

Environmental Protection Internal Report

**QUALITY AUDIT OF BIOLOGICAL SAMPLES
FOR THE 1991 RIVER QUALITY SURVEY
NRA SOUTH WEST REGION
BY RJM GUNN, JF WRIGHT, JH BLACKBURN
& MT FURSE**

October 1992

FWS/92/021

Author: Dr JAD Murray-Bligh
Assistant Scientist (Freshwater Biology)

**C V M Davies
Environmental Protection
Manager**



*National Rivers Authority
South West Region*

QUALITY AUDIT OF BIOLOGICAL SAMPLES FOR THE 1991 RIVER QUALITY SURVEY NRA
SOUTH WEST REGION BY RJM GUNN, JF WRIGHT, JH BLACKBURN & MT FURSE

INTERNAL REPORT FWS/92/021

SUMMARY

This report describes the quality audit of processing and identification of macro-invertebrate samples from NRA South West Region's routine biological river quality monitoring survey undertaken in 1991. The survey was the South West Region's contribution to the 1991 National Biological River Quality Survey. The survey comprised 1380 samples taken from 460 sites.

It was not considered practical to audit the quality of sample collection. Instead, a training video on sample collection was produced and shown to all staff involved in sampling.

A small percentage of the samples were re-sorted and identified by IFE, to audit the quality of the sample sorting and the identification of the macro-invertebrates. The auditing procedure was similar to that undertaken in 1990, with the exception that an equal number of samples (twenty) were audited in each season, and the samples audited were chosen randomly. In 1990 an attempt had been made to audit some samples collected by every NRA biologist.

In general, there were more taxa found in the samples by the auditors but not recorded by NRA (termed 'gains') than taxa recorded as present by NRA but not found by the auditors ('losses'). A small number of recording errors were identified by the auditors. This pattern of errors was similar to that in 1990.

The audit results for NRA South West Region in 1991 were better than the results in 1990. No comparison with the audit results from other regions was available when this report was written.

Dr JAD Murray-Bligh
Assistant Scientist (Freshwater Biology)
October 1992



ACKNOWLEDGEMENTS

The Institute of Freshwater Ecology undertook the quality audit, and were also the authors of Appendix 1.

CONTENTS

Page

SUMMARY.....i

ACKNOWLEDGEMENTS.....ii

LIST OF TABLES.....iv

LIST OF FIGURES.....iv

1 INTRODUCTION.....1

1.1 biological monitoring in the South West Region.....1

1.2 Analytical quality audit.....1

1.3 Aims of the biological quality audit.....2

2 METHODS.....3

2.1 Sampling and sample processing.....3

2.2 Additional sample processing for the quality
audit.....3

2.3 The quality audit procedure.....5

3 RESULTS.....6

4 DISCUSSION.....8

5 REFERENCES.....9

APPENDIX 1 QUALITY AUDIT OF BIOLOGICAL SAMPLES FOR THE 1991
RIVER QUALITY SURVEY NRA SOUTH WEST REGION.....10

LIST OF TABLES

	Page
3.1 Summary of the quality audit results.....	6

LIST OF FIGURES

	Page
2.1 Standard sample data form used to record macro-invertebrate sample data.....	4
3.1 Number of 'gains' in successive audited samples.....	7

1. INTRODUCTION

This report describes the quality audit for the processing and identification of macro-invertebrate samples from the routine biological river quality monitoring programme undertaken by NRA South West Region in 1991.

1.1 Biological monitoring in the South West Region

Since 1990, NRA South West Region has undertaken a routine biological monitoring programme. It encompasses approximately 950 sites covering more than 4230 km of river and approximately 27 km of canal. Each site is surveyed every other year. The invertebrate surveys form part of the NRA National Biological Survey programme.

In 1991, 458 sites on rivers and 2 sites on canals were surveyed.

1.2 Analytical quality audit

Prior to 1990, there had been no systematic programme of quality control for biological work in the South West Region. A independent quality audit of the sample processing and identification has been a feature of the routine invertebrate river quality monitoring programme since its inception in 1990.

The need for quality control was recognised during initial discussions on the 1990 National Biological River Quality Surveys of England and Wales, Scotland, and Northern Ireland. A comprehensive scheme of quality control covering sampling, sorting, identification and analysis was considered, however costs and time did not allow this to be introduced. Instead, a quality audit programme was instigated following advice from the Institute of Freshwater Ecology (IFE).

It was not considered practical to audit the quality of sample collection, which would have been very costly. Instead, considerable effort was made to ensure that all staff taking biological samples received adequate training to ensure that uniform sampling methods were used. To achieve this, a training video on sample collection was produced (National Rivers Authority, 1990) and shown to all involved in sampling.

To audit the quality of the sample sorting and the identification of the macro-invertebrates, a small percentage of the samples were re-sorted and identified by IFE.

In 1991, as in 1990, the same quality audit procedure was used by all NRA Regions, Scottish River Purification Boards (RPBs), and the Department of Economic Development in Northern Ireland (DED). Although the IFE's contract was managed centrally by the NRA's National Freshwater Biology Sub-group, each NRA Region financed the work individually.

The quality audit procedure implemented in 1990 and 1991 was also used for the National NRA Biological Monitoring Surveys and RPB surveys in 1992. It is to be used in future surveys, pending a review of quality control and quality audit procedures [NRA R&D Project A08(92)1]. It is hoped that a quality control programme will be introduced following this review.

1.3 Aims of the biological quality audit

- ♦ To provide an independent assurance of the quality of the regional routine biological river quality monitoring programme and the 1991 National Biological River Quality Survey.
- ♦ To provide a first step towards a standard national quality control system for biological samples, and to provide information to help with its development.
- ♦ To help determine suitable control limits for future quality control systems.
- ♦ To provide information to help estimate the precision of the 1991 biological survey.
- ♦ To improve the quality of biological surveys by identifying those components of sample processing that cause most frequent errors.
- ♦ To provide an indication of the precision of data obtained from the standard NRA sampling and sample processing procedures in general, whether or not the samples are for routine monitoring.

2. METHODS

2.1 Sampling and sample processing

Samples of macro-invertebrates were collected from each site in three seasons:

Spring	March-May
Summer	June-August
Autumn	September-November.

The samples were collected using the Standard NRA methods for routine invertebrate monitoring surveys, which is compatible with RIVPACS and ensures comparability between samples. In shallow water, the samples were obtained by a three minute kick with a 1 mm mesh pond-net, followed by a one minute manual search. Deeper waters were sampled using a medium naturalist's dredge, also with a 1 mm mesh collecting net. These samples each comprised from three to five dredges, plus a one minute search in the shallows close to the river banks.

The invertebrate samples were preserved in 90% alcohol (industrial methylated spirit) to which 5% glycerol was added, either in the field, or immediately on returning to the laboratory at the end of the day.

There was a national requirement to fix the samples in formaldehyde before preservation in 70% alcohol, to ensure that the samples were in good condition for auditing, and because the samples were to be deposited in long-term storage afterwards. The samples from the South West Region were not fixed in formaldehyde owing to the absence of adequate laboratory facilities. Sample preservation was the only major deviation from the standard NRA sample processing procedures.

The samples were stored prior to sorting and identification. All samples were sorted in the laboratory. Invertebrates were identified to family, except for oligochaetes and water mites which were not identified further. The results were recorded on sample data sheets (see figure 2.1), which were sent to NRA Thames Region for entry onto a database and for analysis.

2.2 Additional sample processing for the quality audit

To assist the quality audit one or two specimens of each invertebrate family were placed in a small vial containing 70% alcohol preservative. When sorting had been completed, the sample and vial were returned to a standard 1.3 litre polythene screw-topped container to which 70% alcohol preservative had been added. The screw-topped jars were placed in standard sized plastic containers (lidded trays) for transport to IFE Wareham, for quality audit and long-term storage. A copy of the completed sample data sheet accompanied each sample, see Figure 2.1.

2.3 The quality audit procedures

Twenty samples collected in each season were re-sorted and identified by IFE. These samples were chosen randomly, using random number tables. This

TAXA LIST Site Reference NRA _ _ _ : _ _ _ _

	S	A	M	U		S	A	M	U						
GROUP 1 TAXA (10)					GROUP 4 TAXA (6)					GROUP 6 TAXA (4)					
Siphonuridae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Neritidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Basidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Heplogeniidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Viviparidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sialidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Leptophlebiidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Ancyliidae (Acroloxidae)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Platycolidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Ephemereidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hydroptilidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SUB-TOTAL TAXA <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>					
Potamonthidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Unioidea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GROUP 7 TAXA (3)					
Ephemeroidea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Corophiidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Valvatidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Toenopterygidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gammaridae (Drepanonyctidae)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hydrobiidae (Bithyniidae)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Leuctridae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Platycnemidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lymnaeidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Capniidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Coenagrionidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Physidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Perlodidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SUB-TOTAL TAXA <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>					Planorbidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Perlidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GROUP 5 TAXA (5)					Sphaeriidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Chloroperidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Mesovellidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Glossiphoniidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Aphelochelidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hydrometridae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Mirafnidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Phryganeidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gerridae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Erypodaellidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Molannidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Nepidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Aesidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Beroeidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Noucuridae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SUB-TOTAL TAXA <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>					
Odontoceridae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Notonectidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GROUP 8 TAXA (2)					
Leploceridae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pleidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chironomidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Goeridae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Corixidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SUB-TOTAL TAXA <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>					
Lepidostomatidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Halplidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GROUP 9 TAXA (1)					
Brachycentridae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hygrobiidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Oligochaeta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sericostomatidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dytacidae (Notaridae)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SUB-TOTAL TAXA <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>					
SUB-TOTAL TAXA <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>					Gyrinidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TOTAL TAXA <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>					
GROUP 2 TAXA (8)					Hydrophilidae (Hydrocenidae)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	BMWP SCORE <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>					
Astocidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Clambidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other Taxa					
Leuctidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Scirtidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Agriidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dryopidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Compidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Elmidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Cordulegasteridae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chrysomelidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Aeshnidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Curculionidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Cordulidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hydropterygidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Libellulidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tipulidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Psychomyiidae (Ecnomidae)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Stimuliidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Philopotamidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Planariidae (Dugesidae)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
GROUP 3 TAXA (7)					Dendrocoelidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Coenidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SUB-TOTAL TAXA <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>										
Nemouridae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">No. of individuals</td> </tr> <tr> <td>A - 1-9</td> </tr> <tr> <td>B - 10-99</td> </tr> <tr> <td>C - 100-999</td> </tr> <tr> <td>D - 1000-9999</td> </tr> <tr> <td>E - 10000+</td> </tr> </table>					No. of individuals	A - 1-9	B - 10-99	C - 100-999	D - 1000-9999	E - 10000+
No. of individuals															
A - 1-9															
B - 10-99															
C - 100-999															
D - 1000-9999															
E - 10000+															
Rhyacophidae (Glossosomatidae)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
Polycentropodidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
Limnephilidae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
SUB-TOTAL TAXA <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>															

Figure 2.1 Standard sample data form used to record macro-invertebrate sample data

differed from the method adopted in 1990, when an attempt was made to audit at least 4 samples processed by each NRA biologist. It was felt that choosing the samples to be audited randomly would provide a more representative estimate of the error for the survey as a whole. This approach caused the number of samples audited for each biologist, and for each of the area biology laboratories, to vary.

The samples were subject to the following analysis by the auditors:

- the taxonomic families present in the sample (not just those in the vial, see Section 2.2) were recorded;
- the specimens in the vial were identified without reference to the sample data sheet produced by NRA;
- families found in the sample by IFE which did not appear in the NRA's sample data sheet were counted as 'gains'
- families listed on the NRA's sample data sheet but not found by IFE were counted as losses.

The re-identification of specimens in the vial provided a check on the quality of identification, whilst the comparison of specimens in the vial and in the rest of the sample provided a check on the quality of sorting.

3 RESULTS

The results of the quality audit are reported in detail in Appendix 1. A summary of the results is shown in Table 3.1. There were more 'gains' than 'losses' (see Section 2.3), which was also typical of the audit results in all NRA Regions and RPBs in 1990. A small number of recording errors were noted by the auditors, where NRA biologists had recognised the presence of a taxon and added an example to the vial, but failed to record its presence on the data sheets. These errors were termed 'omissions'.

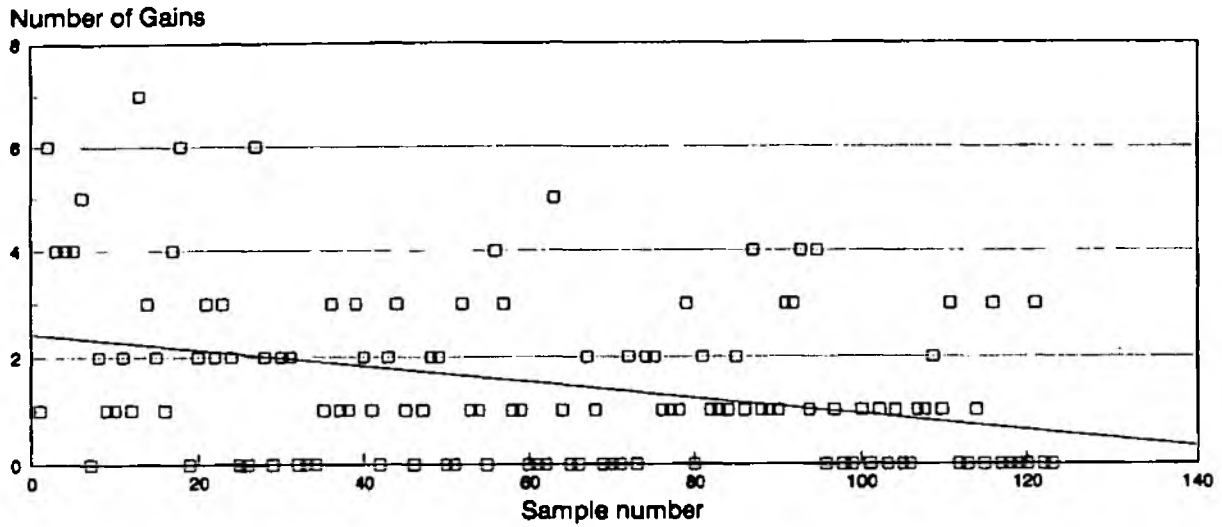
Table 3.1 Summary of the quality audit results

Year	Total number of samples taken	Number of samples checked	Mean losses	Mean gains	Mean omissions
1990	1479	63	0.48	1.83	0.01
1991	1380	60	0.33	1.08	0.03
Spring 91	460	20	0.35	1.00	0.00
Summer 91	460	20	0.30	1.45	0.10
Autumn 91	460	20	0.35	0.80	0.00

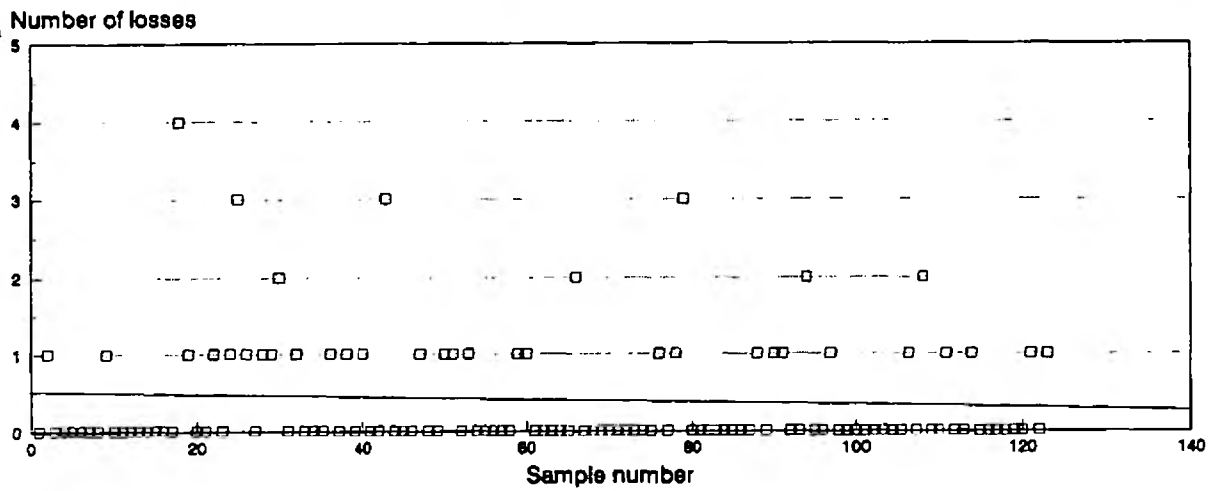
The audit results for NRA South West Region in 1991 were better than the results from 1990. There was little discernable difference in the errors between seasons.

Figure 3.1 shows the variations between consecutive samples that were audited. Poorer results early in 1990 reflected the lack of experience and training of staff. Very quickly the results improved as staff gained competence, and this was reflected clearly in the results for individual staff. The improvement is evident in losses, gains, and omissions.

Gains In successive audited samples



Losses In successive audited samples



Omissions in successive audited samples

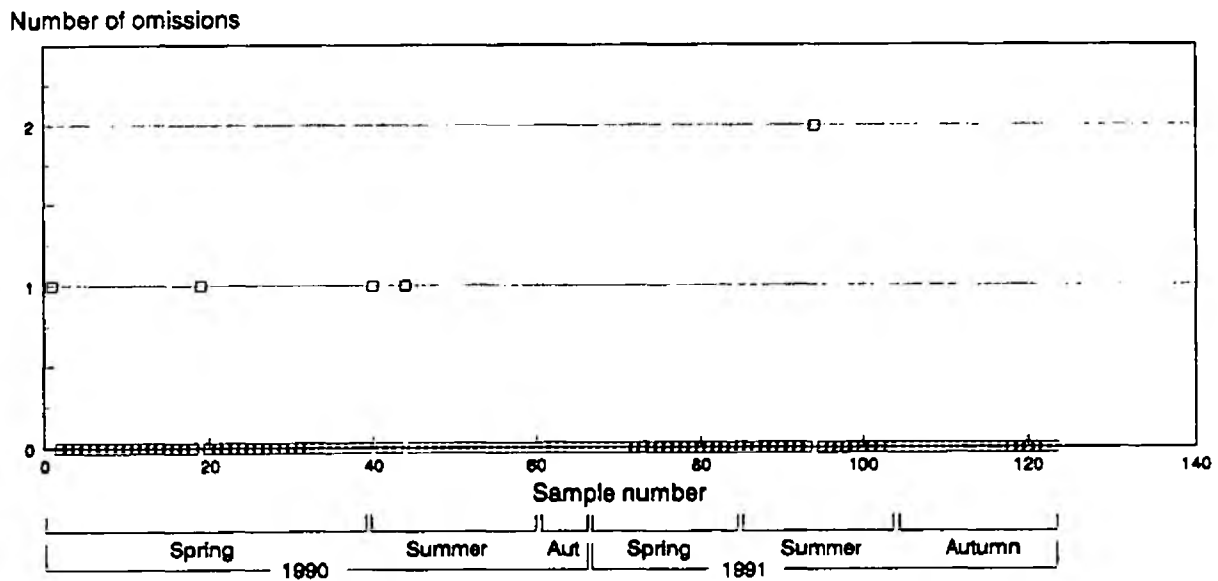


Figure 3.1 Number of 'gains', 'losses' and 'omissions' in successive audited samples. These are in approximately chronological order.

The results of the biological quality audit for the South West Region in 1991 were reassuring.

Some concern was expressed during 1990 that too much effort was placed on reducing processing errors, at the expense of processing the samples expeditiously. IFE recommended that no more than 2 hours should be spent in sorting and identifying each sample (equivalent to 3.5 samples per day): NRA South West Region achieved only 1.5 samples per day. This was partly explained by the fact that samples collected in this Region were particularly rich, containing much plant material which impeded sorting, and many different invertebrate taxa which slowed both the sorting and identification. The sorting rate in 1991 was more rapid than it was in 1990 as the biologists were more experienced, although even now, most samples still take longer to process than IFE's recommendation. The establishment of quality control limits, which are being derived from the results of the quality audits, should help to identify the best balance between accuracy and speed.

Concern was also expressed that the quality audit was being used in the Region as a measure of the performance of individual members of staff, and of the Region as a whole. Neither of these were included in the original aims of the quality audit. In 1990 an attempt was made to audit some samples for each member of staff involved in sample processing, to help them improve their own accuracy by identifying where most of their errors occurred. This may have contributed to the impression that the audit was to monitor individuals' performance. It was because of this, and to enable the audit results to give a better estimate of the precision of the survey as a whole, that the samples subjected to audit in 1991 and in 1992 have been chosen at random, using random number tables.

The results of the quality audit in 1990 were analyzed by WRc (Kinley & Ellis, 1991). The need for a similar analysis of the 1991 quality audit has been agreed by the National Freshwater Biology Group. Unfortunately, changes in the NRA's financial procedures made it difficult to commission a similar analysis. An attempt is to be made to finance the study through a regional budget. An NRA R&D Project is to start this year (1992) to develop improved auditing and quality control systems, based on data and experience of the auditing procedures described in this report (NRA R&D Project A08(92)01).

A more detailed analysis of the results of the quality audit of samples from the South West Region will be the subject of a future report in this series. It will include an evaluation of the taxa which cause most problems.

Furse, M.T., Wright, J.F., Armitage, P.D. and Moss, D. (1986) A practical manual for the classification and prediction of macro-invertebrate communities in running water in Great Britain. Preliminary version. Wareham: Freshwater Biological Association.

Gunn, R.J.M., Wright, J.F., Blackburn, J.H., and Furse, M.T. (1992) Quality audit of biological samples for the 1991 River Quality Survey NRA South West Region. Wareham: Institute of Freshwater Ecology.

Kinley, R.D., and Ellis, J.C. (1991) The application of statistical quality control methods to macroinvertebrate sampling. Medmenham: Water Research Centre.

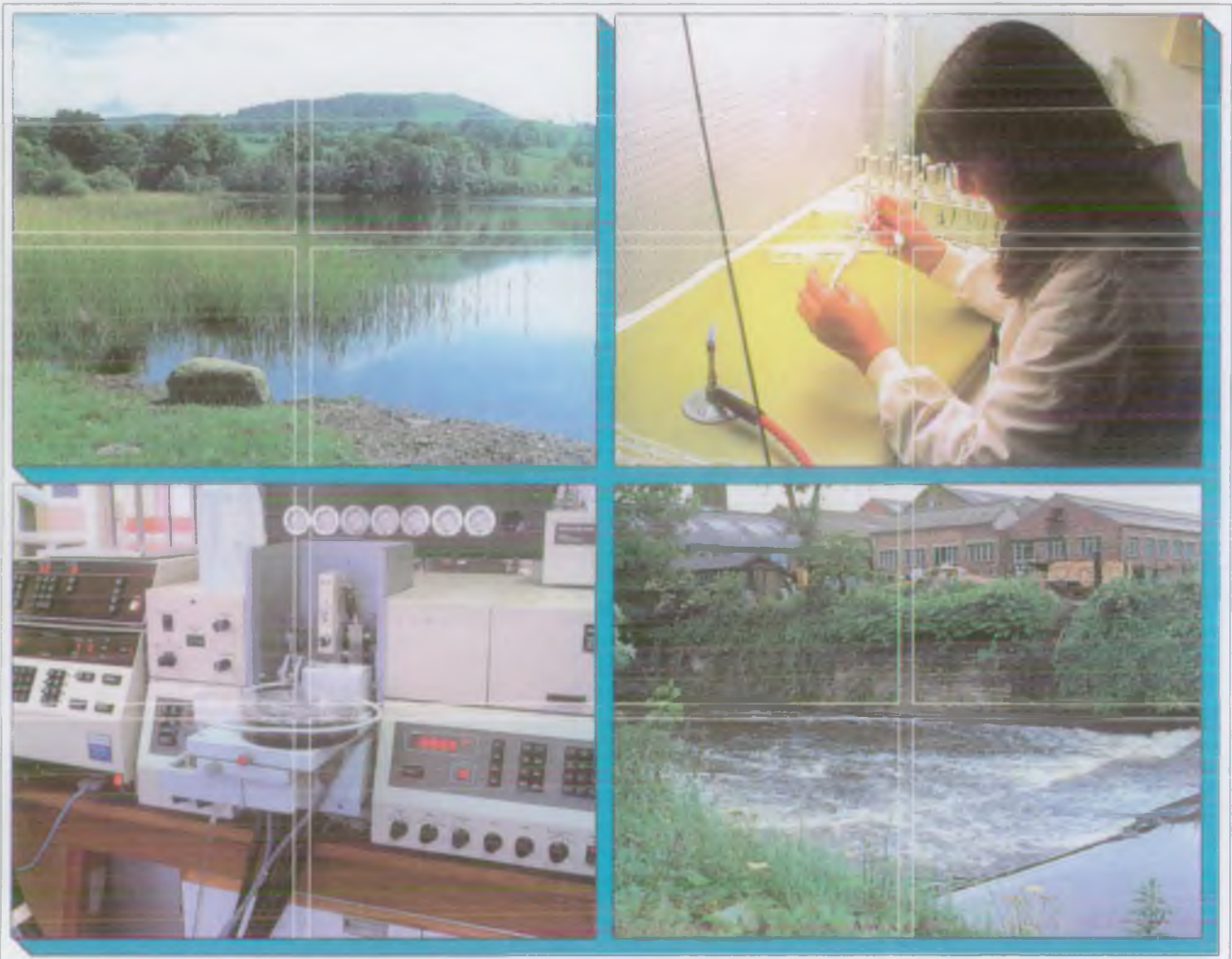
National Rivers Authority (1990) RIVPACS field sampling. Video recording. Spectrum Communications, Birmingham.

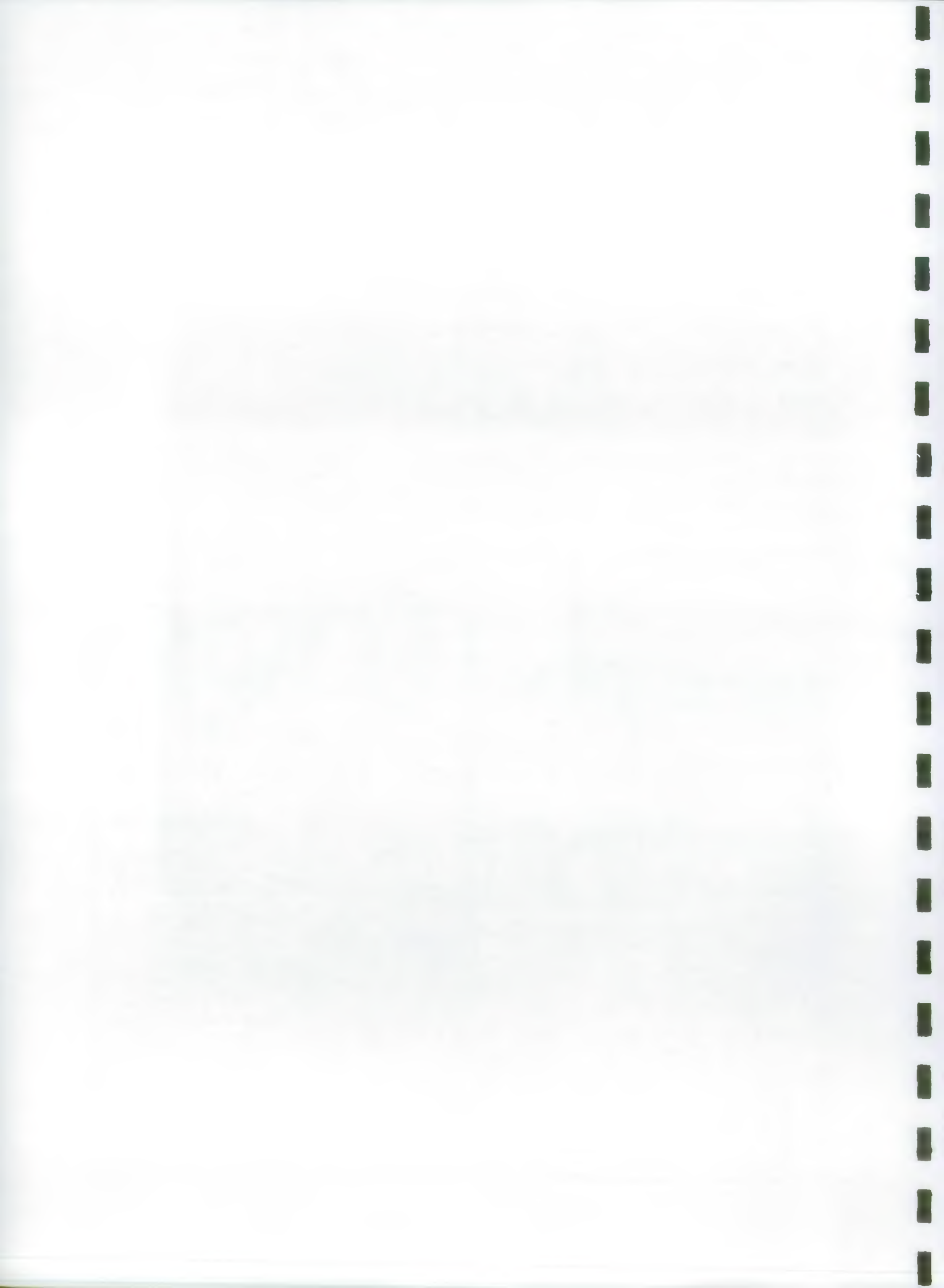


**Institute of
Freshwater
Ecology**

An audit of performance in the processing of macro-invertebrate samples in 1991. NRA South-West Region

**R.J.M Gunn, BA
J.F. Wright, PhD
J.M. Winder, BSc
J.H. Blackburn, BSc**





INSTITUTE OF FRESHWATER ECOLOGY
River Laboratory, East Stoke, Wareham, Dorset BH20 6BB

Tel: 0929 462314

Fax: 0929 462180

**An audit of performance in the processing
of macro-invertebrate samples in 1991.**
NRA South-West Region

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

Project leader:	J.F. Wright
Report date:	May 1992
Report to:	National Rivers Authority South-West Region
IFE Report Ref:	RL/T04053x1/06
TFS Project No:	T04053x1

This is an unpublished report and should not be cited without permission, which should be sought through the Director of the Institute of Freshwater Ecology in the first instance.

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 60 samples audited for South-West Region of the NRA. 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 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. 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 Mike Furse for help and advice, to Kay Symes and Angela Matthews for assistance with cataloguing and storage of samples and to Valerie Palmer for typing the manuscript.

TABLE 1. The IFE Report form

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION		RIVER	
DATE		SITE	
SORTER		SAMPLE CODE	

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

		LOSSES	GAINS
A	<u>VIAL</u>	BMW P FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMW P families listed on sample data sheet and ii) BMW P families found in VIAL by IFE		

B	<u>SAMPLE</u>	BMW P FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMW P families listed on sample data sheet and ii) BMW P families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	

NET LOSSES NET GAINS

NOTES

TABLE 2. The 20 spring samples audited for South-West Region, with sample sorter initials and numbers of taxa 'lost', 'gained' and 'omitted'

River	Site	Sorter	Losses	Gains	Omissions
Camel	Slaughterbridge	TJR	0	1	0
Crooked Oak	Ashmill	LB	0	0	0
South Pool Stream	South Pool	AA	2	0	0
Dunkeswell Stream	U/s Madford confluence	LB	0	2	0
Mole	Meethe Barton	PG	0	1	0
St Erth Stream	Treloweth	NB	0	0	0
Red Lake	U/s Erme confluence	RG	0	0	0
Churchstow Stream	Redford	LB	0	0	0
Gara	Woodford	PG	0	2	0
Little Mere	Wooladon Moor	RG	0	0	0
Camel	Helland Bridge	ST	0	2	0
Camel	Polbrock	ST	0	2	0
Lynher	Bicton Mill Bridge	ST	1	1	0
Teign	Clifford Bridge	JBS	0	1	0
St Merryn Brook	Treveglos	PAB	1	1	0
Lee	Lee Bay Hotel	PG	3	3	0
Seaton	Seaton Beach	PAB	0	0	0
Plym	D/s Blackabrook	RG	0	2	0
Walkham	Bedford Bridge	AA	0	1	0
Fal	Tregoss Bridge	DJP	0	1	0

TABLE 3. The 20 summer samples audited for South-West Region, with sample sorter initials and numbers of taxa 'lost', 'gained' and 'omitted'

River	Site	Sorter	Losses	Gains	Omissions
Fairoak	Upottery	PG	0	1	0
Yarty	Longbridge	RG	0	2	0
Cober	Coverack Bridge	DJP	0	1	0
Tiddy	Tilland Mill Bridge	TJR	0	4	0
Sancreed Brook	Little Sellan Bridge	DJP	1	1	0
Otter	Dotton Mill	PG	0	1	0
Budleigh Brook	Yettington	PG	1	1	0
Menalhyl	Mawgan Porth Bridge	ST	1	3	0
Cober	D/s Helston STW	PAB	0	3	0
Woolacombe	U/s Bridge	PG	0	4	0
Pin Brook	Mosshayne	PG	2	1	2
Culm	D/s Silverton Mill	LB	0	4	0
Holywell Stream	Trelaske	DJP	0	0	0
Bokiddick Stream	Lowerton Farm	PAB	1	1	0
Camel	Helland Bridge	ST	0	0	0
Inny	Trekelland Bridge	ST	0	0	0
Plym	Slough Bridge	LB	0	1	0
Chillington Stream	Chillington	NB	0	0	0
Fowey	Draynes Bridge	TAB	0	1	0
West Webburn	Ponsworthy Bridge	AA	0	0	0

TABLE 4. The 20 autumn samples audited for South-West Region, with sample sorter initials and numbers of taxa 'lost', 'gained' and 'omitted'

River	Site	Sorter	Losses	Gains	Omissions
East Looe	Trussel Bridge	ST	0	1	0
Bokiddick Stream	Lowerton Farm	PAB	0	0	0
Rosevath Stream	Rosevath	TAB	1	0	0
Crackington Stream	Crackington Haven	KAD	0	1	0
Henwood Stream	U/s Axe confluence	RG	2	1	0
Colaton Raleigh Stream	Pophams	PG	0	2	0
Lamberal Water	Forda	AA	0	1	0
Tamar	D/s Deer confluence	TAB	1	3	0
Tamar	Bridgerule	ST	0	0	0
Taw	Chenson	RG	0	0	0
Taw	Kersham	NB	1	1	0
Okement	A3072 Bridge	RG	0	0	0
Mountjoy Stream	Trewassick Bridge	PAB	0	3	0
Penwartha Stream	Pendragon	KAD	0	0	0
Strat	Stratton	ST	0	0	0
Mullion Stream	Mullion Cove	ST	0	0	0
Tregillowe Stream	Gwallon	TJR	0	0	0
Porthowan Stream	Menagissey Bridge	PAB	1	3	0
Perranporth Stream	Mithian	TAB	0	0	0
Melalhyl	Mawgan Porth Bridge	TAB	1	0	0

APPENDIX
Results of individual sample audits

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION South West	RIVER Camel
SEASON 3.4.91	SITE Slaughterbridge
SORTER TJR	SAMPLE CODE NRA06 2537

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;">A</td> <td style="width: 30%; text-align: center;"><u>VIAL</u></td> <td style="width: 35%; text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</td> <td style="width: 30%; text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</td> </tr> <tr> <td></td> <td style="vertical-align: top;"> Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE </td> <td style="text-align: center; vertical-align: top;">None</td> <td style="text-align: center; vertical-align: top;">None</td> </tr> </table>	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		
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							

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

NET LOSSES 0 NET GAINS 1

NOTES 1 Oxyethira sp. 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West		RIVER	Crooked Oak
SEASON	13.3.91		SITE	Ashmill
SORTER	LB		SAMPLE CODE	NRA06 3062

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	South West	RIVER	South Pool Stream
SEASON	25.4.91	SITE	South Pool
SORTER	AA	SAMPLE CODE	NRA06 0816

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

		LOSSES	GAINS
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 1 Erpobdellidae 2 Tipulidae	ADDITIONAL FAMILIES FOUND BY IFE None
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 None

NET LOSSES NET GAINS

NOTES

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION South West	RIVER Dunkeswell Stream
SEASON 12.4.91	SITE U/s Madford Confluence
SORTER LB	SAMPLE CODE NRA06 0579

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;">A</td> <td style="text-align: center;"><u>VIAL</u></td> <td style="text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</td> <td style="text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</td> </tr> <tr> <td></td> <td style="vertical-align: top;"> Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE </td> <td style="text-align: center; vertical-align: top;">None</td> <td style="text-align: center; vertical-align: top;">None</td> </tr> </table>	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		
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							

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">B</td> <td style="text-align: center;"><u>SAMPLE</u></td> <td style="text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</td> <td style="text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</td> </tr> <tr> <td></td> <td style="vertical-align: top;"> Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE </td> <td style="text-align: center; vertical-align: top;"> (This box only completed when no vial supplied with sample) </td> <td style="text-align: center; vertical-align: top;"> 1 Perlodidae 2 Lepidostomatidae </td> </tr> </table>	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 Perlodidae 2 Lepidostomatidae		
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 Perlodidae 2 Lepidostomatidae							

NET LOSSES 0 NET GAINS 2

NOTES

1 *Isoperla grammatica* 1 only
 2 *Crunoecia irrorata* 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Mole
SEASON	26.3.91	SITE	Meethe Barton
SORTER	PG	SAMPLE CODE	NRA06 3060

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

		LOSSES	GAINS
A	<p style="text-align: center;"><u>VIAL</u></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 style="font-weight: bold; font-size: 1.2em;">None</p>	<p>ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="font-weight: bold; font-size: 1.2em;">None</p>
B	<p style="text-align: center;"><u>SAMPLE</u></p> <p>Differences between:</p> <p>i) BMWP families listed on sample data sheet and</p> <p>ii) BMWP families found in SAMPLE by IFE</p>	<p>BMWP FAMILIES NOT FOUND BY IFE</p> <p>(This box only completed when no vial supplied with sample)</p>	<p>ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="font-weight: bold; font-size: 1.2em;">1 Planorbidae</p>

NET LOSSES NET GAINS

NOTES

1 Armiger crista 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West		RIVER	St Erth Stream
SEASON	1.3.91		SITE	Treloweth
SORTER	NB		SAMPLE CODE	NRA06 2217

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	South West	RIVER	Red Lake
SEASON	26.4.91	SITE	U/s Erne Confluence
SORTER	RG	SAMPLE CODE	NRA06 0909

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	South West		RIVER	Churchstow Stream
SEASON	25.4.91		SITE	Redford
SORTER	LB		SAMPLE CODE	NRA06 0818

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

		LOSSES	GAINS
A	<u>VIAL</u>	BMW FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
Differences between: i) BMW families listed on sample data sheet and ii) BMW families found in VIAL by IFE		None	None

B	<u>SAMPLE</u>	BMW FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
Differences between: i) BMW families listed on sample data sheet and ii) BMW 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	South West	RIVER	Gara
SEASON	25.4.91	SITE	Woodford
SORTER	PG	SAMPLE CODE	NRA06 0814

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 Leuctridae 2 Simuliidae

NET LOSSES NET GAINS

NOTES

1 Leuctra hippopus, L.geniculata
2 Simulium cryophilum group (larva) 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West		RIVER	Little Mere
SEASON	22.4.91		SITE	Wooladon Moor
SORTER	RG		SAMPLE CODE	NRA06 2941

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	South West	RIVER	Camel
SEASON	17.4.91	SITE	Helland Bridge
SORTER	ST	SAMPLE CODE	NRA06 2543

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 Caenidae 2 Hydrophilidae

NET LOSSES NET GAINS

NOTES

1 *Caenis rivulorum* 1 only
2 *Hydraena gracilis*

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West		RIVER	Camel
SEASON	16.4.91		SITE	Polbrock
SORTER	ST		SAMPLE CODE	NRA06 2546

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 Caenidae 2 Hydrophilidae

NET LOSSES NET GAINS

NOTES

1 Caenis rivulorum 1 only
2 Hydraena gracilis

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Lynher
SEASON	18.4.91	SITE	Bicton Mill Bridge
SORTER	ST	SAMPLE CODE	NRA06 12135

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 Hydrobiidae	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 Hydrophilidae

NET LOSSES

NET GAINS

NOTES

1 Empty shell
2 Hydraena gracilis 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West		RIVER	Teign
SEASON	23.4.91		SITE	Clifford Bridge
SORTER	JBS		SAMPLE CODE	NRA06 0631

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 Gyridae

NET LOSSES NET GAINS

NOTES

1 Orectochilus villosus (larva) 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	St Merryn Brook
SEASON	13.3.91	SITE	Treveglos
SORTER	PAB	SAMPLE CODE	NRA06 2534

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

		LOSSES	GAINS
A	<p><u>VIAL</u></p> <p>Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE</p>	<p>BMWP FAMILIES NOT FOUND BY IFE</p> <p>1 Lymnaeidae</p>	<p>ADDITIONAL FAMILIES FOUND BY IFE</p> <p>None</p>
B	<p><u>SAMPLE</u></p> <p>Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE</p>	<p>BMWP FAMILIES NOT FOUND BY IFE</p> <p>(This box only completed when no vial supplied with sample)</p>	<p>ADDITIONAL FAMILIES FOUND BY IFE</p> <p>2 Dytiscidae</p>

NET LOSSES NET GAINS

NOTES

1 Succinea sp. found in vial
2 Stictotarsus duodecimpustulatus (adult) 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Lee
DATE	1.3.91	SITE	Lee Bay Hotel
SORTER	PG	SAMPLE CODE	NRA06 3103

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 Sphaeriidae 2 Erpobdellidae 3 Lepidostomatidae	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)	4 Leptophlebiidae 5 Dryopidae 6 Tipulidae

NET LOSSES NET GAINS

NOTES

- 1 Empty Sphaeriid shells in vial
- 4 Paraleptophlebia sp. 1 only
- 5 Dryops sp. (larva) 1 only
- 6 Limnophila (Eloeophila) sp. 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Seaton
DATE	17.4.91	SITE	Seaton Beach
SORTER	PAB	SAMPLE CODE	NRA06 1306

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	South West	RIVER	Plyn
DATE	24.4.91	SITE	D/s Blackabrook
SORTER	RG	SAMPLE CODE	NRA06 1111
AQC OF BMWP FAMILIES		A. IN VIAL	<input style="width: 20px; height: 15px;" type="checkbox"/> +
		B. IN SAMPLE	<input style="width: 20px; height: 15px;" type="checkbox"/> +

		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 Rhyacophilidae 2 Hydroptilidae

NET LOSSES NET GAINS

NOTES

1 Rhyacophila sp. 1 only
2 Hydroptila sp.

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Walkham
DATE	23.4.91	SITE	Bedford Bridge
SORTER	AA	SAMPLE CODE	NRA06 1287

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 Sphaeriidæ

NET LOSSES NET GAINS

NOTES

1 Pisidium sp. 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Fal
DATE	27.3.91	SITE	Tregoss Bridge
SORTER	DJP	SAMPLE CODE	NRA06 1958

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	1 Libellulidae
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

1 Libellula depressa 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Fair oak
DATE	28.6.91	SITE	Upottery
SORTER	PG	SAMPLE CODE	NRA06 0416

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 NET GAINS

NOTES

1 Hydraena gracilis (adults)

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Yarty
DATE	21.6.91	SITE	Longbridge
SORTER	RG	SAMPLE CODE	NRA06 0243

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 Planorbidae 2 Hydrophilidae

NET LOSSES NET GAINS

NOTES

1 *Bathyomphalus contortus* 1 only
 2 *Hydraena gracilis* (adults)

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Cober
DATE	4.6.91	SITE	Coverack Bridge
SORTER	DJP	SAMPLE CODE	NRA06 2005

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

NET LOSSES NET GAINS

NOTES

1 Pisidium sp. 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Tiddy
DATE	16.7.91	SITE	Tilland Mill Bridge
SORTER	TJR	SAMPLE CODE	NRA06 2141

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 Planariidae 2 Ancyliidae 3 Sphaeriidae 4 Leptoceridae

NET LOSSES NET GAINS

NOTES

1 Polycelis felina 1 only
 2 Ancyclus fluviatilis 1 only
 3 Pisidium sp.
 4 Ceraclea dissimilis

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Sancreed Brook
DATE	5.6.91	SITE	Little Sellan Bridge
SORTER	DJP	SAMPLE CODE	NRA06 2120

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 Gyrinidae	2 Hydrophilidae
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

2 Helophorus brevipalpis, H.alternans, Hydraena gracilis (all adults)

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Otter
DATE	2.7.91	SITE	Dotton Mill
SORTER	PG	SAMPLE CODE	NRA06 0415

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 <i>Sericostomatidae</i>

NET LOSSES NET GAINS

NOTES

1 *Sericostoma personatum* 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Budleigh Brook
DATE	2.7.91	SITE	Yettington
SORTER	PG	SAMPLE CODE	NRA06 0425
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 Chloroperlidae	2 Leuctridae
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 1 NET GAINS 1

NOTES

2 Leuctra fusca

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Menalhyl
DATE	21.6.91	SITE	Mawgan Porth Bridge
SORTER	ST	SAMPLE CODE	NRA06 2530

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 <i>Lymnaeidae</i>	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 <i>Leuctridae</i> 3 <i>Leptoceridae</i> 4 <i>Lepidostomatidae</i>

NET LOSSES NET GAINS

NOTES

1 *Succinea* sp. in vial
 2 *Leuctra fusca* 1 only
 3 *Mystacides azurea* (pupa) 1 only
 4 *Lepidostoma hirtum* 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Cober
DATE	4.6.91	SITE	D/s Helston STW
SORTER	PAB	SAMPLE CODE	NRA06 2007

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 Glossiphoniidae 2 Coenagriidae 3 Rhyacophilidae

NET LOSSES NET GAINS

NOTES

- 1 *Helobdella stagnalis* 1 only
- 2 *Ischnura elegans* 1 only
- 3 *Agapetus* sp. (pupa) 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Woolacombe
DATE	4.6.91	SITE	U/s Bridge
SORTER	PG	SAMPLE CODE	NRA06 3040

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	1 Ancylidae
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 Asellidae 3 Heptageniidae 4 Leptophlebiidae

NET LOSSES NET GAINS

NOTES

1 Ancylus fluviatilis
 2 Asellus meridianus 1 only
 3 Rhithrogena sp., Ecdyonurus sp.
 4 Paraleptophlebia sp. 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION South West	RIVER Pin Brook
DATE 11.7.91	SITE Mosshayne
SORTER PG	SAMPLE CODE NRA06 0570

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

	LOSSES	GAINS
A	VIAL	BMWP FAMILIES NOT FOUND BY IFE
Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	1 Valvatidae 2 Lymnaeidae* 3 Gyrinidae 4 Hydrophilidae*	ADDITIONAL FAMILIES FOUND BY IFE 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 supplied with sample)	5 Lymnaeidae* 6 Hydrophilidae* 7 Elmidae	

NET LOSSES 2 NET GAINS 1

NOTES

1 Terrestrial snail in vial
 2,5 Succinea sp. in vial, Lymnaea peregra in sample
 4,6 Terrestrial larva in vial, Helophorus brevivalpis (adults) in sample
 7 Elmis aenea (adult) 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Culm
DATE	5.7.91	SITE	D/s Silverton Mill
SORTER	LB	SAMPLE CODE	NRA06 0577

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 Valvatidae 2 Ancylidae 3 Hydrophilidae 4 Sialidae

NET LOSSES NET GAINS

NOTES

- 1 Valvata piscinalis 1 only
- 2 Acroloxus lacustris
- 3 Indet Hydrophilid larva 1 only
- 4 Sialis lutaria

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Holywell Stream
DATE	20.6.91	SITE	Trelaske
SORTER	DJP	SAMPLE CODE	NRA06 2328

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	South West	RIVER	Bokiddick Stream
DATE	3.7.91	SITE	Lowerton Farm
SORTER	PAB	SAMPLE CODE	NRA06 1612

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

		LOSSES	GAINS
A	<p style="text-align: center;"><u>VIAL</u></p> <p>Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE</p>	<p style="text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</p> <p style="text-align: center;">1 Mesoveliidae</p>	<p style="text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="text-align: center;">None</p>
B	<p style="text-align: center;"><u>SAMPLE</u></p> <p>Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE</p>	<p style="text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</p> <p style="text-align: center;">(This box only completed when no vial supplied with sample)</p>	<p style="text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="text-align: center;">2 Sphaeriidae</p>

NET LOSSES NET GAINS

NOTES

1 *Velia* sp. (nymphs) in vial
 2 *Pisidium* sp.

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Camel
DATE	8.7.91	SITE	Helland Bridge
SORTER	ST	SAMPLE CODE	NRA06 2543

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 South West	RIVER Inny
DATE 17.7.91	SITE Trekelland Bridge
SORTER ST	SAMPLE CODE NRA06 12131

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;">A</td> <td style="width: 30%; text-align: center;"><u>VIAL</u></td> <td style="width: 30%; text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</td> <td style="width: 35%; text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</td> </tr> <tr> <td></td> <td style="vertical-align: top;"> Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE </td> <td style="text-align: center; vertical-align: middle;">None</td> <td style="text-align: center; vertical-align: middle;">None</td> </tr> </table>	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		
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							

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">B</td> <td style="width: 30%; text-align: center;"><u>SAMPLE</u></td> <td style="width: 30%; text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</td> <td style="width: 35%; text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</td> </tr> <tr> <td></td> <td style="vertical-align: top;"> Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE </td> <td style="vertical-align: top;"> (This box only completed when no vial supplied with sample) </td> <td style="text-align: center; vertical-align: middle;">None</td> </tr> </table>	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		
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	South West	RIVER	Plym
DATE	24.7.91	SITE	Slough Bridge
SORTER	LB	SAMPLE CODE	NRA06 1112

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 Chironomidae

NET LOSSES NET GAINS

NOTES

1 Tanypodinae (larva) 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Chillington Stream
DATE	26.7.91	SITE	Chillington
SORTER	NB	SAMPLE CODE	NRA06 0817

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	South West	RIVER	Fowey
DATE	9.7.91	SITE	Draynes Bridge
SORTER	TAB	SAMPLE CODE	NRA06 1513

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

NET LOSSES NET GAINS

NOTES

1 Indet Sphaeriid (decalcified) 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	West Webburn
DATE	24.7.91	SITE	Ponsworthy Bridge
SORTER	AA	SAMPLE CODE	NRA06 0730

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	South West	RIVER	East Looe
DATE	24.9.91	SITE	Trussel Bridge
SORTER	ST	SAMPLE CODE	NRA06 1413

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 Ephemereleidæ

NET LOSSES NET GAINS

NOTES

1 Ephemercella ignita 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION South West

RIVER Bokiddick Stream

DATE 20.9.91

SITE Lowerton Farm

SORTER PAB

SAMPLE CODE NRA06 1612

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	South West		RIVER	Rosevath Stream
DATE	23.9.91		SITE	Rosevath
SORTER	TAB		SAMPLE CODE	NRA06 1616

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 Elmidae	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	South West	RIVER	Crackington Stream
DATE	30.9.91	SITE	Crackington Haven
SORTER	KAD	SAMPLE CODE	NRA06 2607

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 Hydroptilidae

NET LOSSES

NET GAINS

NOTES

1 Hydroptila sp. 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West		RIVER	Henwood Stream
DATE	17.9.91		SITE	U/s Axe confluence
SORTER	RG		SAMPLE CODE	NRA06 0240

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

		LOSSES	GAINS
A	<p><u>VIAL</u></p> <p>Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE</p>	<p>BMWP FAMILIES NOT FOUND BY IFE</p> <p>1 Lymnaeidae 2 Rhyacophilidae</p>	<p>ADDITIONAL FAMILIES FOUND BY IFE</p> <p>None</p>
B	<p><u>SAMPLE</u></p> <p>Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE</p>	<p>BMWP FAMILIES NOT FOUND BY IFE</p> <p>(This box only completed when no vial supplied with sample)</p>	<p>ADDITIONAL FAMILIES FOUND BY IFE</p> <p>3 Coenagriidae</p>

NET LOSSES

NET GAINS

NOTES

1 Succinea sp. in vial and sample
 3 Pyrrhosoma nymphula 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Colaton Raleigh Stream
DATE	19.9.91	SITE	Pophams
SORTER	PG	SAMPLE CODE	NRA06 0424

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 Nemouridae 2 Hydrophilidae

NET LOSSES NET GAINS

NOTES

1 Nemurella picteti 1 only
2 Hydraena gracilis (adult) 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Lamberal Water
DATE	16.10.91	SITE	Forda
SORTER	AA	SAMPLE CODE	NRA06 12117

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 Scirtidae

NET LOSSES NET GAINS

NOTES 1 Elodes sp. (larvae)

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West		RIVER	Tamar
DATE	7.10.91		SITE	D/s Deer confluence
SORTER	TAB		SAMPLE CODE	NRA06 12116

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

		LOSSES	GAINS
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 1 Rhyacophilidae	ADDITIONAL FAMILIES FOUND BY IFE 2 Psychomyiidae
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 3 Platycnemididae 4 Lepidostomatidae

NET LOSSES NET GAINS

NOTES

2 Psychomyia pusilla
 3 Platycnemis pennipes
 4 Lepidostoma hirtum 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Tamar
DATE	7.10.91	SITE	Bridgerule
SORTER	ST	SAMPLE CODE	NRA06 12114

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

		LOSSES	GAINS
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 None	ADDITIONAL FAMILIES FOUND BY IFE None

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 None
---	---	---	--

NET LOSSES

NET GAINS

NOTES

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Taw
DATE	10.9.91	SITE	Chenson
SORTER	RG	SAMPLE CODE	NRA06 3041

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	South West		RIVER	Taw
DATE	9.9.91		SITE	Kersham
SORTER	NB		SAMPLE CODE	NRA06 3042

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

		LOSSES	GAINS
A	<p style="text-align: center;"><u>VIAL</u></p> <p>Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE</p>	<p style="text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</p> <p style="text-align: center;">1 Limnephilidae</p>	<p style="text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="text-align: center;">None</p>

B	<p style="text-align: center;"><u>SAMPLE</u></p> <p>Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE</p>	<p style="text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</p> <p style="text-align: center;">(This box only completed when no vial supplied with sample)</p>	<p style="text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="text-align: center;">1 Valvatidae</p>
----------	--	--	---

NET LOSSES NET GAINS

NOTES 2 Valvata piscinalis

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West		RIVER	Okement
DATE	12.9.91		SITE	A3072 Bridge, Jacobstowe
SORTER	RG		SAMPLE CODE	NRA06 2965

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 South West

RIVER Mountjoy Stream

DATE 12.9.91

SITE Trewassick Bridge

SORTER PAB

SAMPLE CODE NRA06 2536

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	1 Ancylidae

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 Polycentropodidae 3 Beraeidae

NET LOSSES 0

NET GAINS 3

NOTES

- 1 Ancylus fluviatilis
- 2 Plectrocnemis conspersa 1 only
- 3 Beraea maurus 1 only

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West		RIVER	Penwartha Stream
DATE	10.9.91		SITE	Pendragon
SORTER	KAD		SAMPLE CODE	NRA06 2327

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	South West		RIVER	Strat
DATE	7.10.91		SITE	Stratton
SORTER	ST		SAMPLE CODE	NRA06 2711

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 South West

RIVER Mullion Stream

DATE 1.9.91

SITE Mullion Cove

SORTER ST

SAMPLE CODE NRA06 1955

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	South West	RIVER	Tregillowe Stream
DATE	3.9.91	SITE	Gwallon
SORTER	TJR	SAMPLE CODE	NRA06 2114

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	South West		RIVER	Porthtowan Stream
DATE	10.9.91		SITE	Menagissey Bridge
SORTER	PAB		SAMPLE CODE	NRA06 2323

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 Planorbidae	2 Agriidae 3 Rhyacophilidae
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)	4 Hydrophilidae

NET LOSSES NET GAINS

NOTES

1 Terrestrial snail in vial
 2 Calopteryx virgo
 3 Rhyacophila dorsalis
 4 Anacaena globulus, A. lutescens (adults)

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Perranporth Stream
DATE	10.9.91	SITE	Mithian
SORTER	TAB	SAMPLE CODE	NRA06 2326

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

		LOSSES	GAINS
A	<p style="text-align: center;"><u>VIAL</u></p> <p>Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE</p>	<p style="text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</p> <p style="text-align: center; font-size: 1.2em;">None</p>	<p style="text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="text-align: center; font-size: 1.2em;">None</p>
B	<p style="text-align: center;"><u>SAMPLE</u></p> <p>Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE</p>	<p style="text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</p> <p style="text-align: center; font-size: 1.2em;">(This box only completed when no vial supplied with sample)</p>	<p style="text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="text-align: center; font-size: 1.2em;">None</p>

NET LOSSES NET GAINS

NOTES

1991 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	South West	RIVER	Melalhyl
DATE	17.9.91	SITE	Mawgan Porth Bridge
SORTER	TAB	SAMPLE CODE	NRA06 2530

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 Asellidae	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

1 Posterior half only