

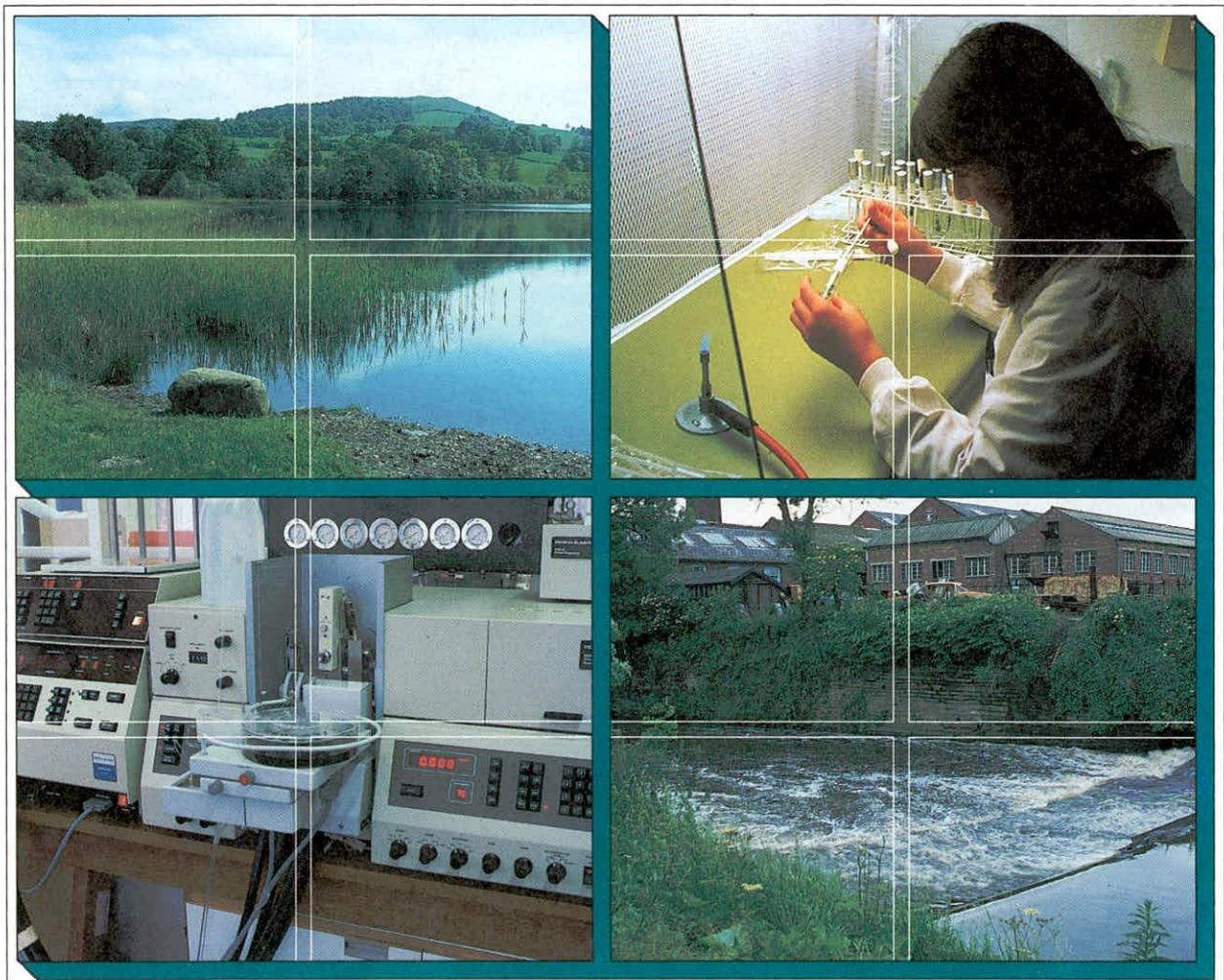
An audit of performance in the analysis of biological samples in 1995 NRA Anglian Region: AQC Audit

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1. INTRODUCTION

The 1995 General Quality Assessment (GQA) Survey included the sampling of aquatic macro-invertebrates for biological assessment of river quality throughout the United Kingdom. In England and Wales the survey was undertaken by the National Rivers Authority (NRA), the River Purification Boards (RPBs) sampled in Scotland, the Industrial Research and Technology Unit (IRTU) undertook the work in Northern Ireland and the Government Laboratory covered the Isle of Man (IOM).

The majority of sites surveyed were sampled in two seasons, spring and autumn. Standard collection procedures were used and the sampling strategy was compatible with RIVPACS (River InVertebrate Prediction And Classification System), a computer model developed by the Institute of Freshwater Ecology (IFE).

Samples were sorted for the families of macro-invertebrates included in the Biological Monitoring Working Party (BMWP) system. Taxa present were recorded on site data sheets. Although attempts had been made to standardise sample processing and recording techniques, these did vary somewhat from region to region.

In order to undertake this massive programme of fieldwork and sample processing, a large number of staff, many of whom were relatively inexperienced, were employed by the surveying agencies. In view of the number of staff involved and the variability of sample processing techniques, it was recognised that a quality assurance exercise was necessary to minimise and quantify errors. Each laboratory appointed at least one experienced analyst to act as an internal analytical quality control (AQC) checker. For most agencies, these checkers re-sorted about 10% of the laboratory's samples, those samples chosen for re-sorting being selected at random. In addition, IFE was contracted to undertake an independent, external audit of the quality of the laboratory analysis of biological samples for each NRA region, each RPB, IRTU and IOM. This commission was consistent with the audit performed by IFE for the National River Quality Survey in 1990 and for the routine biological monitoring of river sites each year between 1991 and 1994. This audit was originally intended as a measure of the quality of the AQC analyses and is termed the main audit or AQC audit. The data collected for the 1995 GQA Survey was not adjusted for errors identified by either of the quality assurance procedures. Therefore the NRA contracted IFE to subject their samples to a further audit of the primary analysis (the primary audit) to provide an independent assessment of the quality of the Survey data .

This report presents the results of the 33 AQC'd samples audited for NRA Anglian Region and represents a measure of the performance of the AQC analyst rather than that of the primary analyst. The results of the Primary Audit, detailing the performance of primary analysts for all 60 samples for the Region, are reported separately.

2. SAMPLE SELECTION

Samples for audit were selected internally by each of the agencies being monitored. The number of samples selected for audit varied between the different agencies and the biologists processing these samples had no prior knowledge of which samples were to be audited. Some agencies only sent to IFE samples that had been processed twice. Others adopted a random selection process, whereby some samples had been analysed just once and some had been re-sorted. 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, IRTU and IOM 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 data sheet containing 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, without reference to the data sheet or to the vial of animals, and the BMWP families identified.
- b) The families contained within the vial were identified.
- c) A comparison was made between the listing of families and those found in the sample by IFE.
- d) A comparison was made between the listing of families and those identified from the vial by IFE.
- e) "Losses" or "gains" from the original 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. Single representatives of a "gained" taxon were noted as such.
- f) An error code, selected from a list on the result sheet, was assigned by the IFE auditor for each "loss" or "gain".

Occasionally a sample did not include a vial containing representative examples of the families listed on the data sheet, while some arrived with the vial damaged in transit such that the representative specimens were no longer separated. For these samples, only operations a), c), e) and f) above were appropriate.

Several directives were issued to IFE relating to the treatment of BMWP taxa. Every taxon recorded on the data sheet must be supported by a voucher specimen of that family in the vial (or, for very large specimens, left in the sample). The only exceptions to this rule were the native crayfish, *Austropotamobius pallipes*, the medicinal leech, *Hirudo medicinalis* and the pearl mussel, *Margaritifera margaritifera* (which does not belong to a BMWP family), all of which are protected species. Where possible, IFE gave the benefit of doubt to the analyst in cases of the "loss" of Planariidae, specimens of which have been known to disintegrate in preservative. Animals deemed to have been dead at the time of sampling, cast insect skins, pupal exuviae and empty mollusc shells were to be excluded from the listing of families present. Isolated posterior ends of "living" specimens were not acceptable as records of a taxon. In these cases, thorax plus abdomen was deemed acceptable but abdomen only was deemed unacceptable. Terrestrial representatives of BMWP scoring families were also to be excluded from the audit. For this reason, Clambidae, Chrysomelidae and Curculionidae, which appear in the BMWP list, were excluded for the purposes of the audit since most representatives of these families are, at best, only semi-aquatic. 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 and sent to the Regional Biologist. Copies of these report forms are presented in the Appendix. For audit samples where a vial of animals was included, the comparison between the listing of families and the taxa found in the vial by IFE was shown in the section of the report form headed "VIAL". Discrepancies could be due to carelessness, misidentifications or errors in completing the data sheet listing the families present. Families not on the listing but found by IFE in the remainder of the sample were entered in the section of the report form headed "SAMPLE" under "Additional BMWP taxa found by IFE". Taxa recorded here represent families missed by the analyst(s) on sorting the sample. When the families listed as "losses" in the first section 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 both as "losses" from the vial and as "gains" from the sample 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".

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 centre section of the report form under "species name".

IFE was asked to interpret each error to provide a possible cause. An error code, selected from a list of options at the foot of each result sheet, was entered against each taxon in the column headed "Presumed cause of error".

For those samples in which the vial of animals was damaged or missing, the "VIAL" sections of the report form were not applicable (N/a). Families not on the list but present in the sample were entered in the section under "SAMPLE" : "Additional taxa" as before. Families recorded on the list but not found by IFE were indicated in the section above this. 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.

The final section of the result sheet summarises the audit, giving details of the numbers of "losses", "gains" and "omissions", together with the net effects on BMWP score and the number of scoring taxa.

5. RESULTS

The results of the AQC audit for Anglian Region are summarised by area in Tables 1 to 3. Table 4 displays the statistics of these regional audit results centered around the target of acceptability of no more than two missed taxa per sample. These data are presented for each analyst, for their Area laboratories and for the Region as a whole. Table 5 compares these results for each NRA Region and Area laboratory. Table 6 presents data for Anglian Region for the net effects of the AQC audit on the BMWP score and number of taxa. This table is again based on the target of no more than two missed taxa per sample. The figure of 13 for an acceptable underestimate of BMWP score is based on twice the average score of all taxa in the BMWP listing (excluding Clambidae, Chrysomelidae and Curculionidae, which are excluded from the audit). This average score is 6.57. Table 7 compares this BMWP data for each NRA Region and Area laboratory. Table 8 lists the taxa missed in sorting by Anglian Region's AQC analysts in the 1995 audit and Table 9 lists all such taxa for the entire 1995 audit (Primary and AQC Audits for NRA regions and Main Audit for other organisations) for the whole of the UK.

6. ACKNOWLEDGEMENTS

Grateful thanks to John Murray-Bligh of NRA Thames Region, who provided an invaluable service in the development and implementation of improved methodology and in providing helpful advice throughout.

Table 1. The 13 AQC'd samples audited for Central Area

River	Site	AQC Analyst	Losses	Gains	Omissions
SPRING					
Broughton Brook	Broughton Gauge	SJL	1	2	0
Counter Drain	Salters Lode	SEH	0	0	2
Middle Level Main Drain	Mullicourt Priory	SEH	1	0	0
AUTUMN					
Marley Gap Brook	Stocks Bridge	ABA	1	4	1
Great Ouse	Eaton Socon Mill	ABA	0	2	1
Counter Drain	Welches Dam	ABA	0	3	0
Claydon Brook	Addington	LJS	1	0	0
Sapiston	Broadgrass Green	LJS	0	0	0
Cottenham Lode	Smithy Fen Bridge	SEH	0	2	0
Forty Foot	Carters Bridge	SEH	1	1	1
Willingham Lode	Willingham Culvert	WTC	0	1	0
	Recreation Ground				
Cranbrook Drain	Colnefen Farm	WTC	2	1	0
Little Ouse	Blo Norton Ford	WTC	0	0	0

Table 2. The 13 AQC'd samples audited for Eastern Area

River	Site	AQC Analyst	Losses	Gains	Omissions
SPRING					
Bucklesham Mill	Ipswich Intake	CSA	1	1	0
Mar Dyke	Stifford G.S.	FCE	0	1	0
Hempnall Beck	Tasburgh Hall Ford	JMG	1	1	0
Burn	South Creake Bridge	JMG	0	4	0
AUTUMN					
Fromus	Gromford	EDT	0	1	0
Wid	Whites Bridge	EDT	0	0	0
Wensum	Hellesdon Mill	EDT	0	3	0
Rattlesden	u/s Confluence ICI	JMG	0	2	0
Rattlesden	Burford Bridge	JMG	0	2	0
Brain	u/s Braintree STW	JMG	1	1	0
Box	Boxford Bypass	LKB	0	0	0
Ore	u/s Framlingham STW	LKB	0	0	0
Blyth	A144 Bridge	LKB	0	2	0

Table 3. The 7 AQC'd samples audited for Northern Area

River	Site	AQC Analyst	Losses	Gains	Omissions
SPRING					
Welland (Coronation Cut)	B1165 Bridge	CAE	1	1	0
Hog Dyke	Old A605 Bridge	CAE	0	1	0
Nene	Irthlingborough	DMB	1	3	0
AUTUMN					
Welland	Gretton Road Bridge	DMB	0	0	0
Lacey Beck	Littlecoates	DMB	0	1	0
Barlings Eau	Stainton Bridge	RPC	0	1	0
Harpers Brook	u/s Brigstock STW	RPC	0	0	0

Table 4. Statistics of 1995 AQC Audit results for Anglian Region

Analyst/Group	n	Mean gains	Standard error	No.samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (l+g+o)	Standard error
Central	13	1.23	0.36	2	15.38	4	2.15	0.45
ABA	3	3.00	0.58	2	66.67	4	4.00	1.00
LJS	2	0.00	0.00	0	0.00	0	0.50	0.50
SEH	4	0.75	0.48	0	0.00	2	2.00	0.41
SJL	1	2.00	n/a	0	0.00	2	3.00	n/a
WTC	3	0.67	0.33	0	0.00	1	1.33	0.88
Eastern	13	1.38	0.33	2	15.38	4	1.62	0.33
CSA	1	1.00	n/a	0	0.00	1	2.00	n/a
EDT	3	1.33	0.88	1	33.33	3	1.33	0.88
FCE	1	1.00	n/a	0	0.00	1	1.00	n/a
JMG	5	2.00	0.55	1	20.00	4	2.40	0.40
LKB	3	0.67	0.66	0	0.00	2	0.67	0.66
Northern	7	1.00	0.38	1	14.29	3	1.29	0.52
CAE	2	1.00	0.00	0	0.00	1	1.50	0.50
DMB	3	1.33	0.88	1	33.33	3	1.67	1.20
RPC	2	0.50	0.50	0	0.00	1	0.50	0.50
Anglian Region	33	1.24	0.20	5	15.15	4	1.76	0.25
Whole of NRA	287	0.92	0.07	36	12.54	6	1.20	0.08

Table 5. Summary of errors found in 1995 AQC Audit for each NRA Laboratory

Region/Lab.	n	Mean gains	Standard error	No.samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (l+g+o)	Standard error
Anglian	33	1.24	0.20	5	15.15	4	1.76	0.25
Central	13	1.23	0.36	2	15.38	4	2.15	0.45
Eastern	13	1.38	0.33	2	15.38	4	1.62	0.33
Northern	7	1.00	0.38	1	14.29	3	1.29	0.52
N'umb & Yorks	30	0.87	0.16	2	6.67	3	1.00	0.19
South Yorkshire	18	0.83	0.20	1	5.56	3	0.94	0.24
Northumbria	2	1.00	0.00	0	0.00	1	1.00	0.00
Dales	10	0.90	0.35	1	10.00	3	1.10	0.41
North West	42	1.19	0.22	10	23.81	6	1.48	0.23
Northern	12	0.75	0.28	1	8.33	3	1.33	0.40
Central	12	0.92	0.38	3	25.00	3	1.00	0.37
Southern	18	1.67	0.40	6	33.33	6	1.89	0.40
Severn-Trent	48	1.19	0.21	8	16.67	6	1.46	0.23
Upper Severn	12	0.75	0.28	1	8.33	3	1.08	0.31
Lower Severn	10	1.60	0.62	3	30.00	5	2.10	0.67
Upper Trent	9	0.78	0.22	0	0.00	2	1.00	0.29
Lower Trent	17	1.47	0.41	4	23.53	6	1.59	0.45
Southern	24	0.38	0.14	1	4.17	3	0.67	0.19
Western	9	0.00	0.00	0	0.00	0	0.22	0.15
Eastern	15	0.60	0.21	1	6.67	3	0.93	0.27
South Western	53	0.51	0.11	1	1.89	3	0.57	0.12
Devon	15	0.73	0.23	0	0.00	2	0.80	0.22
Cornwall	15	0.40	0.21	1	6.67	3	0.40	0.21
North Wessex	14	0.50	0.23	0	0.00	2	0.57	0.23
South Wessex	9	0.33	0.24	0	0.00	2	0.44	0.34
Thames	21	1.10	0.26	4	19.05	3	1.52	0.33
Fobney Mead	13	1.46	0.35	4	30.77	3	2.08	0.45
Waltham Cross	8	0.50	0.27	0	0.00	2	0.63	0.26
Welsh	36	0.89	0.19	5	13.89	3	1.25	0.21
Northern	12	1.50	0.34	3	25.00	3	1.83	0.34
South Western	12	0.58	0.33	2	16.67	3	0.92	0.36
South Eastern	12	0.58	0.23	0	0.00	2	1.00	0.35
Whole of NRA	287	0.92	0.07	36	12.54	6	1.20	0.08

Table 6. Net effects of the AQC Audit on BMWP score and number of scoring taxa

Analyst/Group	n	Mean net effect on BMWP score	% of samples underestimated by score >13	maximum underestimate of BMWP score	Mean net effect on no. of taxa	% of samples underestimated by >2 taxa	Maximum underestimate of no. of taxa
Central	13	3.92	15.38	17	0.69	15.38	3
ABA	3	13.67	66.67	17	2.67	66.67	3
LJS	2	-3.50	0.00	0	-0.50	0.00	0
SEH	4	2.75	0.00	10	0.25	0.00	2
SJL	1	5.00	0.00	5	1.00	0.00	1
WTC	3	0.33	0.00	6	0.00	0.00	1
Eastern	13	5.46	7.69	14	1.15	15.38	4
CSA	1	-4.00	0.00	-4	0.00	0.00	0
EDT	3	6.67	0.00	13	1.13	33.33	3
FCE	1	8.00	0.00	8	1.00	0.00	1
JMG	5	7.60	20.00	14	1.60	20.00	4
LKB	3	3.00	0.00	9	0.67	0.00	2
Northern	7	3.43	0.00	8	0.71	0.00	2
CAE	2	3.00	0.00	5	0.50	0.00	1
DMB	3	4.33	0.00	8	1.00	0.00	2
RPC	2	25.00	0.00	5	0.50	0.00	1
Anglian Region	33	4.42	9.09	17	0.88	12.12	4
Whole of NRA	287	4.11	11.50	30	0.71	10.80	6

Table 7. Net effects of the AQC Audit on BMWP score and number of scoring taxa for each NRA Area

Analyst/Group	n	Mean net effect on BMWP score	% of samples underestimated by score >13	maximum underestimate of BMWP score	Mean net effect on no. of taxa	% of samples underestimated by >2 taxa	Maximum underestimate of no. of taxa
Anglian	33	4.42	9.09	17	0.88	12.12	4
Central	13	3.92	15.38	17	0.69	15.38	3
Eastern	13	5.46	7.69	14	1.15	15.38	4
Northern	7	3.43	0.00	8	0.71	0.00	2
N'umb & Yorks	30	4.67	3.33	25	0.80	3.30	3
South Yorkshire	18	4.28	0.00	13	0.78	5.56	3
Northumbria	2	5.00	0.00	5	1.00	0.00	1
Dales	10	5.30	10.00	25	0.80	10.00	3
North West	42	5.64	14.29	24	0.98	21.43	6
Northern	12	2.42	0.00	13	0.42	8.33	3
Central	12	6.50	25.00	24	8.33	25.00	3
Southern	18	7.22	16.67	23	1.44	27.78	6
Severn-Trent	48	5.00	16.67	30	0.98	16.67	5
Upper Severn	12	2.67	8.33	21	0.42	8.33	3
Lower Severn	10	6.60	30.00	30	1.20	30.00	5
Upper Trent	9	4.78	11.11	18	0.78	0.00	2
Lower Trent	17	5.82	17.65	22	1.35	23.53	5
Southern Region	24	0.88	0.00	12	0.08	0.00	2
Western	9	-1.22	0.00	0	-0.22	0.00	0
Eastern	15	2.13	0.00	12	0.27	0.00	2
South Western	53	2.85	11.32	22	0.45	1.89	3
Devon	15	4.07	20.00	15	0.67	0.00	2
Cornwall	15	2.20	6.67	22	0.40	6.67	3
N.Wessex	14	2.93	14.29	16	0.43	0.00	2
S.Wessex	9	1.78	0.00	10	0.22	0.00	1
Thames	21	4.19	14.29	19	0.76	14.29	3
Fobney Mead	13	5.77	23.08	19	1.00	23.08	3
Waltham Cross	8	1.63	0.00	10	0.38	0.00	2
Welsh	36	4.39	19.44	30	0.58	11.11	3
Northern	12	8.67	41.67	20	1.17	16.67	3
S.Western	12	1.92	16.67	30	0.25	16.67	3
S.Eastern	12	2.58	0.00	11	0.33	0.00	2
Whole of NRA	287	4.11	11.50	30	0.71	10.80	6

Table 8. Taxa missed by Anglian Region's AQC analysts

Family	n	% of Anglian Region's missed taxa in AQC Audit	% of missed taxa in AQC Audit for all NRA Regions
Planariidae (incl. Dugesiidae)	4	11.43	5.17
Hydroptilidae	4	11.43	6.03
Caenidae	3	8.57	2.59
Valvatidae	3	8.57	2.16
Tipulidae	2	5.71	3.88
Elmidae	2	5.71	5.17
Sphaeriidae	2	5.71	5.17
Notonectidae	1	2.86	0.43
Physidae	1	2.86	1.29
Neritidae	1	2.86	0.86
Lymnaeidae	1	2.86	2.16
Libellulidae	1	2.86	0.43
Corophiidae	1	2.86	0.43
Piscicolidae	1	2.86	1.72
Corixidae	1	2.86	0.43
Leptoceridae	1	2.86	3.88
Dendrocoelidae	1	2.86	1.72
Gammaridae (incl. Crangonyctidae)	1	2.86	1.29
Gerridae	1	2.86	0.43
Glossiphoniidae	1	2.86	0.86
Goeridae	1	2.86	1.29
Hydrobiidae (incl. Bithyniidae)	1	2.86	5.17

Table 9. Missed taxa for all samples in 1995 audit

Family	n	% of all missed taxa in 1995 audit
Hydrophilidae (incl. Hydraenidae)	68	5.97
Hydroptilidae	59	5.18
Sphaeriidae	52	4.57
Hydrobiidae (incl. Bithyniidae)	50	4.39
Planariidae (incl. Dugesiidae)	46	4.04
Caenidae	40	3.51
Elmidae	39	3.42
Leptoceridae	39	3.42
Psychomyiidae (incl. Ecnomidae)	39	3.42
Lymnaeidae	33	2.90
Simuliidae	32	2.81
Nemouridae	31	2.72
Limnephilidae	30	2.63
Planorbidae	29	2.55
Halplidae	28	2.46
Tipulidae	25	2.19
Baetidae	23	2.02
Glossiphoniidae	22	1.93
Goeridae	22	1.93
Leptophlebiidae	22	1.93
Dytiscidae (incl. Noteridae)	21	1.84
EphemereIIDae	20	1.76
Valvatidae	20	1.76
Hydropsychidae	18	1.58
Ancylidae (incl. Acroloxidae)	16	1.40
Asellidae	16	1.40
Leuctridae	16	1.40
Piscicolidae	16	1.40
Rhyacophilidae (incl. Glossosomatidae)	16	1.40
Scirtidae	16	1.40
Sericostomatidae	15	1.32
Gyrinidae	14	1.23
Erpobdellidae	13	1.14
Lepidostomatidae	13	1.14
Polycentropodidae	13	1.14
Chloroperlidae	11	0.97
Odontoceridae	11	0.97
Dendrocoelidae	10	0.88
Heptageniidae	10	0.88

Table 9. (cont.)

Family	n	% of all missed taxa in 1995 audit
Gammaridae (incl. Crangonyctidae)	9	0.79
Taeniopterygidae	9	0.79
Hydrometridae	8	0.70
Oligochaeta	8	0.70
Physidae	7	0.61
Chironomidae	6	0.53
Coenagriidae	6	0.53
Perlidae	6	0.53
Brachycentridae	5	0.44
Calopterygidae	5	0.44
Perlodidae	5	0.44
Sialidae	5	0.44
Beraeidae	4	0.35
Corixidae	4	0.35
Corophiidae	4	0.35
Ephemeraeidae	4	0.35
Unionidae	4	0.35
Capniidae	3	0.26
Dryopidae	3	0.26
Gerridae	3	0.26
Libellulidae	3	0.26
Siphonuridae	3	0.26
Aphelocheiridae	2	0.18
Neritidae	2	0.18
Platycnemididae	2	0.18
Aeshnidae	1	0.09
Cordulegasteridae	1	0.09
Notonectidae	1	0.09
Philopotamidae	1	0.09
Viviparidae	1	0.09

APPENDIX

Results of individual sample audits

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Central

DATE: 25.4.95

WATER-COURSE: Broughton Brook

PRIMARY ANALYST: SEH

AQC ANALYST: SJL

SITE: Broughton Gauge

CODE: BF09M06

SORT/AQC METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

Coenagriidae 7

Additional BMWP taxa found by IFE

Platycnemididae 7 Platycnemis pennipes

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Tipulidae 9 Palaria (Palaria) sp.

SUMMARY OF AUDIT

LOSSES 1

GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 5

ON NO. OF TAXA 1

1 No representative of family in vial

5 Specimen dead at time of sampling

9 Taxon missed in sorting

2 Alternative terrestrial specimen in vial

6 Taxon in vial but not recorded

10 Unexplained error

3 Posterior end only in vial

7 Mis-identification

11 Taxon added in internal AQC

4 Empty shell or case or cast skin in vial

8 Typographical error - wrong box ticked

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Central

DATE: 28.3.95

WATER-
COURSE: Counter Drain

PRIMARY
ANALYST: SJL

AQC
ANALYST: SEH

SITE: Salters Lode

CODE: BF52M06

SORT/AQC
METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

Planariidae (incl. Dugesiidae) *

1

Oligochaeta *

1

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Planariidae (incl. Dugesiidae) *

Polycelis nigra/tenuis,
Dugesia lugubris/polychroa

1

Oligochaeta *

Tubificidae

1

SUMMARY OF AUDIT

LOSSES 0

GAINS 0

OMISSIONS: 2

NET EFFECTS:

ON BMWP SCORE 0

ON NO. OF TAXA 0

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Central

DATE: 28.3.95

WATER-

PRIMARY

AQC

COURSE: Middle Level Main Drain

ANALYST: SJL

ANALYST: SEH

SITE: Mullicourt Priory

CODE: BF53M14

SORT/AQC

METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

Dendrocoelidae

1

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

None

SUMMARY OF AUDIT

LOSSES 1

GAINS 0

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE -5

ON NO. OF TAXA -1

1 No representative of family in vial

5 Specimen dead at time of sampling

9 Taxon missed in sorting

2 Alternative terrestrial specimen in vial

6 Taxon in vial but not recorded

10 Unexplained error

3 Posterior end only in vial

7 Mis-identification

11 Taxon added in internal AQC

4 Empty shell or case or cast skin in vial

8 Typographical error - wrong box ticked

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Central

DATE: 4.10.95

WATER-
COURSE: Marley Gap Brook

PRIMARY
ANALYST: SEH

AQC
ANALYST: ABA

SITE: Stocks Bridge, St.Ives

CODE: BF26M14

SORT/AQC
METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

Gerridae		1
Chironomidae *		1

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Leptoceridae	Athripsodes aterrimus 1 only	9
Corophiidae	Corophium curvispinum 1 only	9
Sphaeriidae	Pisidium sp. 1 only	9
Glossiphoniidae	Theromyzon tessulatum 1 only	9
Chironomidae *	Orthocladiinae, Chironomini, Tanytarsini	1

SUMMARY OF AUDIT

LOSSES 1

GAINS 4

OMISSIONS: 1

NET EFFECTS:

ON BMWP SCORE 17

ON NO. OF TAXA 3

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Central

DATE: 17.10.95

WATER-
COURSE: Great Ouse

PRIMARY
ANALYST: SEH

AQC
ANALYST: ABA

SITE: Eaton Socon Mill

CODE: BF20M03

SORT/AQC
METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

Corophiidae * 1

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Valvatidae	Valvata cristata	9
Corophiidae *	Corophium curvispinum	1
Elmidae	Oulimnius sp. (larva) 1 only	9

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 1

NET EFFECTS:

ON BMWP SCORE 8

ON NO. OF TAXA 2

1 No representative of family in vial
2 Alternative terrestrial specimen in vial
3 Posterior end only in vial
4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling
6 Taxon in vial but not recorded
7 Mis-identification
8 Typographical error - wrong box ticked

9 Taxon missed in sorting
10 Unexplained error
11 Taxon added in internal AQC
12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Central

DATE: 6.11.95

WATER-

PRIMARY

AQC

COURSE: Counter Drain

ANALYST: LJS

ANALYST: ABA

SITE: Welches Dam

CODE: BF52M04

SORT/AQC

METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Gerridae	Gerris argentatus 1 only	9
Dendrocoelidae	Dendrocoelum lacteum 1 only	9
Hydroptilidae	Oxyethira sp.	9

SUMMARY OF AUDIT

LOSSES 0

GAINS 3

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 16

ON NO. OF TAXA 3

1 No representative of family in vial

5 Specimen dead at time of sampling

9 Taxon missed in sorting

2 Alternative terrestrial specimen in vial

6 Taxon in vial but not recorded

10 Unexplained error

3 Posterior end only in vial

7 Mis-identification

11 Taxon added in internal AQC

4 Empty shell or case or cast skin in vial

8 Typographical error - wrong box ticked

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Central

DATE: 9.11.95

WATER-COURSE: Claydon Brook

PRIMARY ANALYST: SEH

AQC ANALYST: LJS

SITE: Addington

CODE: BF02M23

SORT/AQC METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

Limnephilidae

1

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

None

SUMMARY OF AUDIT

LOSSES 1 GAINS 0

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE -7

ON NO. OF TAXA -1

- 1 No representative of family in vial
- 2 Alternative terrestrial specimen in vial
- 3 Posterior end only in vial
- 4 Empty shell or case or cast skin in vial

- 5 Specimen dead at time of sampling
- 6 Taxon in vial but not recorded
- 7 Mis-identification
- 8 Typographical error - wrong box ticked

- 9 Taxon missed in sorting
- 10 Unexplained error
- 11 Taxon added in internal AQC
- 12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Central

DATE: 20.11.95

WATER-
COURSE: Sapiston

PRIMARY
ANALYST: ABA

AQC
ANALYST: LJS

SITE: Broadgrass Green

CODE: BF41M01

SORT/AQC
METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

None

SUMMARY OF AUDIT

LOSSES 0

GAINS 0

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 0

ON NO. OF TAXA 0

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Central

DATE: 25.10.95

WATER-COURSE: Cottenham Lode

PRIMARY ANALYST: ABA

AQC ANALYST: SEH

SITE: Smithy Fen Bridge, Cottenham

CODE: BF35M16

SORT/AQC METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Caenidae	Caenis luctuosa/macrura 1 only	9
Lymnaeidae	Lymnaea sp. (juvenile) 1 only	9

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 10

ON NO. OF TAXA 2

- 1 No representative of family in vial
- 2 Alternative terrestrial specimen in vial
- 3 Posterior end only in vial
- 4 Empty shell or case or cast skin in vial

- 5 Specimen dead at time of sampling
- 6 Taxon in vial but not recorded
- 7 Mis-identification
- 8 Typographical error - wrong box ticked

- 9 Taxon missed in sorting
- 10 Unexplained error
- 11 Taxon added in internal AQC
- 12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Central

DATE: 6.11.95

WATER-COURSE: Forty Foot

PRIMARY ANALYST: ABA

AQC ANALYST: SEH

SITE: Carters Bridge, Chatteris

CODE: BF53M37

SORT/AQC METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

Baetidae *		3
Oligochaeta		1

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Caenidae	Caenis horaria	9
Baetidae *	Cloeon dipterum	3

SUMMARY OF AUDIT

LOSSES 1

GAINS 1

OMISSIONS: 1

NET EFFECTS:

ON BMWP SCORE 6

ON NO. OF TAXA 0

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Central

DATE: 25.10.95

WATER-COURSE: Willingham Lode

PRIMARY ANALYST: ABA

AQC ANALYST: WTC

SITE: Willingham Culvert Rec Ground

CODE: BF35M05

SORT/AQC METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Gammaridae (incl. Crangonyctidae)	Crangonyx pseudogracilis 1 only	9
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SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 6
ON NO. OF TAXA 1

1 No representative of family in vial
2 Alternative terrestrial specimen in vial
3 Posterior end only in vial
4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling
6 Taxon in vial but not recorded
7 Mis-identification
8 Typographical error - wrong box ticked

9 Taxon missed in sorting
10 Unexplained error
11 Taxon added in internal AQC
12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Central

DATE: 6.11.95

WATER-COURSE: Cranbrook Drain

PRIMARY ANALYST: LJS

AQC ANALYST: WTC

SITE: Colnefen Farm

CODE: BF52M14

SORT/AQC METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

Dendrocoelidae	1
Hirudinidae	8

Additional BMWP taxa found by IFE

Erpobdellidae	Indet Erpobdellid (juvenile)	8
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SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

None

SUMMARY OF AUDIT

LOSSES 2

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE -5

ON NO. OF TAXA -1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Central

DATE: 20.11.95

WATER-
COURSE: Little Ouse

PRIMARY
ANALYST: SEH

AQC
ANALYST: WTC

SITE: Blo Norton Ford

CODE: BF42M04

SORT/AQC
METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

None

SUMMARY OF AUDIT

LOSSES 0 GAINS 0

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 0

ON NO. OF TAXA 0

- 1 No representative of family in vial
- 2 Alternative terrestrial specimen in vial
- 3 Posterior end only in vial
- 4 Empty shell or case or cast skin in vial

- 5 Specimen dead at time of sampling
- 6 Taxon in vial but not recorded
- 7 Mis-identification
- 8 Typographical error - wrong box ticked

- 9 Taxon missed in sorting
- 10 Unexplained error
- 11 Taxon added in internal AQC
- 12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian	LABORATORY: Eastern	DATE: 13.3.95
WATER-COURSE: Bucklesham Mill	PRIMARY ANALYST: EDT	AQC ANALYST: CSA
SITE: Ipswich Intake	CODE: R04BFMIL030	SORT/AQC METHOD: Live/Preserved

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

Sericostomatidae	1
------------------	---

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Hydroptilidae	Ithytrichia sp.	9
---------------	-----------------	---

SUMMARY OF AUDIT

LOSSES 1	GAINS 1	OMISSIONS: 0	NET EFFECTS:
			ON BMWP SCORE -4
			ON NO. OF TAXA 0

- | | | |
|--|--|--|
| 1 No representative of family in vial | 5 Specimen dead at time of sampling | 9 Taxon missed in sorting |
| 2 Alternative terrestrial specimen in vial | 6 Taxon in vial but not recorded | 10 Unexplained error |
| 3 Posterior end only in vial | 7 Mis-identification | 11 Taxon added in internal AQC |
| 4 Empty shell or case or cast skin in vial | 8 Typographical error - wrong box ticked | 12 Recorded taxon that was rejected by AQC analyst |

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Eastern

DATE: 24.4.95

WATER-COURSE: Mar Dyke

PRIMARY ANALYST: EDT

AQC ANALYST: FCE

SITE: Stifford Gauging Station

CODE: R01BFMD0202

SORT/AQC METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Libellulidae

Indet Libellulid (juvenile) 1 only

9

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 8

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Eastern

DATE: 22.3.95

WATER-COURSE: Hempnall Beck

PRIMARY ANALYST: CSA

AQC ANALYST: JMG

SITE: Tasburgh Hall Ford

CODE: R04BFTAS072

SORT/AQC METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

Polycentropodidae

7

Additional BMWP taxa found by IFE

Psychomyiidae (incl. Ecnomidae)

Lype sp.

7

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

None

SUMMARY OF AUDIT

LOSSES 1

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 1

ON NO. OF TAXA 0

1 No representative of family in vial

5 Specimen dead at time of sampling

9 Taxon missed in sorting

2 Alternative terrestrial specimen in vial

6 Taxon in vial but not recorded

10 Unexplained error

3 Posterior end only in vial

7 Mis-identification

11 Taxon added in internal AQC

4 Empty shell or case or cast skin in vial

8 Typographical error - wrong box ticked

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Eastern

DATE: 18.4.95

WATER-COURSE: Burn

PRIMARY ANALYST: EDT

AQC ANALYST: JMG

SITE: South Creake Bridge

CODE: R04BFBRN010

SORT/AQC METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Planariidae (incl. Dugesiidae)	Polycelis nigra/tenuis 1 only	9
Valvatidae	Valvata cristata 1 only	9
Hydrobiidae (incl. Bithyniidae)	Potamopyrgus jenkinsi 1 only	9
Sphaeriidae	Pisidium sp. 1 only	9

SUMMARY OF AUDIT

LOSSES 0

GAINS 4

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 14

ON NO. OF TAXA 4

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Eastern

DATE: 18.9.95

WATER-COURSE: Fromus

PRIMARY ANALYST: CSA

AQC ANALYST: EDT

SITE: Gromford

CODE: BFFRO040

SORT/AQC METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
-------------	-------------------------------------	---

VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Caenidae	Caenis luctuosa/macrura, C.horaria	9
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SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 7

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Eastern

DATE: 17.9.95

WATER-
COURSE: Wid

PRIMARY
ANALYST: JMG

AQC
ANALYST: EDT

SITE: Whites Bridge

CODE: BFWD0150

SORT/AQC
METHOD: Live/Preserved

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

None

SUMMARY OF AUDIT

LOSSES 0 GAINS 0

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 0

ON NO. OF TAXA 0

- 1 No representative of family in vial
- 2 Alternative terrestrial specimen in vial
- 3 Posterior end only in vial
- 4 Empty shell or case or cast skin in vial

- 5 Specimen dead at time of sampling
- 6 Taxon in vial but not recorded
- 7 Mis-identification
- 8 Typographical error - wrong box ticked

- 9 Taxon missed in sorting
- 10 Unexplained error
- 11 Taxon added in internal AQC
- 12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Eastern

DATE: 13.11.95

WATER-COURSE: Wensum

PRIMARY ANALYST: LKB

AQC ANALYST: EDT

SITE: Hellesdon Mill

CODE: BFWEN240

SORT/AQC METHOD: Live/Preserved

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

Asellidae	Asellus aquaticus	6
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SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Corixidae	Sigara dorsalis 1 only	9
Planariidae (incl. Dugesiidae)	Dugesia lugubris/polychroa 1 only	9

SUMMARY OF AUDIT

LOSSES 0 GAINS 3 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 13
ON NO. OF TAXA 3

- 1 No representative of family in vial
- 2 Alternative terrestrial specimen in vial
- 3 Posterior end only in vial
- 4 Empty shell or case or cast skin in vial

- 5 Specimen dead at time of sampling
- 6 Taxon in vial but not recorded
- 7 Mis-identification
- 8 Typographical error - wrong box ticked

- 9 Taxon missed in sorting
- 10 Unexplained error
- 11 Taxon added in internal AQC
- 12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Eastern

DATE: 9.10.95

WATER-COURSE: Rattlesden

PRIMARY ANALYST: LKB

AQC ANALYST: JMG

SITE: u/s Confluence ICI

CODE: BFGIP060

SORT/AQC METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Neritidae	Theodoxus fluviatilis 1 only	9
Physidae	Physa sp. (juvenile) 1 only	9

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 9

ON NO. OF TAXA 2

- 1 No representative of family in vial
- 2 Alternative terrestrial specimen in vial
- 3 Posterior end only in vial
- 4 Empty shell or case or cast skin in vial

- 5 Specimen dead at time of sampling
- 6 Taxon in vial but not recorded
- 7 Mis-identification
- 8 Typographical error - wrong box ticked

- 9 Taxon missed in sorting
- 10 Unexplained error
- 11 Taxon added in internal AQC
- 12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian
WATER-
COURSE: Rattlesden

LABORATORY: Eastern
PRIMARY
ANALYST: EDT

DATE: 20.11.95
AQC
ANALYST: JMG

SITE: Burford Bridge

CODE: BFRAT090

SORT/AQC
METHOD: Live/Preserved

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Goeridae	Goera pilosa	9
Valvatidae	Valvata piscinalis 1 only	9

SUMMARY OF AUDIT

LOSSES 0 GAINS 2 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 13
ON NO. OF TAXA 2

1 No representative of family in vial
2 Alternative terrestrial specimen in vial
3 Posterior end only in vial
4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling
6 Taxon in vial but not recorded
7 Mis-identification
8 Typographical error - wrong box ticked

9 Taxon missed in sorting
10 Unexplained error
11 Taxon added in internal AQC
12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Eastern

DATE: 27.11.95

WATER-
COURSE: Brain

PRIMARY
ANALYST: LKB

AQC
ANALYST: JMG

SITE: u/s Braintree STW

CODE: BFBR0221

SORT/AQC
METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

Tipulidae Sciomyzidae 7

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Hydroptilidae Hydroptila sp. (pupa) 1 only 9

SUMMARY OF AUDIT

LOSSES 1

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 1

ON NO. OF TAXA 0

- 1 No representative of family in vial
- 2 Alternative terrestrial specimen in vial
- 3 Posterior end only in vial
- 4 Empty shell or case or cast skin in vial

- 5 Specimen dead at time of sampling
- 6 Taxon in vial but not recorded
- 7 Mis-identification
- 8 Typographical error - wrong box ticked

- 9 Taxon missed in sorting
- 10 Unexplained error
- 11 Taxon added in internal AQC
- 12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Eastern

DATE: 2.10.95

WATER-
COURSE: Box

PRIMARY
ANALYST: EDT

AQC
ANALYST: LKB

SITE: Boxford Bypass

CODE: BFBX0134

SORT/AQC
METHOD: Live/Preserved

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

None

SUMMARY OF AUDIT

LOSSES 0

GAINS 0

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 0

ON NO. OF TAXA 0

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Eastern

DATE: 13.11.95

WATER-
COURSE: Ore

PRIMARY
ANALYST: EDT

AQC
ANALYST: LKB

SITE: u/s Framlingham STW

CODE: BFORE010

SORT/AQC
METHOD: Live/Preserved

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

None

SUMMARY OF AUDIT

LOSSES 0

GAINS 0

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 0

ON NO. OF TAXA 0

- 1 No representative of family in vial
- 2 Alternative terrestrial specimen in vial
- 3 Posterior end only in vial
- 4 Empty shell or case or cast skin in vial

- 5 Specimen dead at time of sampling
- 6 Taxon in vial but not recorded
- 7 Mis-identification
- 8 Typographical error - wrong box ticked

- 9 Taxon missed in sorting
- 10 Unexplained error
- 11 Taxon added in internal AQC
- 12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Eastern

DATE: 13.11.95

WATER-COURSE: Blyth

PRIMARY ANALYST: EDT

AQC ANALYST: LKB

SITE: A144 Bridge

CODE: BFBLY020

SORT/AQC METHOD: Live/Preserved

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Planariidae (incl. Dugesiidae)	Polycelis nigra/tenuis 1 only	9
Piscicolidae	Piscicola geometra 1 only	9

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 9

ON NO. OF TAXA 2

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian	LABORATORY: Northern	DATE: 4.4.95
WATER-COURSE: Welland (Coronation Cut)	PRIMARY ANALYST: RPC	AQC ANALYST: CAE
SITE: B1165 Bridge	CODE: R05BFWELL490B	SORT/AQC METHOD: Live/Preserved

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

Unionidae	Note on data sheet "Returned to river"	1
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Additional BMWP taxa found by IFE

Polycentropodidae	Cyrnus flavidus	6
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SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

None

SUMMARY OF AUDIT

LOSSES 1

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 1

ON NO. OF TAXA 0

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian LABORATORY: Northern DATE: 1.5.95
WATER- PRIMARY AQC
COURSE: Hog Dyke ANALYST: RPC ANALYST: CAE
SITE: Raunds, Old A605 Bridge CODE: BFHOGD090R SORT/AQC
METHOD: Live/Preserved

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Elmidae Elmis acnea (larvae) 9

SUMMARY OF AUDIT

LOSSES 0 GAINS 1 OMISSIONS: 0 NET EFFECTS:
ON BMWP SCORE 5
ON NO. OF TAXA 1

- | | | |
|--|--|--|
| 1 No representative of family in vial | 5 Specimen dead at time of sampling | 9 Taxon missed in sorting |
| 2 Alternative terrestrial specimen in vial | 6 Taxon in vial but not recorded | 10 Unexplained error |
| 3 Posterior end only in vial | 7 Mis-identification | 11 Taxon added in internal AQC |
| 4 Empty shell or case or cast skin in vial | 8 Typographical error - wrong box ticked | 12 Recorded taxon that was rejected by AQC analyst |

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Northern

DATE: 25.9.95

WATER-COURSE: Welland

PRIMARY ANALYST: RPC

AQC ANALYST: DMB

SITE: Gretton Road Bridge

CODE: BFWELL170G

SORT/AQC METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

None

SUMMARY OF AUDIT

LOSSES 0

GAINS 0

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 0

ON NO. OF TAXA 0

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Northern

DATE: 30.11.95

WATER-COURSE: Lacey Beck

PRIMARY ANALYST: SJH

AQC ANALYST: DMB

SITE: Littlecoates

CODE: BFLACE070L

SORT/AQC METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Planariidae (incl. Dugesidae)	Polycelis nigra/tenuis 1 only	9
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SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 5

ON NO. OF TAXA 1

1 No representative of family in vial
2 Alternative terrestrial specimen in vial
3 Posterior end only in vial
4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling
6 Taxon in vial but not recorded
7 Mis-identification
8 Typographical error - wrong box ticked

9 Taxon missed in sorting
10 Unexplained error
11 Taxon added in internal AQC
12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Northern

DATE: 26.9.95

WATER-COURSE: Barlings Eau

PRIMARY ANALYST: DMB

AQC ANALYST: RPC

SITE: Stainton Bridge

CODE: BFBARL090S

SORT/AQC METHOD: Live/Preserved

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Tipulidae	Tipula montium group I only	9
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SUMMARY OF AUDIT

LOSSES 0 GAINS 1 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 5

ON NO. OF TAXA 1

1 No representative of family in vial

5 Specimen dead at time of sampling

9 Taxon missed in sorting

2 Alternative terrestrial specimen in vial

6 Taxon in vial but not recorded

10 Unexplained error

3 Posterior end only in vial

7 Mis-identification

11 Taxon added in internal AQC

4 Empty shell or case or cast skin in vial

8 Typographical error - wrong box ticked

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Anglian

LABORATORY: Northern

DATE: 16.10.95

WATER-

PRIMARY

AQC

COURSE: Harpers Brook

ANALYST: LJS

ANALYST: RPC

SITE: u/s Brigstock STW

CODE: BFHARP140B

SORT/AQC

METHOD: Live/Live

RESULTS OF MAIN AUDIT

Family name	Species name (where appropriate)	Presumed cause of error (see footnotes)
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VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

None

SUMMARY OF AUDIT

LOSSES 0

GAINS 0

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 0

ON NO. OF TAXA 0

1 No representative of family in vial

5 Specimen dead at time of sampling

9 Taxon missed in sorting

2 Alternative terrestrial specimen in vial

6 Taxon in vial but not recorded

10 Unexplained error

3 Posterior end only in vial

7 Mis-identification

11 Taxon added in internal AQC

4 Empty shell or case or cast skin in vial

8 Typographical error - wrong box ticked

12 Recorded taxon that was rejected by AQC analyst

Omission (*) = Recorded, not in vial but found by IFE in sample (no net loss or gain)