET LOSSES NET GAINS

NOTES

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

| | | | | |
|--------|----------------|--|-------------|-------------|
| REGION | North East RPB | | RIVER | Ord Burn |
| DATE | 11.11.91 | | SITE | D/s Ord Dam |
| SORTER | LC | | SAMPLE CODE | |

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

| | | LOSSES | GAINS |
|---|--|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 | <u>SAMPLE</u> | 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 supplied with sample) | 1 Elmidae |

NET LOSSES NET GAINS

NOTES

1 *Elmis aenea* (adults)

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION North East RPB

RIVER Catterline Burn

DATE 5.11.91

SITE Mill of Uras

SORTER MAD

SAMPLE CODE

AQC OF BMWP FAMILIES A. IN VIAL +

B. IN SAMPLE +

| | | LOSSES | GAINS |
|---|--|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 | <u>SAMPLE</u> | 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 supplied with sample) | 1 Hydrophilidae |

NET LOSSES 0

NET GAINS 1

NOTES 1 Indet hydrophilid larva 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION North East RPB

RIVER Loch na Bo

DATE 9.10.91

SITE Loch outlet

SORTER LC

SAMPLE CODE

AQC OF BMWP FAMILIES A. IN VIAL +

B. IN SAMPLE +

| | | LOSSES | GAINS |
|--|-------------|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 | <u>SAMPLE</u> | 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 supplied with sample) | 1 Leptoceridae 2 Simuliidae |

NET LOSSES 0

NET GAINS 2

NOTES

1 *Athripsodes aterrimus*
 2 *Simulium noelleri* (pupa) 1 only

Caenid in vial (*C. luctuosa/macrura*) has rear end only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION North East RPB

RIVER Water of Cruden

DATE 2.10.91

SITE U/s Hatton STW

SORTER MAD

SAMPLE CODE

AQC OF BMWP FAMILIES A. IN VIAL +

B. IN SAMPLE +

| | | LOSSES | GAINS |
|--|-------------|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 | <u>SAMPLE</u> | 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 supplied with sample) | 1 Simuliidae |

NET LOSSES 0

NET GAINS 1

NOTES

1 Simulium ornatum group, S.equinum (pupae)

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION North East RPB

RIVER Brodiach Burn

DATE 11.11.91

SITE Mill of Brotherfield

SORTER LC

SAMPLE CODE

AQC OF BMWP FAMILIES A. IN VIAL +

B. IN SAMPLE +

| | | LOSSES | GAINS |
|--|-------------|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 | <u>SAMPLE</u> | 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 supplied with sample) | None |

NET LOSSES 0

NET GAINS 0

NOTES

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

| | | | | |
|--------|----------------|--|-------------|------------|
| REGION | North East RPB | | RIVER | North Ugie |
| DATE | 11.11.91 | | SITE | Mill Bank |
| SORTER | MAD | | SAMPLE CODE | |

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

| | | LOSSES | GAINS |
|----------|--|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 | <u>SAMPLE</u> | 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 supplied with sample) | 1 Leptophlebiidae 2 Caenidae 3 Polycentropodidae |

NET LOSSES NET GAINS

NOTES

- 1 *Paraleptophlebia submarginata* 1 only
 - 2 *Caenis rivulorum*
 - 3 *Polycentropus* sp. (juvenile) 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION North East RPB

RIVER Crynoch Burn

DATE 11.11.91

SITE Milton Bridge

SORTER LC

SAMPLE CODE

AQC OF BMWP FAMILIES A. IN VIAL +

B. IN SAMPLE +

| | | LOSSES | GAINS |
|--|-------------|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 Baetidae* | 2 Hydrobiidae |

| | | | |
|--|---------------|---|--|
| B | <u>SAMPLE</u> | 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 supplied with sample) | 3 Baetidae* 4 Polycentropodidae |

NET LOSSES 0

NET GAINS 2

NOTES

2 *Potamopyrgus jenkinsi*
 3 *Baetis rhodani*
 4 *Polycentropus flavomaculatus*

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

| | | | | |
|--------|----------------|--|-------------|----------------|
| REGION | North East RPB | | RIVER | Corncairn Burn |
| DATE | 8.10.91 | | SITE | U/s Cornhill |
| SORTER | JP | | SAMPLE CODE | |

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

| | | LOSSES | GAINS |
|----------|--|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 | <u>SAMPLE</u> | 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 supplied with sample) | None |

NET LOSSES NET GAINS

NOTES

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

| | | | | |
|--------|----------------|--|-------------|-----------------|
| REGION | North East RPB | | RIVER | Water of Cruden |
| DATE | 2.10.91 | | SITE | Cruden Bay |
| SORTER | LC | | SAMPLE CODE | |

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

| | | LOSSES | GAINS |
|----------|--|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 Baetidae* | None |

| | | | |
|----------|--|---|---|
| B | <u>SAMPLE</u> | 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 supplied with sample) | 2 Baetidae* 3 Rhyacophilidae 4 Psychomyiidae |

NET LOSSES NET GAINS

NOTES

2 Baetis rhodani
3 Rhyacophila dorsalis (pupa) 1 only
4 Tinodes waeneri 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION **North East RPB**

RIVER **Dour**

DATE **2.10.91**

SITE **D/s New Aberdour**

SORTER **MAD**

SAMPLE CODE

AQC OF BMWP FAMILIES A. IN VIAL +

B. IN SAMPLE +

| | | LOSSES | GAINS |
|--|-------------|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 | <u>SAMPLE</u> | 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 supplied with sample) | 1 Sphaeriidae 2 Hydrophilidae |

NET LOSSES **0**

NET GAINS **2**

NOTES

1 Pisidium sp.
2 Helophorus flavipes (adults)

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION **North East RPB**

RIVER **Carron**

DATE **5.11.91**

SITE **Stonehaven**

SORTER **MAD**

SAMPLE CODE

AQC OF BMWP FAMILIES A. IN VIAL *

B. IN SAMPLE +

| | | LOSSES | GAINS |
|----------|--|--|----------------------------------|
| A | <u>VIAL</u> | BMWP FAMILIES NOT FOUND BY IFE | ADDITIONAL FAMILIES FOUND BY IFE |
| | Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE | * Lid separated from vial in transit. Contents dispersed in sample. Identification check not applicable | |

| | | | |
|----------|--|---|----------------------------------|
| B | <u>SAMPLE</u> | 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 supplied with sample) | 1 Simuliidae |

NET LOSSES **0**

NET GAINS **1**

NOTES

1 Simulium ornatum group (larvae)

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION **North East RPB**

RIVER **Deskford Burn**

DATE **8.10.91**

SITE **Seatown**

SORTER **JP**

SAMPLE CODE

AQC OF BMWP FAMILIES A. IN VIAL

B. IN SAMPLE

| | | LOSSES | GAINS |
|--|-------------|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 | <u>SAMPLE</u> | 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 supplied with sample) | None |

NET LOSSES

NET GAINS

NOTES

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION **North East RPB**

RIVER **Forthie Water**

DATE **5.11.91**

SITE **U/s Drumlithie STW**

SORTER **MAD**

SAMPLE CODE

AQC OF BMWP FAMILIES A. IN VIAL

B. IN SAMPLE

| | | LOSSES | GAINS |
|--|-------------|--------------------------------|----------------------------------|
| A | <u>VIAL</u> | 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 | <u>SAMPLE</u> | 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 supplied with sample) | None |

NET LOSSES

NET GAINS

NOTES