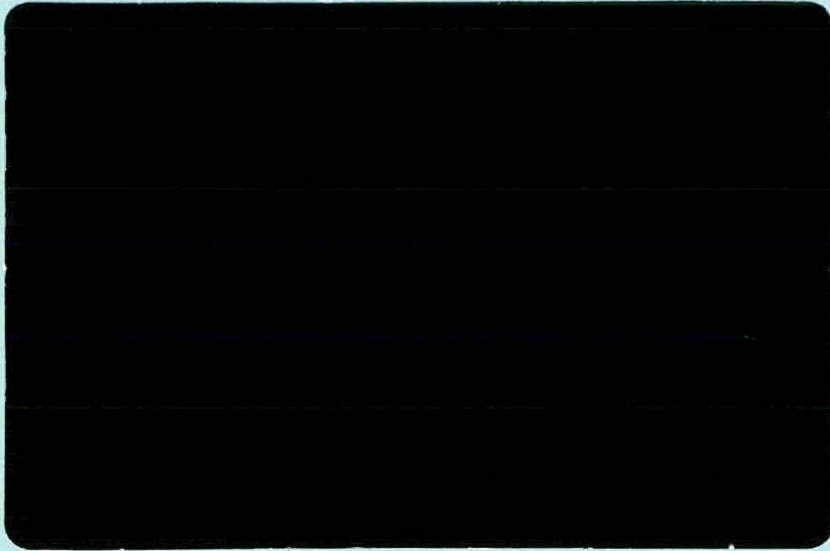


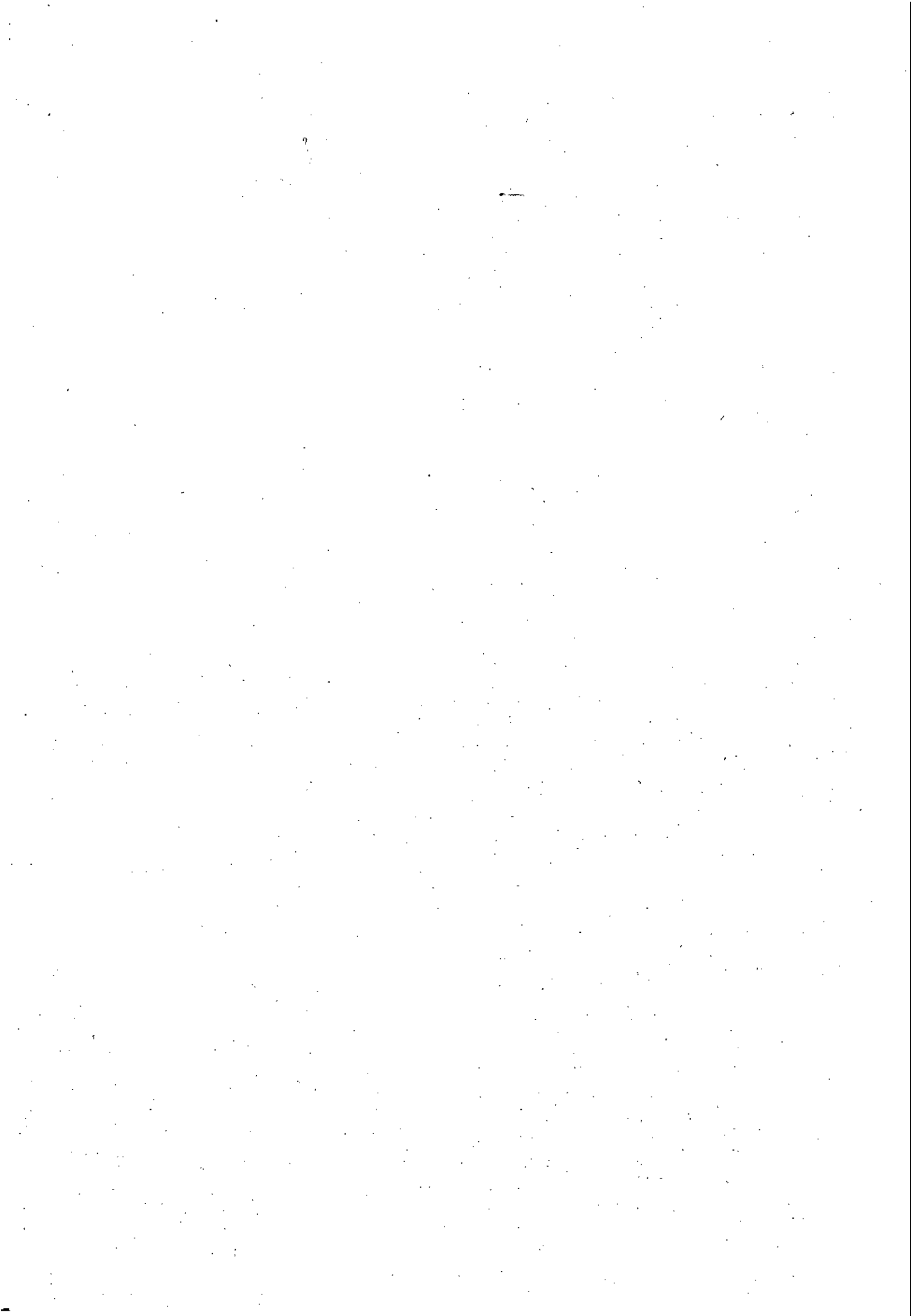
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An audit of performance in the analysis of biological
Samples in 1997
Environment Agency: AQC Audit

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Statement of Use

Information in this document is to help biologists in the Agency to identify where analytical errors occur so that they can be reduced or eliminated. Data in the tables provide measures of the accuracy of data produced in the Agency's internal Analytical Quality Control (AQC) scheme for samples analysed in accordance with the standard methods for the River Invertebrate Prediction and Classification System (RIVPACS) and analysed to the level required for the Biological Monitoring Working Party (BMWP)-score system, including General Quality Assessment (GQA). Information in this report may be used to determine the AQC parameters used in individual laboratories, as well as for estimating errors in the primary data from information obtained from AQC inspections

Research Contractor

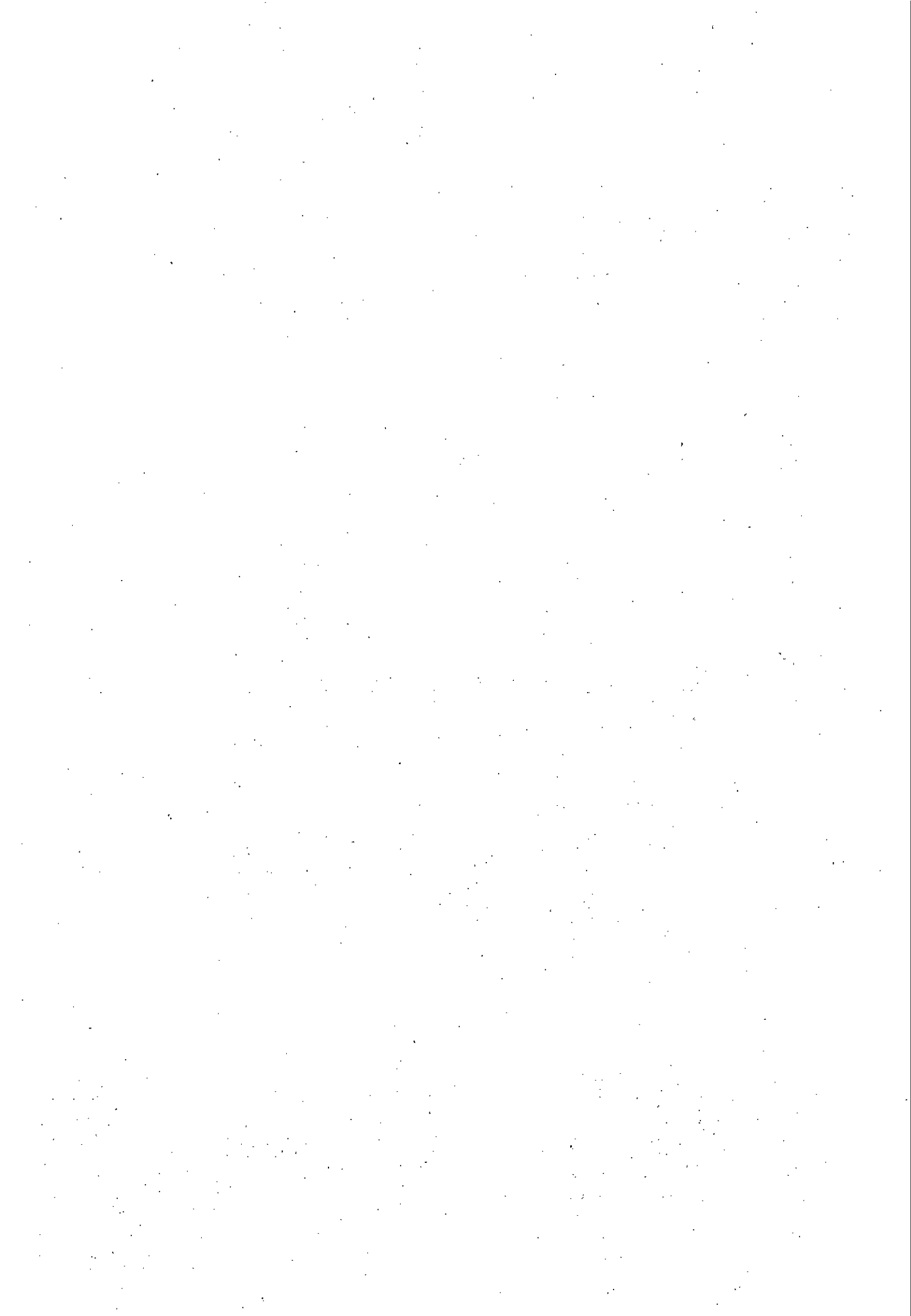
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1. INTRODUCTION

In 1997 the sampling of aquatic macro-invertebrates for the biological assessment of river quality was carried out throughout the United Kingdom. This task was undertaken by the Environment Agency (The Agency) in England and Wales, the Scottish Environment Protection Agency (SEPA) in Scotland and the Industrial Research and Technology Unit (IRTU) undertook the work in Northern Ireland.

Each organisation employed standard collection procedures as used in the 1995 General Quality Assessment (GQA) Survey. The sampling strategy was therefore 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 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) inspector. These inspectors re-sorted 10% of the laboratory's samples, those samples chosen for re-sorting being selected randomly. In addition, IFE was contracted to undertake an independent, external audit of the quality of the laboratory analysis of biological samples for each Agency and SEPA region and for IRTU. This commission was consistent with the audit performed by IFE for the National River Quality Surveys in 1990 and 1995 and for the routine biological monitoring of river sites each year between 1991 and 1994 and again in 1996. The audit for the Agency comprised two elements. The AQC Audit provided a measure of the quality of performance of the AQC inspectors. The Primary Audit provided an independent assessment of the quality of the data, since this was not adjusted for errors identified by either of the other quality assurance procedures.

This report presents the results of the audit of 426 samples that were internally AQC'd by Agency staff. The results of the Primary Audit, detailing the performance of the Agency's biologists who performed the primary analyses of 483 samples, are reported separately (Gunn *et al.*, 1998).

2. SAMPLE SELECTION

Samples for audit were selected internally by each of the organisations being monitored. The method of selection used by the Agency is described in Environment Agency (1996). The number of samples selected for audit varied between laboratories and the biologists processing these samples had no prior knowledge of which samples were to be audited. Laboratories were instructed to send to IFE samples that had been processed twice (once for primary analysis and once for internal AQC inspection). Those which analysed an insufficient number of samples throughout the year to provide the requisite number of AQC-inspected samples for the audit sent as many AQC-inspected samples as they could and made up the number with samples which had been analysed just once. 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 organisation, within the limits of the total number of samples that IFE was contracted to audit.

3. SAMPLE PROCESSING

The normal protocol for Agency, SEPA and IRTU biologists was to sort their samples within the laboratory and to select examples of each scoring taxon within the BMWP system. 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. Samples for internal AQC analysis should have been sorted in the same manner as the primary analysis. The AQC inspector's task included confirming the identification of the contents of the vial and the correctness of the data sheet. Any additional taxa found at AQC were to be placed in a separate vial without altering the contents of the primary analyst's vial, although this instruction was not always followed.

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 or vials 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 vials of animals, and the BMWP families identified.
- b) The families contained within the vials 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 vials 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 appropriate Regional Biologist. Examples for Primary and AQC Audits of the same site are shown in Figures 1 & 2. IFE were instructed not to include copies of these forms in the report but that each region would keep their own forms as an appendix to this report. 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". This section also included taxa added by the internal AQC analyst. 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 or the wrong family box being ticked on the data sheet.

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.

Figure 1. An example of a Primary Audit result sheet

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Example	LABORATORY: Example	DATE: 01/04/97
WATER-COURSE: Beautiful River	PRIMARY ANALYST: XX	AQC ANALYST: YY
SITE: Utopia	CODE: 0001/AQC01	SORT/AQC METHOD: Preserved/Preserved

RESULTS OF PRIMARY AUDIT

Family name	Presumed cause of error (see footnotes)
<u>VIAL</u>	
<u>BMWP taxa not found in vial</u>	
Planorbidae	12
Terrestrial snail in vial	
Baetidae *	1
Limnephilidae	7
<u>Additional BMWP taxa found in vial</u>	
Lepidostomatidae	7
Lepidostoma hirtum (Fabricius)	
<u>SAMPLE</u>	
<u>BMWP taxa not found in sample</u> (for samples where vial is broken or absent)	
N/a	
<u>Additional BMWP taxa found in sample</u>	
Baetidae *	1
Baetis rhodani (Pictet)	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a) 1 only	
Hydroptilidae	11
Hydroptila sp. (p)	
Psychomyiidae (incl. Ecnomidae)	11
Psychomyia pusilla (Fabricius) 1 only	

SUMMARY OF AUDIT

LOSSES: 2 GAINS: 4 OMISSIONS: 1

NET EFFECTS:
ON BMWP SCORE 19
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)

Figure 2. An example of an AQC Audit result sheet

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: Example	LABORATORY: Example	DATE: 01/04/97
WATER-COURSE: Beautiful River	PRIMARY ANALYST: XX	AQC ANALYST: YY
SITE: Utopia	CODE: 0001/AQC01	SORT/AQC METHOD: Preserved/Preserved

RESULTS OF AQC AUDIT

Family name	Presumed cause of error (see footnotes)
<u>VIAL</u>	
<u>BMWP taxa not found in vial</u>	
Baetidae *	1
Limnephilidae	7
<u>Additional BMWP taxa found in vial</u>	
Lepidostomatidae	7
Lepidostoma hirtum (Fabricius)	
<u>SAMPLE</u>	
<u>BMWP taxa not found in sample</u> (for samples where vial is broken or absent)	
N/a	
<u>Additional BMWP taxa found in sample</u>	
Baetidae *	1
Baetis rhodani (Pictet)	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a) 1 only	

SUMMARY OF AUDIT

LOSSES: 1 GAINS: 2 OMISSIONS: 1

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)

5. RESULTS

The results of the AQC Audit for 1997 for all Agency Regions are presented, Region by Region, in Tables 1 to 55. A summary of the basic audit results in terms of losses, gains and omissions is followed by 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 AQC inspector, for their Area Laboratories and for the Region as a whole. Then follows information on the net effects of the AQC Audit on the BMWP score and number of taxa for the Region's data. These results are 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. Following this are listings for the Region of the taxa missed at family and species levels in the 1997 audit. Tables 56 and 57 summarise the statistics and effects of the 1997 AQC Audit for the whole of the Agency. Tables 58 and 59 give listings of all taxa, at family and species levels respectively, missed in sorting by all of the Agency's AQC analysts and Tables 60 and 61 give similar listings for all samples audited in 1997 for the whole of the United Kingdom (Primary and AQC Audits for Agency Regions plus single Audit for other organisations). Data for the Primary Audit are presented in a separate report (Gunn *et al.*, 1998).

Estimating sample biases for the compare module of RIVPACS III+

The underestimation of the number of BMWP-scoring taxa is termed bias for the purpose of the compare module of RIVPACS III+. An estimate of bias is provided by the net gains (number of gains minus number of losses) for the Primary Audit. Values are listed in the Primary Audit report (Gunn *et al.*, 1998) and can be used directly for RIVPACS. When basing bias on results from internal AQC inspections, it is necessary to add the net gains owing to errors made in AQC inspection to the net gains reported by the AQC. Errors made in AQC inspection for each laboratory, Region and the Agency as a whole are listed in Table 57 in the column "mean net effect on no. of taxa". To estimate the bias over a different period to that covered by this audit, the value in Table 57 can still be used if the quality of AQC inspection is consistently good for the period under consideration (mean number of gains should be no more than 0.5, see Table 56). If the AQC inspection was of poor quality or varying quality, it is necessary to refer to the AQC Audit result sheets for individual samples. Note that estimates of bias should be based on the results of at least 20 audited samples. Further instructions are given in Clarke *et al.* (1997).

6. ACKNOWLEDGEMENTS

Grateful thanks to the Agency's project leader, John Murray-Bligh of Thames Region, who contributed to the development and implementation of improved methodology and who provided helpful advice throughout the period of the audit

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AUDIT OF ANGLIAN REGION'S AQC INSPECTORS

Table 1 The 20 AQC'd samples audited for Central Area of Anglian Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Ouse	Brackley	LJS	0	0	1
Sapiston	Bardwell Bridge	LJS	0	1	0
Cam	Littlebury Bridge	LJS	0	0	1
Gadder	Oxborough Bridge	LJS	1	0	2
Flit	Shefford North Bridge	LJS	2	2	0
Tove	Capenham Bridge	SEH	0	0	0
Clipstone Brook	Leighton Buzzard	SEH	0	0	2
Ivel	Broom Mill	SEH	0	1	0
Ouse	Harrold Bridge	SEH	0	5	0
Old Bedford	Welmor Sluice	SEH	1	0	1
Wendon Brook	B1383 Bridge	SJH	0	1	0
Granta	Hildersham Ford	SJH	0	1	2
Rhee	Haslingfield Road Bridge	SJH	1	2	0
Ely Ouse	Ely High Bridge	SJH	1	0	0
Nar	Castle Acre Bridge	SJH	1	1	1
Flood Relief Channel	Downham Bridge	WTC	0	0	0
Mill Basin	Mill Basin PS	WTC	0	2	1
Fancott Brook	Cranford Bridge	WTC	0	4	1
Tove	Bozenham Mill	WTC	0	4	0
Little Ouse	Brandon Road Bridge	WTC	1	1	0

Table 2 The 20 AQC'd samples audited for Eastern Area of Anglian Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Blyth	Rectory Street	CSA	0	0	0
Wensum	Great Ryburgh Bridge	CSA	0	0	0
Brett	Layham Mill	CSA	0	1	0
Brett	Scripscross Bridge	CSA	0	2	0
Rattlesden	Burford Bridge	CSA	0	2	0
Rattlesden	u/s Confluence ICI	CSA	0	0	0
Dove	Thorndon Bridge	JHS	0	0	0
Pant	Codham Mill Ford	JHS	0	1	0
Starston Beck	Redenhall	JHS	0	1	0
Wang	Wangford Bridge	JHS	0	2	0
Bure	Buxton Mill	JHS	0	0	0
Colne	Earls Colne Bridge	JHS	1	2	0
Chelmer	Paper Mills	JHS	0	0	0
Gipping	Sproughton Mill	JMG	0	0	0
Laverham Brook	Lower Road Ford	JMG	0	0	0
Chainbridge Tributary	Chainbridge Farm	JMG	0	1	0
Yare	Strumpshaw	JMG	0	1	0
Colne	Middle Mill	JMG	0	0	0
Holland Brook	Holland Main Road Bridge	JMG	0	0	0
Chilton Brook	Folly Road Bridge	JMG	0	0	0

Table 3 The 20 AQC'd samples audited for Northern Area of Anglian Region

River	Site	AQC Analyst	Losses	Gains	Omissions
East Halton Beck	College Bridge	CAE	0	0	0
Whaplode	Whaplode Marsh	DMB	0	0	0
West Glen	Little Bytham	DMB	0	1	0
Rase	Bishopbridge	IMC	0	0	0
Rase	Bully Hill	IMC	0	0	0
Chater	Ketton	IMC	0	0	0
Welland	Rockingham	IMC	1	1	1
Skellingthorpe Main Drain	u/s Skellingthorpe STW	RPC	0	1	0
Upper Witham	Easton Park	RPC	0	1	0
Slade Brook	Glendon Hall Wood	RPC	0	0	0
Caistor Canal	Westfield Farm	RPC	0	0	0
Willow Brook (South)	Lodge Farm	RPC	0	0	0
Willow Brook	Apethorpe	RPC	0	2	0
Wootton Brook	Milton Malsor Road Bridge	RPC	0	0	0
Woldgrift Drain	Washdyke Bridge	RPC	0	0	0
Ise	d/s Rushton STW	RPC	1	1	1
Nene	Duston Mill	RPC	0	2	0
Brant	Blackmoor Bridge	RPC	0	3	0
Ise	Rushton	RPC	0	1	0
Werrington Brook	Cuckoos Hollow Lake inlet	RPC	0	0	1

Table 4 Statistics of the 1997 AQC Audit 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	20	1.25	0.34	3	15.00	5	2.25	0.34
LJS	5	0.60	0.40	0	0	2	2.00	0.63
SEH	5	1.20	0.97	1	20.00	5	2.00	0.84
SJH	5	1.00	0.32	0	0	2	2.20	0.49
WTC	5	2.20	0.80	2	40.00	4	2.80	0.86
Eastern	20	0.65	0.18	0	0	2	0.70	0.21
CSA	6	0.83	0.40	0	0	2	0.83	0.40
JHS	7	0.86	0.34	0	0	2	1.00	0.44
JMG	7	0.29	0.18	0	0	1	0.29	0.18
Northern	20	0.65	0.20	1	5.00	3	0.90	0.25
CAE	1	0	n/a	0	0	0	0	n/a
DMB	2	0.50	0.50	0	0	1	0.50	0.50
IMC	4	0.25	0.25	0	0	1	0.75	0.75
RPC	13	0.85	0.27	1	7.69	3	1.08	0.31
Anglian Region	60	0.85	0.15	4	6.67	5	1.28	0.18

Table 5 Net effects of the AQC Audit on BMWP score and number of scoring taxa for Anglian Region

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	20	4.50	15.00	25	0.85	15.00	5
LJS	5	-1.00	0	6	0	0	1
SEH	5	4.60	20.00	23	1.00	20.00	5
SJH	5	2.80	0	8	0.40	0	1
WTC	5	11.60	40.00	25	2.00	40.00	4
Eastern	20	3.85	5.00	14	0.60	0	2
CSA	6	5.83	16.67	14	0.83	0	2
JHS	7	4.00	0	11	0.71	0	2
JMG	7	2.00	0	8	0.29	0	1
Northern	20	3.00	5.00	19	0.55	5.00	3
CAE	1	0	0	0	0	0	0
DMB	2	5.00	0	10	0.50	0	1
IMC	4	-0.75	0	0	0.00	0	0
RPC	13	4.08	7.69	19	0.77	7.69	3
Anglian Region	60	3.78	8.33	25	0.67	6.67	5

Table 6 The families missed by Anglian Region's AQC inspectors

Family		% of Anglian Region's missed families in AQC Audit
Hydroptilidae	9	20.93
Coenagriidae	4	9.30
Psychomyiidae (incl. Ecnomidae)	3	6.98
Limnephilidae	3	6.98
Caenidae	2	4.65
Planariidae (incl. Dugesiidae)	2	4.65
Hydrobiidae (incl. Bithyniidae)	2	4.65
Rhyacophilidae (incl. Glossosomatidae)	1	2.33
Ancylidae (incl. Acroloxidae)	1	2.33
Valvatidae	1	2.33
Sialidae	1	2.33
Physidae	1	2.33
Notonectidae	1	2.33
Lymnaeidae	1	2.33
Baetidae	1	2.33
Leptophlebiidae	1	2.33
Hydrophilidae (incl. Hydraenidae)	1	2.33
Hydrometridae	1	2.33
Elmidae	1	2.33
Dendrocoelidae	1	2.33
Corixidae	1	2.33
Calopterygidae	1	2.33
Simuliidae	1	2.33
Libellulidae	1	2.33
Asellidae	1	2.33
Total	43	100

Table 7 The species missed by Anglian Region's AQC inspectors

Species	n	% of Anglian Region's missed species in AQC Audit
Hydroptila sp.	8	17.78
Coenagriidae indet	3	6.67
Limnephilidae indet	3	6.67
Tinodes waeneri (L.)	2	4.44
Lymnaea peregra (Muller)	1	2.22
Lype sp.	1	2.22
Notonecta sp.	1	2.22
Oulimnius sp.	1	2.22
Paraleptophlebia sp.	1	2.22
Potamopyrgus jenkinsi (Smith)	1	2.22
Physa fontinalis (L.)	1	2.22
Polycelis nigra group	1	2.22
Sialis lutaria (L.)	1	2.22
Simulium (Simulium) ornatum group	1	2.22
Valvata piscinalis (Muller)	1	2.22
Agapetus sp.	1	2.22
Oxyethira sp.	1	2.22
Asellus aquaticus (L.)	1	2.22
Sigara (Sigara) sp.	1	2.22
Libellulidae indet	1	2.22
Agraylea multipunctata Curtis	1	2.22
Ancyclus fluviatilis Muller	1	2.22
Baetis rhodani (Pictet)	1	2.22
Bithynia tentaculata (L.)	1	2.22
Caenis horaria (L.)	1	2.22
Ischnura elegans (Van der Linden)	1	2.22
Ithytrichia sp.	1	2.22
Caenis luctuosa group	1	2.22
Hydrometra stagnorum (L.)	1	2.22
Hydraena riparia Kugelann	1	2.22
Dugesia polychroa group	1	2.22
Dendrocoelum lacteum (Muller)	1	2.22
Calopteryx splendens (Harris)	1	2.22
Total	45	100

AUDIT OF MIDLANDS REGION'S AQC INSPECTORS

Table 8 The 20 AQC'd samples audited for Upper Severn Area of Midlands Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Staffs/Worcs Canal	Kidderminster	ADG	1	1	0
Afon Biga	d/s Lime	ADG	0	1	0
Gallows Brook	u/s Hagley	ADG	0	0	0
Blakedown Brook	Churchill	ADG	0	0	0
Ledwyche Brook	Henley	ADG	0	0	0
Vyrnwy	Llanymynech	ADG	0	1	0
Minsterley Brook	Hogstow	ADG	0	0	0
Laughen Brook	A4013	ADG	0	1	0
Clun	u/s Teme	ADG	0	0	0
Cain	Llanfyllin	ADG	0	0	0
Stour	Caunsall	ADG	0	0	0
Luttley Gutter West	Wassel Grove	ADG	0	0	0
Hoo Brook	u/s Offmore	ADG	0	0	0
Worfe	Confluence	ADG	0	0	0
Vyrnwy	Melverley	ADG	0	0	1
Cerist	Fan Bridge	ADG	0	0	0
Severn	Dolwen	ADG	0	0	0
Stratford Brook	d/s Pattingham	ADG	0	0	0
Tanat	Pedair Ford	ADG	0	2	0
Vyrnwy	Llanymynech	ADG	2	0	0

Table 9 The 20 AQC'd samples audited for Lower Severn Area of Midlands Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Nailsworth Stream	d/s Avening WRW	HJW	0	0	0
Pool Brook	Upton on Severn	HJW	0	4	0
Yelvertoft Brook	Lilbourne	HJW	0	0	0
Itchen	Marton	HJW	0	0	0
Shorn Brook	Hardwicke	HJW	0	0	0
Cannop - The Cut	u/s Cromptons	HJW	1	1	0
Leaddon	Wedderburn Bridge	HJW	0	2	0
Alne	Millhouse	HJW	0	1	0
Avon	Stare Bridge	HJW	0	1	0
Leaddon	Newton Bridge	HJW	0	1	0
Longhope Brook	u/s Court Farm	HJW	0	0	0
Leaddon	Uplands Bridge	HJW	0	0	1
Cowhoneybourne Brook	Clayfields Barn	HJW	0	2	0
Avon	Warwick	HJW	0	1	0
Swilgate	Tewkesbury	HJW	0	0	1
Piddle Brook	Wyre Mill	HJW	0	0	0
Cinderford Brook	d/s Englehardts	HJW	0	0	0
Carisbrook	d/s Rank Xerox	HJW	0	1	0
Daniels Brook	Brookthorpe	HJW	0	0	0
Cannop Brook	New Mills	PCG	1	0	0

Table 10 The 20 AQC'd samples audited for Upper Trent Area of Midlands Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Trent	Hanford	GF	0	0	0
Footherley Brook	Footherley Hall	GF	0	1	0
Brereton Brook	Ash Lagoon Channel	GF	0	1	0
Darklands Brook	Drakelow	GF	0	1	0
Bil Brook	Pendeford	GF	0	0	0
Churnet	Churnet Mouth	GF	0	1	1
Sibson Brook	Sibson	GF	0	2	0
Dove	Mayfield	GF	0	1	0
Doxey Brook	Doxey	GF	0	0	0
Mease	Measham	GF	1	1	0
Spitalhill Brook	Ashbourne	GF	0	0	0
Blithe	Cookshill	GF	0	0	0
Henmore Brook	Atlow	GF	0	2	0
Dove	Sudbury	GF	1	2	0
Trent & Mersey Canal	Copp Lane	GF	0	1	0
Sow	u/s Cop Mere	GF	0	0	0
Tame	Chetwynd	GF	0	2	0
Manifold	Hulme End	GF	0	0	0
Blake Brook	Bridgend	GF	0	1	0
Mease	Croxall	GF	1	2	0

Table 11 The 20 AQC'd samples audited for Lower Trent Area of Midlands Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Bradford Brook	Alport	PS	0	3	0
Bullwell Hall Stream	Lake inlet	PS	0	1	0
Derwent	Darley Dale Bridge	PS	0	4	0
Chesterfield Canal	Retford	PS	0	2	1
Sookholme Brook	d/s Coal Tip Tributary	PS	0	3	0
Countesthorpe Brook	Sence confluence	PS	0	0	1
Braunstone Tributary	u/s Lubbesthorpe Brook	PS	0	0	0
Eau	Scotton	PS	0	1	0
Bradwell Brook	Brough	PS	0	1	0
Poulter	Cuckney	PS	0	0	0
Trent	d/s FGD Plant	PS	0	0	0
Tideswell Brook	Tideswell Dale	PS	0	1	0
Bottle Brook	Lumb Farm	PS	0	0	0
Cuttle Brook	Sinfin Golf Course	PS	0	0	0
Erewash	Stanton Gate	PS	0	0	0
Nethergreen Brook	Eastwood	PS	0	0	0
Rothley Brook	Ratby	PS	0	0	0
Bottesford Beck	Brigg Road	PS	0	0	0
Stainforth & Keadby Canal	Keadby	PS	0	1	0
Shire Brook	Sookholme Brook confluence	PS	0	0	0

Table 12 Statistics of the 1997 AQC Audit for Midlands 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
Upper Severn	20	0.30	0.13	0	0	2	0.50	0.17
ADG	20	0.30	0.13	0	0	2	0.50	0.17
Lower Severn	20	0.70	0.23	1	5.00	4	0.90	0.23
HJW	19	0.74	0.24	1	5.26	4	0.89	0.24
PCG	1	0.00	n/a	0	0	0	1.00	n/a
Upper Trent	20	0.90	0.18	0	0	2	1.10	0.23
GF	20	0.90	0.18	0	0	2	1.10	0.23
Lower Trent	20	0.85	0.27	3	15.00	4	0.95	0.29
PS	20	0.85	0.27	3	15.00	4	0.95	0.29
Midlands Region	80	0.69	0.11	4	5.00	4	0.86	0.12

Table 13 Net effects of the AQC Audit on BMWP score and number of scoring taxa for Midlands Region

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
Upper Severn	20	0.80	0	13	0.15	0	2
ADG	20	0.80	0	13	0.15	0	2
Lower Severn	20	3.45	10.00	18	0.60	5.00	4
HJW	19	3.79	10.53	18	0.68	5.26	4
PCG	1	-3.00	0	-3	-1.00	0	-1
Upper Trent	20	3.70	5.00	17	0.75	0	2
GF	20	3.70	5.00	17	0.75	0	2
Lower Trent	20	4.90	10.00	25	0.85	15.00	4
PS	20	4.90	10.00	25	0.85	15.00	4
Midlands Region	80	3.21	6.25	25	0.59	5.00	4

Table 14 The families missed by Midland Region's AQC inspectors

Family		% of Midlands Region's missed families in AQC Audit
Leptoceridae	4	8.89
Haliplidae	3	6.67
Lymnaeidae	3	6.67
Hydroptilidae	3	6.67
Planariidae (incl. Dugesiidae)	2	4.44
Planorbidae	2	4.44
Caenidae	2	4.44
Gerridae	2	4.44
Elmidae	2	4.44
Tipulidae	2	4.44
Valvatidae	2	4.44
Ancylidae (incl. Acroloxidae)	2	4.44
Rhyacophilidae (incl. Glossosomatidae)	1	2.22
Simuliidae	1	2.22
Piscicolidae	1	2.22
Periodidae	1	2.22
Nemouridae	1	2.22
Sphaeriidae	1	2.22
Chironomidae	1	2.22
Limnephilidae	1	2.22
Baetidae	1	2.22
Coenagriidae	1	2.22
Corixidae	1	2.22
Dytiscidae (incl. Noteridae)	1	2.22
Erpobdellidae	1	2.22
Hydrobiidae (incl. Bithyniidae)	1	2.22
Asellidae	1	2.22
Lepidostomatidae	1	2.22
Total	45	100

Table 15 The species missed by Midlands Region's AQC inspectors

Species	n	% of Midlands Region's missed species in AQC Audit
Ithytrichia sp.	3	6.67
Lymnaea truncatula (Muller)	2	4.44
Acroloxus lacustris (L.)	2	4.44
Athripsodes bilineatus (L.)	2	4.44
Caenis rivulorum Eaton	2	4.44
Gerris (Gerris) lacustris (L.)	2	4.44
Valvata piscinalis (Muller)	1	2.22
Oulimnius tuberculatus (Muller)	1	2.22
Nemoura avicularis Morton	1	2.22
Oreodytes sanmarkii (Sahlberg)	1	2.22
Oulimnius sp.	1	2.22
Mystacides nigra/longicornis	1	2.22
Piscicola geometra (L.)	1	2.22
Pisidium sp.	1	2.22
Polycelis felina (Dalyell)	1	2.22
Potamopyrgus jenkinsi (Smith)	1	2.22
Sigara sp.	1	2.22
Simulium (Simulium) ornatum group	1	2.22
Valvata cristata Muller	1	2.22
Lepidostoma hirtum (Fabricius)	1	2.22
Tanypodinae	1	2.22
Coenagriidae indet	1	2.22
Lymnaea peregra (Muller)	1	2.22
Agapetus sp.	1	2.22
Armiger crista (L.)	1	2.22
Asellus aquaticus (L.)	1	2.22
Brychius elevatus (Panzer)	1	2.22
Dicranota sp.	1	2.22
Dugesia polychroa group	1	2.22
Ecclisopteryx guttulata (Pictet)	1	2.22
Erpobdellidae indet	1	2.22
Gyraulus albus (Muller)	1	2.22
Halipus sp.	1	2.22
Halipus wehnckeii (Gerhardt)	1	2.22
Helius sp.	1	2.22
Isoperla grammatica (Poda)	1	2.22
Adicella reducta (Mclachlan)	1	2.22
Baetis vernus Curtis	1	2.22
Total	45	100

AUDIT OF NORTH EAST REGION'S AQC INSPECTORS

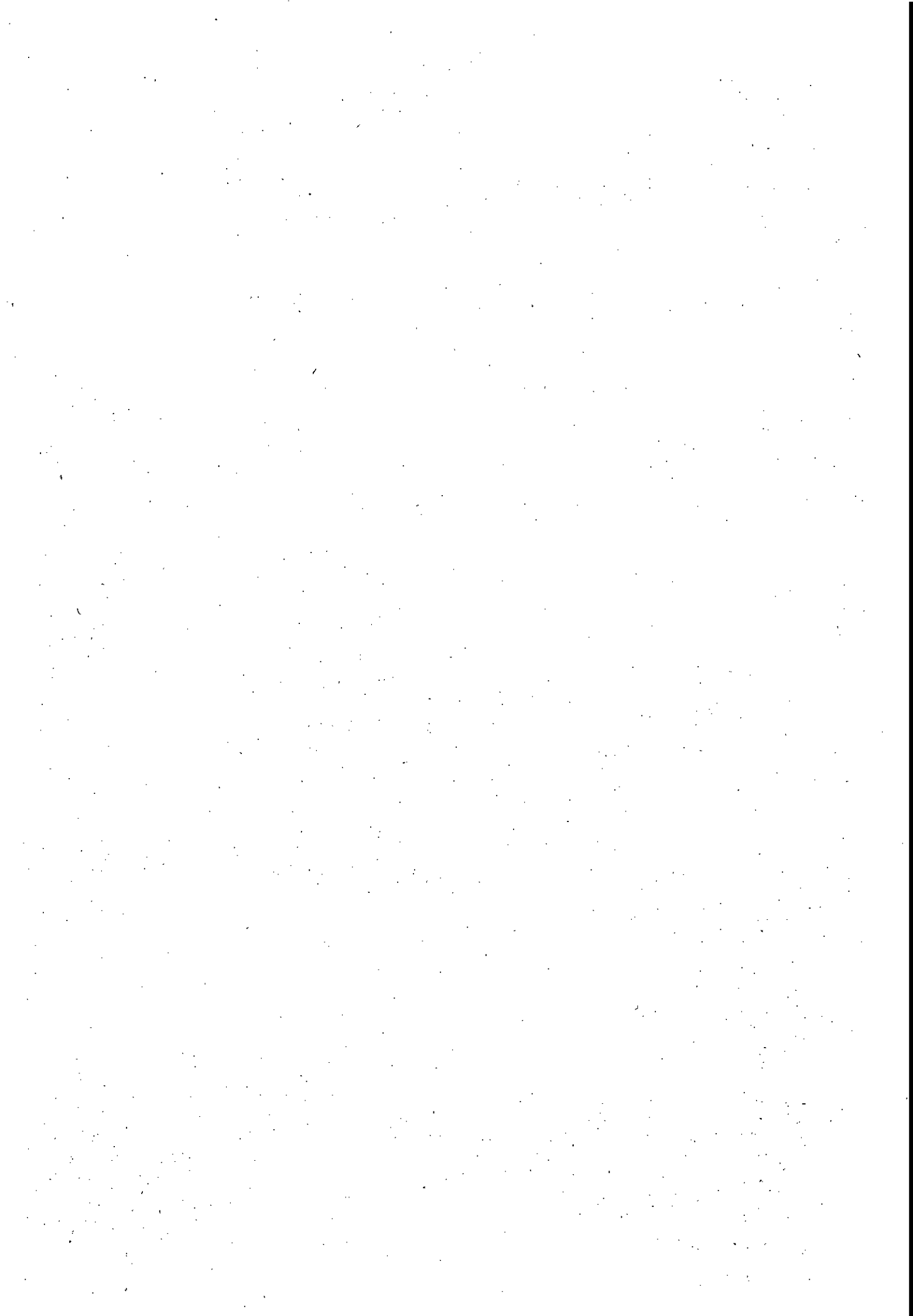


Table 16 The 20 AQC'd samples audited for Dales Area of North East Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Esk	d/s Murk Esk	EA	0	0	0
May Beck	Sneaton High Moor	EA	0	1	0
Ure	Aysgarth	EA	0	0	0
Tutt	Boroughbridge	EA	0	0	0
Ruthmoor Beck	Middle Rigg,	EA	0	0	0
Ouse	Acaster Malbis	EA	0	4	0
Wharfe	Kettlewell	EA	0	0	0
Ure	Wensley	EA	1	2	0
Wharfe	d/s Burley Weir	EA	0	0	0
Wharfe	Burnsall	EA	0	0	0
Skirfare	Hawkswick	EA	0	0	0
Washburn	Leathley Bridge	EA	0	0	0
Great Fryup Beck	Street	EA	0	1	0
Derwent	Forge Valley	EA	0	0	0
Rye	Nunnington	EA	0	1	0
Mickleby Beck	Sandsend	EA	0	0	0
Ure	West Tanfield	EA	0	0	0
Ure	Aldwark Toll Bridge	EA	0	3	0
Wharfe	Hubberholme	EA	0	2	0
Wharfe	Addingham	EA	0	0	0

Table 17 The 20 AQC'd samples audited for Northumbria Area of North East Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Wear	u/s Gaunless	EC	0	1	0
Rookhope Burn	Rookhope	EC	0	0	0
Wear	u/s Vinovium STW	EC	0	1	0
Gore Burn	u/s Confluence	EC	0	0	0
Lewis Burn	u/s Picnic d/s FB	EC	0	1	0
Twizell Burn	B6313 Bridge	EC	0	0	0
Gaunless	Bishops Palace	EC	0	1	0
Wear	Shincliffe	EC	0	3	0
Wear	u/s Vinovium STW	EC	0	1	0
Rookhope Burn	Rookhope	FC	0	0	0
Gaunless	Fylands d/s CSO	FC	0	0	0
Team	u/s Rowletch Burn	FC	0	0	0
South Tyne	Warden	FC	0	2	0
North Tyne	u/s Kielder	FC	0	0	0
Wansbeck	Morpeth	FC	0	0	0
Alwin	Alwinton	FC	1	0	0
Derwent	Ebchester	FC	0	1	0
Font	d/s Font Burn	FC	0	5	1
Hazon Burn	Whittle Colliery	VW	1	2	0
Gaunless	Butterknowle	VW	0	1	0

Table 18 The 20 AQC'd samples audited for Ridings Area of North East Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Worth	d/s North Beck	JB	0	0	0
Dearne	d/s Hinchcliffes Mill	JB	0	0	0
Holme	d/s New Mill Dyke	JB	0	0	0
Aire	Saltaire	JB	0	2	1
Moss	Pipworth Lane	JB	0	2	0
Handley Brook	u/s R.Rother	JB	1	1	0
Hebble Brook	d/s Ogden Reservoir (S3)	JB	0	2	0
Colne	Colne Bridge	JB	0	2	0
Old Howe	Frodingham Bridge	JMG	1	1	0
Sheaf	Queens Road	RJJ	0	0	0
Midgram Beck	Spring Farm Lane	RJJ	1	0	0
Doe Lea	Doe Lea Bridge	VH	0	2	0
Smithy Brook	d/s Old Minewater adit	VH	0	0	0
Rother	Canklow	VH	0	0	0
Dearne	Adj. to Wetland scheme	VH	0	0	0
Aire	E.Riddlesden Hall	VH	0	2	0
Toftshaw Beck	d/s CSO 314	VH	0	0	0
Brook Dike	d/s Station Road	VH	0	1	0
Red Beck	d/s Brookfoot Dyeworks	VH	0	2	0
Calder	Sowerby Bridge	VH	1	1	0

Table 19 Statistics of the 1997 AQC Audit for North East 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
Dales	20	0.70	0.26	2	10.00	4	0.75	0.28
EA	20	0.70	0.26	2	10.00	4	0.75	0.28
Northumbria	20	0.95	0.29	2	10.00	5	1.10	0.33
EC	9	0.89	0.31	1	11.11	3	0.89	0.31
FC	9	0.89	0.56	1	11.11	5	1.11	0.65
VW	2	1.50	0.50	0	0	2	2.00	1.00
Ridings	20	0.90	0.20	0	0	2	1.15	0.23
JB	8	1.13	0.35	0	0	2	1.38	0.42
JMG	1	1.00	n/a	0	0	1	2.00	n/a
RJJ	2	0	0	0	0	0	0.50	0.50
VH	9	0.89	0.31	0	0	2	1.00	0.33
North East Region	60	0.85	0.14	4	6.67	5	1.00	0.16

Table 20 Net effects of the AQC Audit on BMWP score and number of scoring taxa for North East Region

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
Dales	20	4.55	10.00	22	0.65	10.00	4
EA	20	4.55	10.00	22	0.65	10.00	4
Northumbria	20	5.30	10.00	31	0.85	10.00	5
EC	9	5.89	11.11	20	0.89	11.11	3
FC	9	4.56	11.11	31	0.78	11.11	5
VW	2	6.00	0	7	1.00	0	1
Ridings	20	3.60	5.00	14	0.70	0	2
JB	8	4.75	0	10	1.00	0	2
JMG	1	0.00	0	0	0.00	0	0
RJJ	2	-1.50	0	0	-0.50	0	0
VH	9	4.11	11.11	14	0.78	0	2
N.East Region	60	4.48	8.33	31	0.73	6.67	5

Table 21 The families missed by North East Region's AQC inspectors

Family		% of North East Region's missed families in AQC Audit
Hydrophilidae (incl. Hydraenidae)	4	8.70
Leptoceridae	4	8.70
Hydrobiidae (incl. Bithyniidae)	3	6.52
Planariidae (incl. Dugesiidae)	3	6.52
Hydroptilidae	3	6.52
Simuliidae	3	6.52
Caenidae	3	6.52
Elmidae	3	6.52
Asellidae	2	4.35
Lepidostomatidae	2	4.35
Planorbidae	2	4.35
Nemouridae	2	4.35
Baetidae	2	4.35
Lymnaeidae	1	2.17
Piscicolidae	1	2.17
Beraeidae	1	2.17
Dytiscidae (incl. Noteridae)	1	2.17
Scirtidae	1	2.17
Sericostomatidae	1	2.17
Ancylidae (incl. Acroloxidae)	1	2.17
Sphaeriidae	1	2.17
Tipulidae	1	2.17
Rhyacophilidae (incl. Glossosomatidae)	1	2.17
Total	46	100

Table 22 The species missed by North East Region's AQC inspectors

Species	n	% of North East Region's missed species in AQC Audit
Potamopyrgus jenkinsi (Smith)	3	6.12
Caenis rivulorum Eaton	3	6.12
Hydroptila sp.	3	6.12
Lepidostoma hirtum (Fabricius)	2	4.08
Hydraena gracilis Germar	2	4.08
Elmis aenea (Muller)	2	4.08
Mystacides azurea (L.)	2	4.08
Asellus aquaticus (L.)	2	4.08
Piscicola geometra (L.)	1	2.04
Oxyethira sp.	1	2.04
Pisidium sp.	1	2.04
Oulimnius sp.	1	2.04
Oreodytes sanmarkii (Sahlberg)	1	2.04
Polycelis felina (Dalyell)	1	2.04
Oecetis lacustris (Pictet)	1	2.04
Ochthebius bicolon Germar	1	2.04
Nemurella picteti Klapalek	1	2.04
Ceraclea dissimilis (Stephens)	1	2.04
Protonemura praecox (Morton)	1	2.04
Polycelis nigra group	1	2.04
Lymnaea peregra (Muller)	1	2.04
Helophorus (Atracthelophorus) brevipalpis Bedel	1	2.04
Glossosoma sp.	1	2.04
Elodes sp.	1	2.04
Dugesia polychroa group	1	2.04
Simulium (Simulium) ornatum group	1	2.04
Beraea maurus (Curtis)	1	2.04
Bathymphalus contortus (L.)	1	2.04
Baetis vernus Curtis	1	2.04
Baetis scambus group	1	2.04
Athripsodes aterrimus (Stephens)	1	2.04
Anisus vortex (L.)	1	2.04
Ancylus fluviatilis Muller	1	2.04
Simulium (Nevermannia) cryophilum group	1	2.04
Dugesia tigrina (Girard)	1	2.04
Simulium (Wilhelmia) sp.	1	2.04
Tipula sp.	1	2.04
Sericostoma personatum (Spence)	1	2.04
Total	49	100

AUDIT OF NORTH WEST REGION'S AQC INSPECTORS

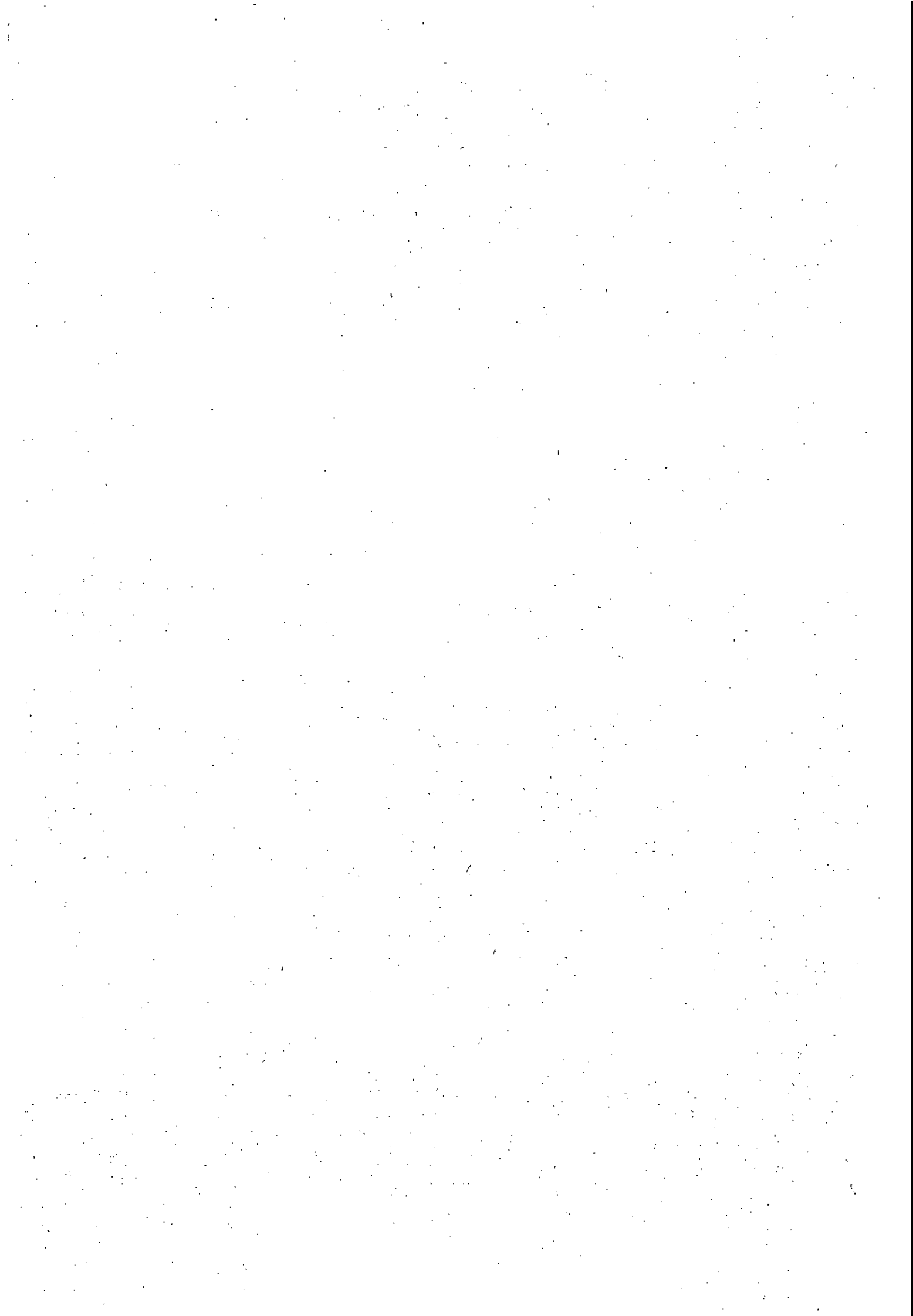


Table 23 The 20 AQC'd samples audited for Central Area of North West Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Yarrow	Tanyard Brook	AM	0	0	0
Bashall Brook	u/s Waddington STW	AM	0	1	0
Calder	Barden Clough	AM	0	0	0
Hyndburn Brook	Tinker Brook	AM	0	1	0
Darwen	u/s Hardman Way	AM	0	0	0
Alt	u/s Fazakerley ETW	AM	0	0	0
Lune	R.Roeburn	EIG	1	1	0
Ribble	u/s R.Calder	EIG	3	1	0
Calder	Inghams Farm	EIG	1	2	0
Crossens	The Sluice PS	EIG	1	1	0
Ribble	Mearly Brook	HFH	1	0	0
Alt	Bull Bridge	HFH	0	0	0
Lune	Deep Gill	HFH	1	2	0
Wyre	Hillylaid Pool	HFH	0	0	0
Ribble	Site 249	HFH	0	0	0
Lune	Killington	HFH	0	1	0
Calder	R.Brun	HFH	0	1	0
Crossens	Fine Jane Brook	HFH	0	0	0
Douglas	Smithy Brook	HFH	0	0	0
Alt	Alt Bridge	HFH	0	0	0

Table 24 The 20 AQC'd samples audited for Northern Area of North West Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Worm Gill	ptc R. Calder	AJ	0	1	0
Irt	Forest Bridge	AJ	0	1	0
Ellen	Uldale	AJ	1	0	0
Annas	A595 Bridge	AJ	0	1	0
Kinmont Beck	Near Bootle	AJ	1	1	0
Derwent	u/s Ouse Bridge	AJ	0	0	0
Deep Meadows Beck	u/s Tidal Doors	AJ	0	0	0
Ehen	Braystones	AJ	0	1	0
Whit Beck	NY 156 249	AJ	0	1	0
Gill Gooden	NY 157 412	AJ	1	0	0
Glenridding	Glenridding Bridge	AJ	0	1	0
Murton Beck	d/s Murton West STW	AJ	1	0	0
Cald Beck	d/s Caldbeck Church	AJ	0	3	0
Sour Milk Gill	ptc Far Easedale Beck	NTC	0	1	0
Wiza Beck	Dockray	NTC	0	0	0
Summerground Gill	NY 442 309	NTC	0	1	0
Annas	Bootle	NTC	0	0	0
Eea	d/s Cartmel STW	NTC	0	1	0
Eden	d/s Grinsdale Church	NTC	0	0	0
Kirk Beck	ptc R. Ehen	NTC	0	1	0

Table 25 The 10 AQC'd samples audited for Southern Area of North West Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Bollin	Warburton Mill	AG	0	0	1
Scoineshore Brook	u/s Industrial Estate	AG	0	0	0
Hornsmill Brook	u/s A56	AT	0	2	0
Gowy	Bunbury	DGH	1	2	0
Milton Brook	Milton Brook Bridge	DGH	0	1	0
Tame	ptc Goyt	DGH	0	0	0
Dean	u/s Rainow ETW	DGH	0	1	0
Barrow Brook	Little Barrow	DGH	1	1	0
Etherow	Compstall Bridge	DGH	0	1	0
Roch	ptc Irwell	DGH	0	3	1

Table 26 Statistics of the 1997 AQC Audit for North West 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	20	0.55	0.15	0	0	2	0.95	0.28
AM	6	0.33	0.21	0	0	1	0.33	0.21
EIG	4	1.25	0.25	0	0	2	2.75	0.48
HFH	10	0.40	0.22	0	0	2	0.60	0.31
Northern	20	0.70	0.16	1	5.00	3	0.90	0.16
AJ	13	0.77	0.23	1	7.69	3	1.08	0.21
NTC	7	0.57	0.20	0	0	1	0.57	0.20
Southern	10	1.10	0.31	1	10.00	3	1.50	0.40
AG	2	0	0	0	0	0	0.50	0.50
AT	1	2.00	n/a	0	0	2	2.00	n/a
DGH	7	1.29	0.36	1	14.29	3	1.71	0.52
North West Region	50	0.72	0.11	2	4.00	3	1.04	0.15

Table 27 Net effects of the AQC Audit on BMWP score and number of scoring taxa for North West Region

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	20	0.15	0	10	0.15	0	1
AM	6	2.83	0	10	0.33	0	1
EIG	4	-6.50	0	5	-0.25	0	1
HFH	10	1.20	0	7	0.20	0	1
Northern	20	3.25	5.00	20	0.50	5.00	3
AJ	13	3.46	7.69	20	0.46	7.69	3
NTC	7	2.86	0	7	0.57	0	1
Southern	10	4.20	10.00	16	0.90	10.00	3
AG	2	0	0	0	0	0	0
AT	1	6.00	0	6	2.00	0	2
DGH	7	5.14	14.29	16	1.00	14.29	3
N.West Region	50	2.20	4.00	20	0.44	4.00	3

Table 28 The families missed by North West Region's AQC inspectors

Family		% of North West Region's missed families in AQC Audit
Elmidae	5	20.00
Planorbidae	3	12.00
Ancyliidae (incl. Acroloxidae)	2	8.00
Nemouridae	2	8.00
Planariidae (incl. Dugesiidae)	1	4.00
Asellidae	1	4.00
Rhyacophilidae (incl. Glossosomatidae)	1	4.00
Odontoceridae	1	4.00
Leuctridae	1	4.00
Hydropsychidae	1	4.00
Hydrophilidae (incl. Hydraenidae)	1	4.00
Heptageniidae	1	4.00
Goeridae	1	4.00
Glossiphoniidae	1	4.00
Gammaridae (incl. Crangonyctidae)	1	4.00
Ephemerellidae	1	4.00
Sphaeriidae	1	4.00
Total	25	100

Table 29 The species missed by North West Region's AQC inspectors

Species	n	% of North West Region's missed species in AQC Audit
<i>Limnius volckmari</i> (Panzer)	3	11.54
<i>Elmis aenea</i> (Muller)	2	7.69
<i>Gyraulus albus</i> (Muller)	2	7.69
<i>Silo</i> sp.	1	3.85
<i>Rhyacophila dorsalis</i> (Curtis)	1	3.85
<i>Rhithrogena</i> sp.	1	3.85
<i>Polycelis felina</i> (Dalyell)	1	3.85
<i>Pisidium</i> sp.	1	3.85
<i>Odontocerum albicorne</i> (Scopoli)	1	3.85
<i>Leuctra hippopus</i> (Kempny)	1	3.85
<i>Hydropsyche sitalai</i> Dohler	1	3.85
<i>Ancylus fluviatilis</i> Muller	1	3.85
<i>Nemurella picteti</i> Klapalek	1	3.85
Ancylidae indet	1	3.85
<i>Hydraena gracilis</i> Germar	1	3.85
<i>Anisus vortex</i> (L.)	1	3.85
<i>Asellus aquaticus</i> (L.)	1	3.85
<i>Ephemerella ignita</i> (Poda)	1	3.85
<i>Esolus parallelepipedus</i> (Muller)	1	3.85
<i>Gammarus</i> sp.	1	3.85
<i>Glossiphonia complanata</i> (L.)	1	3.85
<i>Amphinemura sulcicollis</i> (Stephens)	1	3.85
Total	26	100

AUDIT OF SOUTHERN REGION'S AQC INSPECTORS

Table 30 The 26 AQC'd samples audited for the Kent Area of Southern Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Eden Vale Stream	d/s Lake	E1	0	2	0
Line Tributary	u/s Netherfield	E1	0	2	0
Great Stour	Vauxhall	E1	0	0	0
Ouse	d/s Abstraction	E1	0	2	0
Darent	d/s Augmentation	E1	0	1	0
North End Stream	North End	E1	0	1	0
Darent	Bridge Cottage	E1	0	1	0
Cuckmere	Arlington Intake	E1	0	0	0
Ouse	u/s Weir	E1	0	0	0
Darent	Shoreham Village	E1	0	0	0
Great Stour	Vauxhall Bridge	E1	0	0	0
Medway	d/s Hampsted Canal	E1	0	1	0
Bough Beech Stream	d/s Reservoir	E1	0	0	0
Great Stour	Bucksford	E1	1	0	0
Hexden Channel	Maytham Wharfe	E1	0	0	0
Darent	Farningham	E1	0	1	0
Eridge Stream	Ham Bridge	E1	0	1	0
Dour	Kearsney	E1	0	1	0
West Hoathly Stream	Blackland Wood	E1	0	1	0
Brede	u/s Rye Harbour	E1	0	0	0
Great Stour	Shalmsford Street	E1	0	1	0
Great Stour	d/s Lenham	E4	0	0	0
Len Tributary	d/s Leeds STW	E4	0	0	0
Eridge Stream	d/s Redgate Mill STW	E4	0	1	1
North Stream	Old Dawns Farm	E4	0	2	0
Wingham	Wingham	E4	1	1	0

Table 31 The 14 AQC'd samples audited for the Hampshire & Sussex Areas of Southern Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Test	Wherwell	W9	0	0	0
Kird	Kirdford Bridge	W9	0	3	1
Arreton Stream	u/s Hasely Coombe	W9	0	0	0
Shawfords Lake	A5051 Bridge	W9	0	1	0
Arun	Amiesmill Farm	W9	0	1	1
Whiteparish Stream	Chadwell Farm	W15	0	0	0
Black Ditch	Lyminster	W15	0	0	0
Cadland Stream	Calor Site	W15	1	0	0
Adur East	Hookers Farm	W15	0	0	0
Boldings Brook	Gunbarn Bridge	W19	0	0	0
Aldingbourne Rife	Lidsey Tip	W19	0	0	0
Brightstone Stream	Brightstone Mill	W19	0	0	0
Warblington Stream No.1	Brook Farm	W19	0	0	0
Warblington Stream No.3	Church Path	W19	0	0	0

Table 32 Statistics of the 1997 AQC Audit for Southern 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
Kent	26	0.73	0.14	0	0	2	0.85	0.15
E1	21	0.71	0.16	0	0	2	0.76	0.15
E4	5	0.80	0.37	0	0	2	1.20	0.49
Hants & Sussex	14	0.36	0.23	1	7.14	3	0.57	0.31
W15	4	0	0	0	0	0	0.25	0.25
W19	5	0	0	0	0	0	0	0
W9	5	1.00	0.55	1	20.00	3	1.40	0.75
Southern Region	40	0.60	0.12	1	2.50	3	0.75	0.15

Table 33 Net effects of the AQC Audit on BMWP score and number of scoring taxa for Southern Region

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
Kent	26	3.58	3.85	16	0.65	0	2
E1	21	3.52	0	10	0.67	0	2
E4	5	3.80	20.00	16	0.60	0	2
Hants & Sussex	14	2.14	7.14	23	0.29	7.14	3
W9	5	7.00	20.00	23	1.00	20.00	3
W15	4	-1.25	0	0	-0.25	0	0
W19	5	0	0	0	0	0	0
Southern Region	40	3.08	5.00	23	0.53	2.50	3

Table 34 The families missed by Southern Region's AQC inspectors

Family		% of Southern Region's missed families in AQC Audit
Hydrophilidae (incl. Hydraenidae)	4	21.05
Planariidae (incl. Dugesiidae)	2	10.53
Elmidae	2	10.53
Ephemerellidae	2	10.53
Goeridae	2	10.53
Caenidae	1	5.26
Planorbidae	1	5.26
Lymnaeidae	1	5.26
Dryopidae	1	5.26
Dendrocoelidae	1	5.26
Valvatidae	1	5.26
Hydroptilidae	1	5.26
Total	19	100

Table 35 The species missed by Southern Region's AQC inspectors

Species	n	% of Southern Region's missed species in AQC Audit
Ephemerella ignita (Poda)	2	10.00
Valvata piscinalis (Muller)	1	5.00
Hydraena riparia Kugelann	1	5.00
Lymnaea peregra (Muller)	1	5.00
Limnius volckmari (Panzer)	1	5.00
Polycelis nigra group	1	5.00
Valvata cristata Muller	1	5.00
Hydraena gracilis Germar	1	5.00
Silo nigricornis (Pictet)	1	5.00
Helophorus (Atracthelophorus) brevipalpis Bedel	1	5.00
Goera pilosa (Fabricius)	1	5.00
Polycelis felina (Dalyell)	1	5.00
Elmis aenea (Muller)	1	5.00
Dryops sp.	1	5.00
Dendrocoelum lacteum (Muller)	1	5.00
Caenis luctuosa group	1	5.00
Anisus sp.	1	5.00
Agraylea multipunctata Curtis	1	5.00
Helophorus (Helophorus) obscurus Mulsant	1	5.00
Total	20	100

AUDIT OF SOUTH WEST REGION'S AQC INSPECTORS



Table 36 The 20 AQC'd samples audited for Devon Area of South West Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Coombe Raleigh Stream	d/s Discharge ditch	AA	0	1	0
Torrige	New Bridge	AA	0	2	0
Knighy Brook	u/s Yeo confluence	AA	0	2	0
Dart	Dartington Hall	AA	0	0	0
Okement	Knowle Bridge	AA	0	0	0
Dart	d/s Dart Bridge	AA	0	1	0
Erme	Stowford Weir	AD	0	0	0
Torrige Tributary	d/s Little Torrington STW	AH	0	0	0
Taw	Chenson	AH	0	0	0
Lew	Hatherleigh	AH	0	0	0
Dart	d/s Buckfastleigh STW	AH	0	1	0
West Okement	Okehampton Hospital	AH	0	0	0
Little Mere	u/s Petrookstowe STW	AH	0	0	1
Taw	Newnham Bridge	AH	0	0	0
Yeo	d/s West Anstey STW	AH	0	0	0
Mole	North Molton Bridge	LK	0	0	0
Taw	Umberleigh	LMB	0	1	0
Creedy Tributary	u/s Shute STW	LMB	0	1	0
Okement	Brightly Bridge	LMB	0	0	0
Okement	Woodhall Bridge	LMB	0	0	0

Table 37 The 15 AQC'd samples audited for North Wessex Area of South West Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Alham	Mill Farm	AB	0	0	0
Congresbury Yeo	u/s Town Bridge	AB	0	0	0
Abberd Brook	u/s Housing Estate	AB	0	0	0
Chew	d/s Chewton Mendip	AB	0	0	0
Congresbury Yeo	d/s Village	AB	0	0	0
Langford Brook	Site 2	AH	0	0	0
Siston Brook	u/s Storm overflow	SJH	0	0	0
Tetbury Avon Tributary	Estcourt Farm	SJH	0	1	0
South Drain	Shapwick	SJH	0	0	0
Tetbury Avon	Shipton Mill	SJH	0	0	0
Tetbury Avon	Estcourt	SJH	0	0	0
Yeo	Goathill	WO	0	1	0
Congresbury Yeo	d/s Reg Spring	WO	0	0	0
Congresbury Yeo	d/s Reg Spring	WO	0	1	0
South Drain	Shapwick Heath (E)	WO	0	0	0

Table 38 The 16 AQC'd samples audited for South Wessex Area of South West Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Fleet Stream	d/s Langton Herring	PRH	0	1	0
Spetisbury Stream Tributary	u/s Spetisbury Cress beds	PRH	0	1	0
Teffont Brook	Teffont Manor	PRH	0	0	0
Lodden	Lugmarsh Farm	PRH	0	1	0
Lodden	Gutchpool Farm	PRH	0	0	0
Western Avon Tributary	d/s Wedhampton STW	PRH	0	0	0
Rodden Stream	d/s Langton Herring	PRH	0	0	0
Hooke	d/s Toller Porcorum	PRH	0	1	0
Ebblake	d/s Industrial Estate	PRH	0	0	0
Piddle	Piddletrenthide Church	PRH	0	2	0
Fern Brook	Kings Court Palace	PRH	0	0	0
Ebblake	u/s Industrial Estate	PRH	0	0	0
Holt Heath Stream	Holt Heath Crossing	PRH	0	0	0
Hampshire Avon	North End Farm	PRH	0	0	0
Clockhouse Brook	Burton	PRH	0	0	0
Nadder	Panthers Bridge	PRH	0	1	0

Table 39 Statistics of the 1997 AQC Audit for South West 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
Devon	20	0.45	0.15	0	0	2	0.50	0.15
AA	6	1.00	0.37	0	0	2	1.00	0.37
AD	1	0	n/a	0	0	0	0	n/a
AH	8	0.13	0.13	0	0	1	0.25	0.16
LB	1	1.00	n/a	0	0	1	1.00	n/a
LK	1	0	n/a	0	0	0	0	n/a
LMB	3	0.33	0.33	0	0	1	0.33	0.33
North Wessex	15	0.20	0.11	0	0	1	0.20	0.11
AB	5	0.00	0.00	0	0	0	0.00	0.00
AH	1	0.00	n/a	0	0	0	0.00	n/a
SJH	5	0.20	0.20	0	0	1	0.20	0.20
WO	4	0.50	0.29	0	0	1	0.50	0.29
South Wessex	16	0.44	0.16	0	0	2	0.44	0.16
PRH	16	0.44	0.16	0	0	2	0.44	0.16
South West Region	51	0.37	0.08	0	0	2	0.39	0.08

Table 40 Net effects of the AQC Audit on BMWP score and number of scoring taxa for South West Region

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
Devon	20	2.60	5.00	15	0.45	0	2
AA	6	5.33	16.67	15	1.00	0	2
AD	1	0	0	0	0	0	0
AH	8	0.63	0	5	0.13	0	1
LB	1	10.00	0	10	1.00	0	1
LK	1	0	0	0	0	0	0
LMB	3	1.67	0	5	0.33	0	1
North Wessex	15	1.20	0	10	0.20	0	1
AB	5	0	0	0	0	0	0
AH	1	0	0	0	0	0	0
SJH	5	1.00	0	5	0.20	0	1
WO	4	3.25	0	10	0.50	0	1
South Wessex	16	3.25	0	10	0.44	0	2
PRH	16	3.25	0	10	0.44	0	2
S.West Region	51	2.39	1.96	15	0.37	0	2

Table 41 The families missed by South West Region's AQC inspectors

Family		% of South West Region's missed families in AQC Audit
Planariidae (incl. Dugesiidae)	2	11.76
Hydrobiidae (incl. Bithyniidae)	2	11.76
Hydroptilidae	2	11.76
Leptoceridae	2	11.76
Taeniopterygidae	1	5.88
Tipulidae	1	5.88
Psychomyiidae (incl. Ecnomidae)	1	5.88
Polycentropodidae	1	5.88
Hydropsychidae	1	5.88
Ephemeraidae	1	5.88
Asellidae	1	5.88
Calopterygidae	1	5.88
Lymnaeidae	1	5.88
Total	17	100

Table 42 The species missed by South West Region's AQC inspectors

Species	n	% of South West Region's missed species in AQC Audit
Potamopyrgus jenkinsi (Smith)	2	11.11
Polycelis nigra group	2	11.11
Lymnaea peregra (Muller)	1	5.56
Antocha vitripennis (Meigen)	1	5.56
Tipula sp.	1	5.56
Tinodes waeneri (L.)	1	5.56
Polycentropus flavomaculatus (Pictet)	1	5.56
Mystacides azurea (L.)	1	5.56
Hydroptila sp.	1	5.56
Hydropsyche siltalai Dohler	1	5.56
Ephemera danica Muller	1	5.56
Calopteryx splendens (Harris)	1	5.56
Brachyptera risi (Morton)	1	5.56
Asellus aquaticus (L.)	1	5.56
Ithytrichia sp.	1	5.56
Athripsodes albifrons/bilineatus	1	5.56
Total	18	100

AUDIT OF THAMES REGION'S AQC INSPECTORS

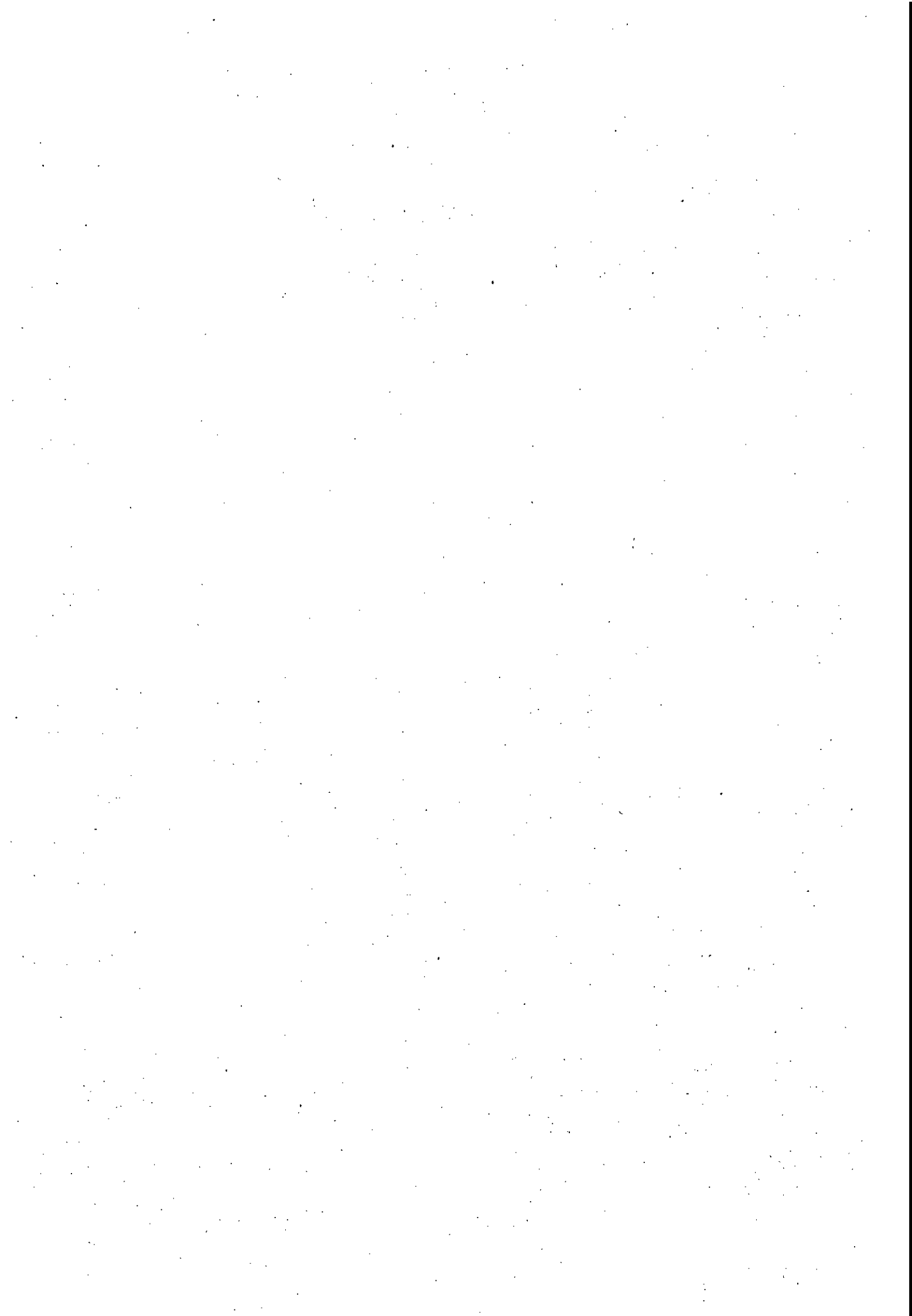


Table 43 The 16 AQC'd samples audited for the Fobney Mead Laboratory of Thames Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Summerstown Ditch	d/s Marsh Gibbon STW	300	0	0	0
The Cut	Cannon Hill	300	0	2	0
Garsington Stream	B480	300	0	2	0
Bookham Brook	Bookham Road	300	0	0	0
Thames	South Stoke	300	2	2	0
Bletchington Brook	u/s Gallos Brook	300	0	1	0
Thames	MWD Walton	300	0	1	0
Blackwater	u/s Whitewater	300	0	2	0
Bear Brook	u/s R. Thame	300	0	2	0
Bourne	Englefield House	300	0	0	0
Thames	Donnington Bridge	300	1	0	1
Veneymore Stream	d/s Trout Farm	300	2	1	4
Stocklake Brook	u/s Bear Brook	300	0	0	0
Blackwater	Frimley Bridges	300	0	1	0
Marcham Brook	Fyfield	300	0	2	0
Horsenden Stream	Brook Road	300	0	2	0

Table 44 The 24 AQC'd samples audited for the Hatfield Laboratory of Thames Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Misbourne	Denham	DJL	0	1	0
Horton Brook	u/s Tan House Stream	DJL	0	0	0
Mad Bess Brook	Mad Bess Wood	DJL	0	0	0
Quaggy	Mottingham Lane	DJL	0	1	0
Small Lee	d/s Ordnance Road	DJL	0	0	0
Navestock Brook	d/s Strawberry Wood	DJL	0	1	0
Lee	Lea Valley Road	DJL	1	0	0
Crane	Crane Park	DJL	0	0	0
Friary Park Stream	Friary Park	DJL	0	0	0
Duke of Northumberlands	River Gardens	DJL	1	0	0
Lee	d/s Enfield Weir	DJL	0	0	0
Duke of Northumberlands	Worton Road	DJL	0	0	0
Gade	d/s Cassiobury Park	DJL	0	1	0
Beverley Brook	Richmond Park	DJL	0	1	0
Colne/GUC	u/s Maple Lodge STW	DJL	0	0	0
Hogsmill	Surbiton Hill Park	DJL	0	1	0
Lee	u/s East Hyde Roadbridge	DJL	0	0	0
Gade	Gade Water Nurseries	DJL	0	0	0
Colne	Waterfields Rec Ground	JE	0	1	0
Rib	Westmill	JE	0	0	0
Misbourne	u/s Gerards Cross STW	JE	0	2	0
Ash (Lee)	North of Widford	JE	0	2	0
Colne	Coppermill Lane	JE	0	1	0
Gade	u/s Gade Bridge Lane	JE	0	1	0

Table 45 Statistics of the 1997 AQC Audit for Thames 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
Fobney Mead	16	1.13	0.22	0	0	2	1.75	0.44
300	16	1.13	0.22	0	0	2	1.75	0.44
Hatfield	24	0.54	0.13	0	0	2	0.63	0.13
DJL	18	0.33	0.11	0	0	1	0.44	0.12
JE	6	1.17	0.31	0	0	2	1.17	0.31
Thames Region	40	0.78	0.13	0	0	2	1.08	0.21

Table 46 Net effects of the AQC Audit on BMWP score and number of scoring taxa for Thames Region

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
Fobney Mead	16	4.44	6.25	15	0.81	0	2
300	16	4.44	6.25	15	0.81	0	2
Hatfield	24	2.50	0	10	0.46	0	2
DJL	18	1.50	0	10	0.22	0	1
JE	6	5.50	0	10	1.17	0	2
Thames Region	40	3.28	2.50	15	0.60	0	2

Table 47 The families missed by Thames Region's AQC inspectors

Family		% of Thames Region's missed families in AQC Audit
Elmidae	3	10.34
Planariidae (incl. Dugesiidae)	3	10.34
Ancylidae (incl. Acroloxidae)	2	6.90
Physidae	2	6.90
Hydrobiidae (incl. Bithyniidae)	2	6.90
Hydropsychidae	2	6.90
Hydroptilidae	2	6.90
Dytiscidae (incl. Noteridae)	2	6.90
Planorbidae	1	3.45
Simuliidae	1	3.45
Tipulidae	1	3.45
Molannidae	1	3.45
Leptophlebiidae	1	3.45
Haliplidae	1	3.45
Gyrinidae	1	3.45
Dryopidae	1	3.45
Brachycentridae	1	3.45
Dendrocoelidae	1	3.45
Lymnaeidae	1	3.45
Total	29	100

Table 48 The species missed by Thames Region's AQC inspectors

Species	n	% of Thames Region's missed species in AQC Audit
Polycelis nigra group	3	10.34
Elmis aenea (Muller)	3	10.34
Potamopyrgus jenkinsi (Smith)	2	6.90
Hydroptila sp.	2	6.90
Simulium (Simulium) ornatum group	1	3.45
Platambus maculatus (L.)	1	3.45
Brachycentrus subnubilus Curtis	1	3.45
Tipula (Yamatotipula) montium group	1	3.45
Agabus sp.	1	3.45
Ancylidae indet	1	3.45
Physa sp.	1	3.45
Physa fontinalis (L.)	1	3.45
Paraleptophlebia sp.	1	3.45
Orectochilus villosus (Muller)	1	3.45
Dryops sp.	1	3.45
Dendrocoelum lacteum (Muller)	1	3.45
Molanna angustata Curtis	1	3.45
Bathyomphalus contortus (L.)	1	3.45
Haliphus fluviatilis Aube	1	3.45
Hydropsyche siltalai Dohler	1	3.45
Ancylus fluviatilis Muller	1	3.45
Lymnaea peregra (Muller)	1	3.45
Hydropsyche angustipennis (Curtis)	1	3.45
Total	29	100

AUDIT OF WELSH REGION'S AQC INSPECTORS

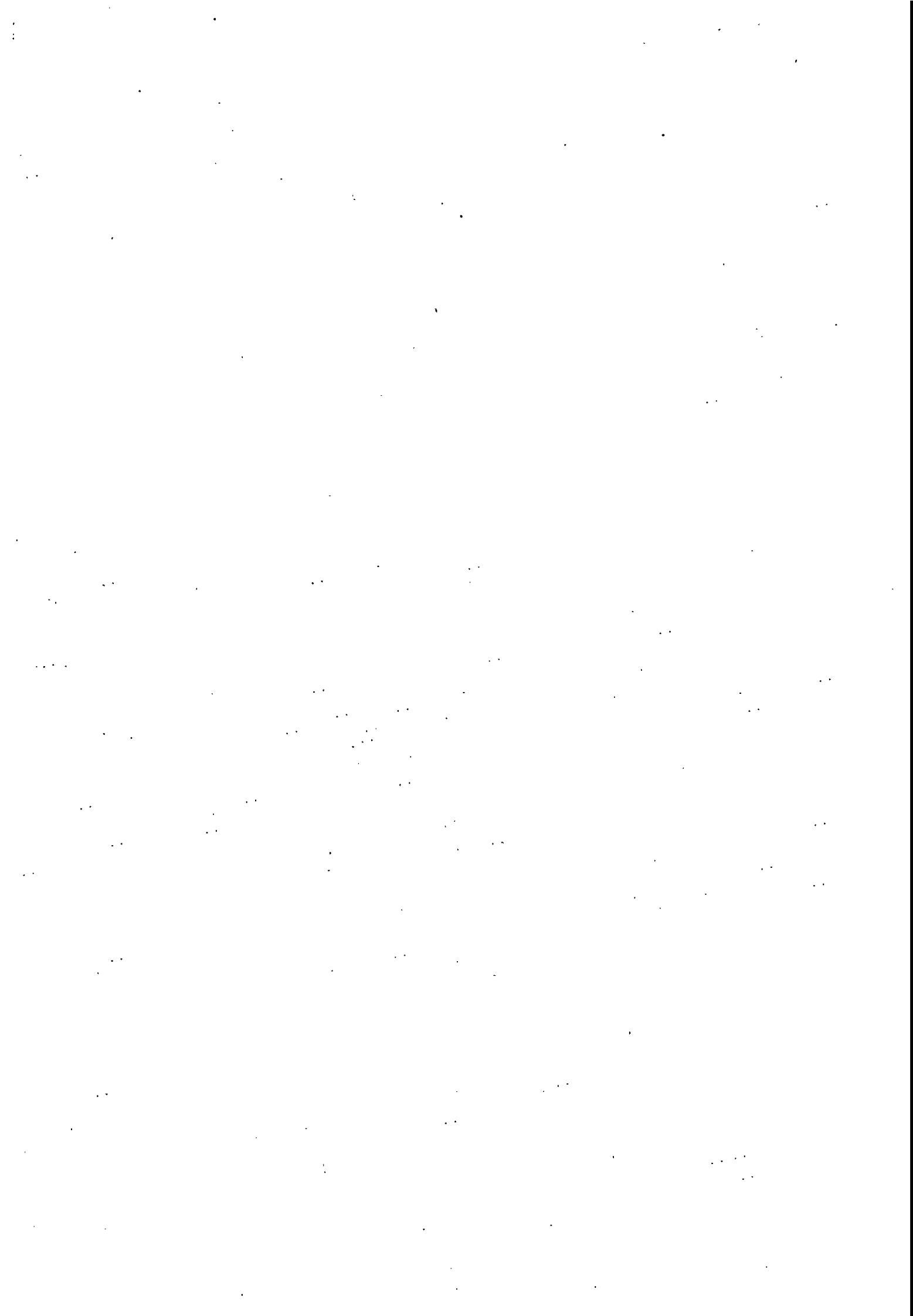


Table 49 The 10 AQC'd samples audited for Northern Area of Welsh Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Afon Twrch	u/s Afon Groes	353	1	3	0
Afon Wheeler	u/s Pant Gwyn	353	1	1	0
Nant Sir Roger	d/s Whitford STW	353	1	2	1
Afon Eitha	u/s Pen y cae WTW	353	0	0	0
Afon Glan Sais	d/s Teiryd WTW	353	0	2	0
Dwryrd	u/s Iron Bridge	377	0	0	0
Alyn	Football Ground	377	1	0	0
Afon Tryweryn Tributary	d/s Rhyduchaf STW	377	0	0	0
Coddington Brook	d/s Clutton STW	377	1	3	1
Afon Erch Tributary	u/s Llangybi STW	377	0	1	1

Table 50 The 20 AQC'd samples audited for South Eastern Area of Welsh Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Usk	Llantrisant	367	0	1	0
Ebbw	Culvert opp Steelworks	367	0	2	0
Sirhowy	d/s Roadbridge	367	0	0	0
Sirhowy	u/s Footbridge	367	0	1	0
Ely	u/s St Fagans STW	367	0	0	0
Rhondda	d/s Gwyddon confluence	367	0	0	0
Ely	d/s Peterston-s-Ely	367	0	0	0
Tarrington Brook	d/s Tarrington STW	367	0	1	0
Nant Llancarfan	d/s Bonvilston East STW	367	0	1	2
Un-named Tributary	u/s Trellech STW	367	2	0	0
Hindwell Brook	Nash Bridge	367	0	0	0
Cage Brook	u/s Clehonger STW	367	0	1	0
Clyro Brook	u/s Clyro STW	367	0	0	0
Wye	d/s Builth Wells STW	367	1	1	0
Tedstone Brook	Bromyard	367	0	0	0
Cwm Brook	u/s Farm	367	0	0	0
Usk	d/s Llanfoist Bridge	367	1	0	0
Nant Gledyr	Gypsy Lane	367	0	0	0
Rhymney	Pengam	367	0	0	0
Un-named Tributary	u/s Cwrt Bleddyn	367	1	5	0

Table 51 The 15 AQC'd samples audited for South Western Area of Welsh Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Soden	d/s Pant Sod Farm	361	0	1	0
Nant Denys	d/s Silian PS	361	0	0	0
Wyre	u/s Llanrhystud STW	361	0	0	0
E. Cleddau	u/s Narbeth East STW	361	0	1	0
Sprinkle Pill	u/s Hook STW	361	0	2	0
Cartlett Brook	u/s Crundale PS	361	1	0	0
Ritec	u/s St Florence STW	361	1	0	0
Un-named Watercourse	d/s Reynoldston STW	361	0	0	0
Dulais	d/s Llangybi STW	361	0	3	0
Nant-y-Bugael	d/s Fishponds	361	0	1	0
Lash	u/s Minewater discharge	361	0	0	0
Cwmwaungron	d/s Bonfire	361	0	0	0
Nant Pant-yr-haidd	u/s Llanafan	361	0	0	0
Gwili	u/s Crosshands STW	367	0	0	0
Afon Marlas Tributary	d/s Carmel & Pantillyn STW	367	0	2	0

Table 52 Statistics of the 1997 AQC Audit for Welsh 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
Northern	10	1.20	0.39	2	20.00	3	2.00	0.58
353	5	1.60	0.51	1	20.00	3	2.40	0.75
377	5	0.80	0.58	1	20.00	3	1.60	0.93
South Eastern	20	0.65	0.26	1	5.00	5	1.00	0.33
367	20	0.65	0.26	1	5.00	5	1.00	0.33
South Western	15	0.67	0.25	1	6.67	3	0.80	0.24
361	13	0.62	0.27	1	7.69	3	0.77	0.26
367	2	1.00	1.00			2	1.00	1.00
Welsh Region	45	0.78	0.17	4	8.89	5	1.16	0.22

Table 53 Net effects of the Primary Audit on BMWP score and number of scoring taxa for Welsh Region

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
Northern	10	6.50	30.00	17	0.70	0	2
353	5	9.60	60.00	17	1.00	0	2
377	5	3.40	0	11	0.40	0	2
South Eastern	20	1.90	5.00	20	0.35	5.00	4
367	20	1.90	5.00	20	0.35	5.00	4
South Western	15	4.73	20.00	20	0.53	6.67	3
361	13	4.31	15.38	20	0.46	7.69	3
367	2	7.50	50.00	15	1.00	0	2
Welsh Region	45	3.87	15.56	20	0.49	4.44	4

Table 54 The families missed by Welsh Region's AQC inspectors

Family		% of Welsh Region's missed families in AQC Audit
Scirtidae	3	10.34
Elmidae	2	6.90
Hydropsychidae	2	6.90
Hydrophilidae (incl. Hydraenidae)	2	6.90
Gerridae	2	6.90
Ephemerellidae	2	6.90
Limnephilidae	2	6.90
Leptoceridae	1	3.45
Goeridae	1	3.45
Leptophlebiidae	1	3.45
Planariidae (incl. Dugesiidae)	1	3.45
Psychomyiidae (incl. Ecnomidae)	1	3.45
Leuctridae	1	3.45
Lepidostomatidae	1	3.45
Hydrobiidae (incl. Bithyniidae)	1	3.45
Dryopidae	1	3.45
Corixidae	1	3.45
Coenagriidae	1	3.45
Asellidae	1	3.45
Simuliidae	1	3.45
Hydrometridae	1	3.45
Total	29	100

Table 55 The species missed by Welsh Region's AQC inspectors

Species	n	% of Welsh Region's missed species in AQC Audit
<i>Elmis aenea</i> (Muller)	2	6.90
<i>Hydropsyche siltalai</i> Dohler	2	6.90
Scirtidae indet	2	6.90
Limnephilidae indet	2	6.90
<i>Ephemerella ignita</i> (Poda)	2	6.90
<i>Leuctra geniculata</i> (Stephens)	1	3.45
<i>Lype</i> sp.	1	3.45
<i>Potamopyrgus jenkinsi</i> (Smith)	1	3.45
<i>Silo pallipes</i> (Fabricius)	1	3.45
<i>Pyrrhosoma nymphula</i> (Sulzer)	1	3.45
<i>Hydrometra stagnorum</i> (L.)	1	3.45
<i>Crunoecia irrorata</i> (Curtis)	1	3.45
<i>Mystacides azurea</i> (L.)	1	3.45
<i>Hydraena gracilis</i> Germar	1	3.45
<i>Helophorus</i> (<i>Atracthelophorus</i>) <i>brevipalpis</i> Bedel	1	3.45
<i>Habrophlebia fusca</i> (Curtis)	1	3.45
<i>Gerris</i> (<i>Gerris</i>) sp.	1	3.45
<i>Gerris</i> (<i>Gerris</i>) <i>gibbifer</i> Schummel	1	3.45
<i>Elodes</i> sp.	1	3.45
<i>Dryops</i> sp.	1	3.45
Corixidae indet	1	3.45
<i>Asellus aquaticus</i> (L.)	1	3.45
<i>Simulium</i> (<i>Wilhelmia</i>) <i>equinum</i> (L.)	1	3.45
<i>Dugesia tigrina</i> (Girard)	1	3.45
Total	29	100

SUMMARY OF PRIMARY AUDIT FOR ENVIRONMENT AGENCY

Table 56 Statistics of the 1997 AQC Audit for each Agency laboratory

Analyst/Group	n	Mean gains	Standard error	No. samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (I+g+o)	Standard error
Anglian Region	60	0.85	0.15	4	6.67	5	1.28	0.18
Central	20	1.25	0.34	3	15.00	5	2.25	0.34
Eastern	20	0.65	0.18	0	0	2	0.70	0.21
Northern	20	0.65	0.20	1	5.00	3	0.90	0.25
Midlands Region	80	0.69	0.11	4	5.00	4	0.86	0.12
Upper Severn	20	0.30	0.13	0	0	2	0.50	0.17
Lower Severn	20	0.70	0.23	1	5.00	4	0.90	0.23
Upper Trent	20	0.90	0.18	0	0	2	1.10	0.23
Lower Trent	20	0.85	0.27	3	15.00	4	0.95	0.29
North East Region	60	0.85	0.14	4	6.67	5	1.00	0.16
Dales	20	0.70	0.26	2	10.00	4	0.75	0.28
Northumbria	20	0.95	0.29	2	10.00	5	1.10	0.33
Ridings	20	0.90	0.20	0	0	2	1.15	0.23
North West Region	50	0.72	0.11	2	4.00	3	1.04	0.15
Central	20	0.55	0.15	0	0	2	0.95	0.28
Northern	20	0.70	0.16	1	5.00	3	0.90	0.16
Southern	10	1.10	0.31	1	10.00	3	1.50	0.40
Southern Region	40	0.60	0.12	1	2.50	3	0.75	0.15
Kent	26	0.73	0.14	0	0	2	0.85	0.15
Hants & Sussex	14	0.36	0.23	1	7.14	3	0.57	0.31
South West Region	51	0.37	0.08	0	0	2	0.39	0.08
Cornwall	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Devon	20	0.45	0.15	0	0	2	0.50	0.15
North Wessex	15	0.20	0.11	0	0	1	0.20	0.11
South Wessex	16	0.44	0.16	0	0	2	0.44	0.16
Thames Region	40	0.78	0.13	0	0	2	1.08	0.21
Fobney Mead	16	1.13	0.22	0	0	2	1.75	0.44
Hatfield	24	0.54	0.13	0	0	2	0.63	0.13
Welsh Region	45	0.78	0.17	4	8.89	5	1.16	0.22
Northern	10	1.20	0.39	2	20.00	3	2.00	0.58
South Eastern	20	0.65	0.26	1	5.00	5	1.00	0.33
South Western	15	0.67	0.25	1	6.67	3	0.80	0.24
Whole of Agency	426	0.71	0.05	19	4.46	5	0.95	0.06

Table 57 Net effects of the 1997 AQC Audit on BMWP score and number of scoring taxa for each Agency laboratory

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 Region	60	3.78	8.33	25	0.67	6.67	5
Central	20	4.50	15.00	25	0.85	15.00	5
Eastern	20	3.85	5.00	14	0.60	0	2
Northern	20	3.00	5.00	19	0.55	5.00	3
Midlands Region	80	3.21	6.25	25	0.59	5.00	4
Upper Severn	20	0.80	0	13	0.15	0	2
Lower Severn	20	3.45	10.00	18	0.60	5.00	4
Upper Trent	20	3.70	5.00	17	0.75	0	2
Lower Trent	20	4.90	10.00	25	0.85	15.00	4
N. East Region	60	4.48	8.33	31	0.73	6.67	5
Dales	20	4.55	10.00	22	0.65	10.00	4
Northumbria	20	5.30	10.00	31	0.85	10.00	5
Ridings	20	3.60	5.00	14	0.70	0	2
N. West Region	50	2.20	4.00	20	0.44	4.00	3
Central	20	0.15	0	10	0.15	0	1
Northern	20	3.25	5.00	20	0.50	5.00	3
Southern	10	4.20	10.00	16	0.90	10.00	3
Southern Region	40	3.08	5.00	23	0.53	2.50	3
Kent	26	3.58	3.85	16	0.65	0	2
Hants & Sussex	14	2.14	7.14	23	0.29	7.14	3
S. West Region	51	2.39	1.96	15	0.37	0	2
Cornwall	0	n/a	n/a	n/a	n/a	n/a	n/a
Devon	20	2.60	5.00	15	0.45	0	2
North Wessex	15	1.20	0	10	0.20	0	1
South Wessex	16	3.25	0	10	0.44	0	2
Thames Region	40	3.28	2.50	15	0.60	0	2
Fobney Mead	16	4.44	6.25	15	0.81	0	2
Hatfield	24	2.50	0	10	0.46	0	2
Welsh Region	45	3.87	15.56	20	0.49	4.44	4
Northern	10	6.50	30.00	17	0.70	0	2
South Eastern	20	1.90	5.00	20	0.35	5.00	4
South Western	15	4.73	20.00	20	0.53	6.67	3
Whole of Agency	426	3.32	6.57	31	0.56	3.99	5

Table 58 The families missed by the Agency's AQC inspectors in the 1997 Audit

Family	n	% of Agency's missed families in AQC Audit
Hydroptilidae	20	7.91
Elmidae	18	7.11
Planariidae (incl. Dugesiidae)	16	6.32
Hydrophilidae (incl. Hydraenidae)	12	4.74
Hydrobiidae (incl. Bithyniidae)	11	4.35
Leptoceridae	11	4.35
Planorbidae	9	3.56
Caenidae	8	3.16
Ancylidae (incl. Acroloxidae)	8	3.16
Lymnaeidae	8	3.16
Asellidae	7	2.77
Simuliidae	7	2.77
Coenagriidae	6	2.37
Hydropsychidae	6	2.37
Limnephilidae	6	2.37
Tipulidae	5	1.98
Nemouridae	5	1.98
Ephemerellidae	5	1.98
Psychomyiidae (incl. Ecnomidae)	5	1.98
Goeridae	4	1.58
Baetidae	4	1.58
Dytiscidae (incl. Noteridae)	4	1.58
Gerridae	4	1.58
Haliplidae	4	1.58
Scirtidae	4	1.58
Rhyacophilidae (incl. Glossosomatidae)	4	1.58
Valvatidae	4	1.58
Lepidostomatidae	4	1.58
Dendrocoelidae	3	1.19
Leptophlebiidae	3	1.19
Corixidae	3	1.19
Sphaeriidae	3	1.19
Dryopidae	3	1.19
Physidae	3	1.19
Calopterygidae	2	0.79
Piscicolidae	2	0.79
Leuctridae	2	0.79
Hydrometridae	2	0.79
Taeniopterygidae	1	0.40
Brachycentridae	1	0.40
Chironomidae	1	0.40
Beraeidae	1	0.40

Table 58 continued

Family	n	% of Agency's missed families in AQC Audit
Notonectidae	1	0.40
Odontoceridae	1	0.40
Glossiphoniidae	1	0.40
Sialidae	1	0.40
Ephemeridae	1	0.40
Erpobdellidae	1	0.40
Gammaridae (incl. Crangonyctidae)	1	0.40
Perlodidae	1	0.40
Gyrinidae	1	0.40
Libellulidae	1	0.40
Heptageniidae	1	0.40
Sericostomatidae	1	0.40
Polycentropodidae	1	0.40
Molannidae	1	0.40
Total	253	100

Table 59 The species missed by the Agency's AQC inspectors in the 1997 Audit

Species	n	% of Agency's missed species in AQC Audit
Hydroptila sp.	14	5.36
Potamopyrgus jenkinsi (Smith)	10	3.83
Elmis aenea (Muller)	10	3.83
Polycelis nigra group	8	3.07
Asellus aquaticus (L.)	7	2.68
Lymnaea peregra (Muller)	6	2.30
Limnephilidae indet	5	1.92
Ithytrichia sp.	5	1.92
Hydropsyche siltalai Dohler	5	1.92
Ephemerella ignita (Poda)	5	1.92
Caenis rivulorum Eaton	5	1.92
Hydraena gracilis Germar	5	1.92
Mystacides azurea (L.)	4	1.53
Limnius volckmari (Panzer)	4	1.53
Polycelis felina (Dalyell)	4	1.53
Coenagriidae indet	4	1.53
Ancylus fluviatilis Muller	4	1.53
Simulium (Simulium) ornatum group	4	1.53
Tinodes waeneri (L.)	3	1.15
Helophorus (Atracthelophorus) brevipalpis Bedel	3	1.15
Gyraulus albus (Muller)	3	1.15
Pisidium sp.	3	1.15
Oulimnius sp.	3	1.15
Lepidostoma hirtum (Fabricius)	3	1.15
Valvata piscinalis (Muller)	3	1.15
Dugesia polychroa group	3	1.15
Dryops sp.	3	1.15
Dendrocoelum lacteum (Muller)	3	1.15
Anisus vortex (L.)	2	0.77
Lymnaea truncatula (Muller)	2	0.77
Lype sp.	2	0.77
Agapetus sp.	2	0.77
Baetis vernus Curtis	2	0.77
Athripsodes bilineatus (L.)	2	0.77
Hydrometra stagnorum (L.)	2	0.77
Gerris (Gerris) lacustris (L.)	2	0.77
Acroloxus lacustris (L.)	2	0.77
Bathynomphalus contortus (L.)	2	0.77
Caenis luctuosa group	2	0.77
Agraylea multipunctata Curtis	2	0.77
Calopteryx splendens (Harris)	2	0.77
Elodes sp.	2	0.77

Table 59 continued

Species	n	% of Agency's missed species in AQC Audit
Ancylidae indet	2	0.77
Dugesia tigrina (Girard)	2	0.77
Hydraena riparia Kugelann	2	0.77
Oreodytes sanmarkii (Sahlberg)	2	0.77
Scirtidae indet	2	0.77
Piscicola geometra (L.)	2	0.77
Nemurella picteti Klapalek	2	0.77
Valvata cristata Muller	2	0.77
Tipula sp.	2	0.77
Physa fontinalis (L.)	2	0.77
Paraleptophlebia sp.	2	0.77
Oxyethira sp.	2	0.77
Bithynia tentaculata (L.)	1	0.38
Brachycentrus subnubilus Curtis	1	0.38
Brachyptera risi (Morton)	1	0.38
Brychius elevatus (Panzer)	1	0.38
Beraea maurus (Curtis)	1	0.38
Silo nigricornis (Pictet)	1	0.38
Baetis rhodani (Pictet)	1	0.38
Sigara sp.	1	0.38
Sigara (Sigara) sp.	1	0.38
Ceraclea dissimilis (Stephens)	1	0.38
Sialis lutaria (L.)	1	0.38
Corixidae indet	1	0.38
Crunoecia irrorata (Curtis)	1	0.38
Sericostoma personatum (Spence)	1	0.38
Dicranota sp.	1	0.38
Caenis horaria (L.)	1	0.38
Antocha vitripennis (Meigen)	1	0.38
Adicella reducta (Mclachlan)	1	0.38
Agabus sp.	1	0.38
Amphinemura sulcicollis (Stephens)	1	0.38
Tipula (Yamatotipula) montium group	1	0.38
Tanypodinae	1	0.38
Silo sp.	1	0.38
Simulium (Wilhelmia) sp.	1	0.38
Silo pallipes (Fabricius)	1	0.38
Armiger crista (L.)	1	0.38
Simulium (Wilhelmia) equinum (L.)	1	0.38
Athripsodes albifrons/bilineatus	1	0.38
Athripsodes aterrimus (Stephens)	1	0.38
Simulium (Nevermannia) cryophilum group	1	0.38

Table 59 continued

Species	n	% of Agency's missed species in AQC Audit
<i>Pyrrhosoma nymphula</i> (Sulzer)	1	0.38
<i>Baetis scambus</i> group	1	0.38
<i>Anisus</i> sp.	1	0.38
<i>Oecetis lacustris</i> (Pictet)	1	0.38
<i>Rhithrogena</i> sp.	1	0.38
<i>Physa</i> sp.	1	0.38
<i>Oulimnius tuberculatus</i> (Muller)	1	0.38
<i>Hydropsyche angustipennis</i> (Curtis)	1	0.38
<i>Orectochilus villosus</i> (Muller)	1	0.38
<i>Haliphus wehncke</i> (Gerhardt)	1	0.38
<i>Isoperla grammatica</i> (Poda)	1	0.38
<i>Haliphus</i> sp.	1	0.38
<i>Odontocerum albicorne</i> (Scopoli)	1	0.38
<i>Leuctra geniculata</i> (Stephens)	1	0.38
<i>Leuctra hippopus</i> (Kempny)	1	0.38
Libellulidae indet	1	0.38
<i>Ochthebius bicolon</i> Germar	1	0.38
<i>Notonecta</i> sp.	1	0.38
<i>Nemoura avicularis</i> Morton	1	0.38
<i>Mystacides nigra/longicornis</i>	1	0.38
<i>Ischnura elegans</i> (Van der Linden)	1	0.38
<i>Gammarus</i> sp.	1	0.38
<i>Helophorus</i> (<i>Helophorus</i>) <i>obscurus</i> Mulsant	1	0.38
<i>Ecclisopteryx guttulata</i> (Pictet)	1	0.38
<i>Molanna angustata</i> Curtis	1	0.38
<i>Protonemura praecox</i> (Morton)	1	0.38
<i>Ephemera danica</i> Muller	1	0.38
<i>Polycentropus flavomaculatus</i> (Pictet)	1	0.38
<i>Helius</i> sp.	1	0.38
<i>Esolus parallelepipedus</i> (Muller)	1	0.38
<i>Rhyacophila dorsalis</i> (Curtis)	1	0.38
<i>Gerris</i> (<i>Gerris</i>) <i>gibbifer</i> Schummel	1	0.38
<i>Platambus maculatus</i> (L.)	1	0.38
<i>Gerris</i> (<i>Gerris</i>) sp.	1	0.38
<i>Glossiphonia complanata</i> (L.)	1	0.38
<i>Glossosoma</i> sp.	1	0.38
<i>Goera pilosa</i> (Fabricius)	1	0.38
<i>Habrophlebia fusca</i> (Curtis)	1	0.38
<i>Haliphus fluviatilis</i> Aube	1	0.38
Erpobdellidae indet	1	0.38
Total	261	100

MISSED TAXA FOR ALL SAMPLES IN THE 1997 AUDIT

Table 60 Missed families for all samples in the 1997 Audit

Family	n	% of missed families in 1997 audit
Hydroptilidae	68	5.75
Elmidae	66	5.58
Hydrophilidae (incl. Hydraenidae)	61	5.16
Planariidae (incl. Dugesiidae)	53	4.48
Leptoceridae	45	3.81
Hydrobiidae (incl. Bithyniidae)	43	3.64
Simuliidae	36	3.05
Lymnaeidae	36	3.05
Planorbidae	36	3.05
Sphaeriidae	34	2.88
Ancylidae (incl. Acroloxidae)	32	2.71
Hydropsychidae	32	2.71
Limnephilidae	32	2.71
Nemouridae	32	2.71
Caenidae	29	2.45
Halplidae	28	2.37
Tipulidae	28	2.37
Psychomyiidae (incl. Ecnomidae)	28	2.37
Asellidae	25	2.12
Ephemerellidae	22	1.86
Lepidostomatidae	22	1.86
Rhyacophilidae (incl. Glossosomatidae)	20	1.69
Valvatidae	19	1.61
Goeridae	18	1.52
Physidae	18	1.52
Scirtidae	17	1.44
Dytiscidae (incl. Noteridae)	17	1.44
Coenagriidae	16	1.35
Leuctridae	16	1.35
Baetidae	15	1.27
Glossiphoniidae	15	1.27
Gammaridae (incl. Crangonyctidae)	13	1.10
Leptophlebiidae	13	1.10
Sericostomatidae	13	1.10
Chironomidae	12	1.02
Erpobdellidae	12	1.02
Heptageniidae	11	0.93
Gerridae	11	0.93
Polycentropodidae	11	0.93
Perlodidae	10	0.85
Gyrinidae	10	0.85
Dendrocoelidae	9	0.76
Piscicolidae	9	0.76

Table 60 continued

Family	n	% of missed families in 1997 audit
Taeniopterygidae	8	0.68
Corixidae	8	0.68
Odontoceridae	8	0.68
Beraeidae	7	0.59
Calopterygidae	7	0.59
Dryopidae	7	0.59
Sialidae	7	0.59
Oligochaeta	7	0.59
Hydrometridae	5	0.42
Chloroperlidae	5	0.42
Ephemeridae	4	0.34
Brachycentridae	4	0.34
Libellulidae	2	0.17
Notonectidae	2	0.17
Molannidae	2	0.17
Unionidae	1	0.08
Phryganeidae	1	0.08
Philopotamidae	1	0.08
Nepidae	1	0.08
Pleidae	1	0.08
Corophiidae	1	0.08
Total	1182	100

Table 61 Missed species for all samples in the 1997 Audit

Species	n	% of missed species in 1997 audit
Hydroptila sp.	49	3.90
Potamopyrgus jenkinsi (Smith)	40	3.18
Elmis aenea (Muller)	38	3.02
Hydraena gracilis Germar	34	2.70
Pisidium sp.	28	2.23
Polycelis nigra group	26	2.07
Lymnaea peregra (Muller)	26	2.07
Asellus aquaticus (L.)	23	1.83
Ephemerella ignita (Poda)	22	1.75
Ancylus fluviatilis Muller	22	1.75
Limnephilidae indet	19	1.51
Mystacides azurea (L.)	18	1.43
Caenis rivulorum Eaton	18	1.43
Lepidostoma hirtum (Fabricius)	18	1.43
Simulium (Simulium) ornatum group	18	1.43
Hydropsyche sitalai Dohler	17	1.35
Haliplus sp.	16	1.27
Limnius volckmari (Panzer)	15	1.19
Ithytrichia sp.	15	1.19
Polycelis felina (Dalyell)	14	1.11
Physa fontinalis (L.)	13	1.03
Sericostoma personatum (Spence)	13	1.03
Tinodes waeneri (L.)	13	1.03
Elodes sp.	13	1.03
Lype sp.	12	0.95
Gyraulus albus (Muller)	12	0.95
Valvata piscinalis (Muller)	12	0.95
Glossiphonia complanata (L.)	12	0.95
Oulimnius sp.	11	0.87
Orectochilus villosus (Muller)	10	0.79
Helophorus (Atracthelophorus) brevipalpis Bedel	10	0.79
Dendrocoelum lacteum (Muller)	9	0.72
Dicranota sp.	9	0.72
Piscicola geometra (L.)	9	0.72
Coenagriidae indet	9	0.72
Nemurella picteti Klapalek	9	0.72
Oulimnius tuberculatus (Muller)	9	0.72
Valvata cristata Muller	9	0.72
Bathyomphalus contortus (L.)	8	0.64
Odontocerum albicorne (Scopoli)	8	0.64
Orthocladiinae	8	0.64
Hydropsyche sp.	8	0.64
Isoperla grammatica (Poda)	8	0.64

Table 61 continued

Species	n	% of missed species in 1997 audit
Agapetus sp.	8	0.64
Anisus vortex (L.)	8	0.64
Goera pilosa (Fabricius)	7	0.56
Gammarus pulex (L.)	7	0.56
Erpobdellidae indet	7	0.56
Nemoura avicularis Morton	7	0.56
Caenis luctuosa group	7	0.56
Amphinemura sulcicollis (Stephens)	7	0.56
Dugesia polychroa group	7	0.56
Armiger crista (L.)	7	0.56
Dryops sp.	7	0.56
Sialis lutaria (L.)	7	0.56
Calopteryx splendens (Harris)	7	0.56
Rhyacophila dorsalis (Curtis)	7	0.56
Acroloxus lacustris (L.)	6	0.48
Baetis rhodani (Pictet)	6	0.48
Lymnaea truncatula (Muller)	6	0.48
Hydropsyche angustipennis (Curtis)	6	0.48
Agabus sp.	6	0.48
Athripsodes bilineatus (L.)	6	0.48
Helobdella stagnalis (L.)	6	0.48
Agraylea multipunctata Curtis	6	0.48
Dugesia tigrina (Girard)	6	0.48
Oxyethira sp.	6	0.48
Athripsodes aterrimus (Stephens)	5	0.40
Tipula (Yamatotipula) montium group	5	0.40
Athripsodes sp.	5	0.40
Erpobdella octoculata (L.)	5	0.40
Silo pallipes (Fabricius)	5	0.40
Oreodytes sanmarkii (Sahlberg)	5	0.40
Gerris (Gerris) lacustris (L.)	5	0.40
Sphaeriidae indet	5	0.40
Tipula sp.	5	0.40
Antocha vitripennis (Meigen)	5	0.40
Chloroperla torrentium (Pictet)	5	0.40
Leuctra fusca (L.)	5	0.40
Hydraena riparia Kugelann	5	0.40
Rhithrogena sp.	5	0.40
Paraleptophlebia sp.	5	0.40
Hydrometra stagnorum (L.)	5	0.40
Leuctra geniculata (Stephens)	4	0.32
Leuctra hippopus (Kempny)	4	0.32
Ischnura elegans (Van der Linden)	4	0.32

Table 61 continued

Species	n	% of missed species in 1997 audit
<i>Athripsodes cinereus</i> (Curtis)	4	0.32
<i>Baetis vernus</i> Curtis	4	0.32
Hydrophilidae indet	4	0.32
<i>Brachycentrus subnubilus</i> Curtis	4	0.32
<i>Brachyptera risi</i> (Morton)	4	0.32
<i>Haliplus fluviatilis</i> Aube	4	0.32
<i>Ceraclea dissimilis</i> (Stephens)	4	0.32
Ancylidae indet	4	0.32
<i>Ecdyonurus</i> sp.	4	0.32
<i>Beraea maurus</i> (Curtis)	4	0.32
<i>Sigara</i> (<i>Sigara</i>) sp.	4	0.32
Tubificidae	4	0.32
<i>Platambus maculatus</i> (L.)	4	0.32
Tanypodinae	4	0.32
<i>Taeniopteryx nebulosa</i> (L.)	4	0.32
<i>Polycentropus flavomaculatus</i> (Pictet)	4	0.32
<i>Psychomyia pusilla</i> (Fabricius)	4	0.32
<i>Simulium</i> (<i>Nevermannia</i>) <i>cryophilum</i> group	4	0.32
Scirtidae indet	4	0.32
<i>Lymnaea stagnalis</i> (L.)	4	0.32
<i>Silo nigricornis</i> (Pictet)	4	0.32
<i>Crangonyx pseudogracilis</i> Bousfield	3	0.24
<i>Caenis horaria</i> (L.)	3	0.24
<i>Helophorus</i> (<i>Helophorus</i>) <i>obscurus</i> Mulsant	3	0.24
<i>Pyrrhosoma nymphula</i> (Sulzer)	3	0.24
<i>Cloeon dipterum</i> (L.)	3	0.24
<i>Habrophlebia fusca</i> (Curtis)	3	0.24
<i>Crunoecia irrorata</i> (Curtis)	3	0.24
<i>Glossosoma</i> sp.	3	0.24
Polycentropodidae indet	3	0.24
<i>Ephemera danica</i> Muller	3	0.24
<i>Gammarus</i> sp.	3	0.24
<i>Physa</i> sp.	3	0.24
<i>Esolus parallelepipedus</i> (Muller)	3	0.24
<i>Haliplus lineatocollis</i> (Marshall)	3	0.24
<i>Simulium</i> (<i>Eusimulium</i>) <i>aureum</i> group	3	0.24
<i>Adicella reducta</i> (Mclachlan)	3	0.24
<i>Limnophilus lunatus</i> Curtis	3	0.24
Leptophlebiidae indet	3	0.24
<i>Leuctra</i> sp.	3	0.24
<i>Nemoura cambrica</i> group	3	0.24
<i>Simulium</i> (<i>Boophthora</i>) <i>erythrocephalum</i> (de Geer)	3	0.24
<i>Simulium</i> (<i>Wilhelmia</i>) sp.	3	0.24

Table 61 continued

Species	n	% of missed species in 1997 audit
<i>Athripsodes albifrons</i> (L.)	3	0.24
<i>Simulium</i> (<i>Simulium</i>) <i>argyreatum</i> group	3	0.24
<i>Cyrnus trimaculatus</i> (Curtis)	2	0.16
<i>Asellus meridianus</i> Racovitza	2	0.16
<i>Protonemura praecox</i> (Morton)	2	0.16
<i>Crenobia alpina</i> (Dana)	2	0.16
<i>Ecclisopteryx guttulata</i> (Pictet)	2	0.16
<i>Anisus</i> sp.	2	0.16
Tanytarsini	2	0.16
<i>Protonemura meyeri</i> (Pictet)	2	0.16
<i>Brychius elevatus</i> (Panzer)	2	0.16
Corixidae indet	2	0.16
<i>Beraeodes minutus</i> (L.)	2	0.16
<i>Protonemura</i> sp.	2	0.16
<i>Simulium</i> (<i>Wilhelmia</i>) <i>equinum</i> (L.)	2	0.16
<i>Simulium</i> (<i>Nevermannia</i>) <i>angustitarse</i> group	2	0.16
Chironomini	2	0.16
<i>Rhyacophila</i> sp.	2	0.16
<i>Baetis scambus</i> group	2	0.16
<i>Riolus subviolaceus</i> (Muller)	2	0.16
<i>Polycentropus</i> sp.	2	0.16
<i>Silo</i> sp.	2	0.16
<i>Sigara</i> sp.	2	0.16
<i>Bithynia tentaculata</i> (L.)	2	0.16
<i>Athripsodes albifrons/bilineatus</i>	2	0.16
<i>Ochthebius bicolon</i> Germar	2	0.16
Libellulidae indet	2	0.16
Lumbricidae	2	0.16
<i>Molanna angustata</i> Curtis	2	0.16
<i>Molophilus</i> sp.	2	0.16
<i>Mystacides nigra/longicornis</i>	2	0.16
Naididae	2	0.16
<i>Nemoura cinerea</i> (Retzius)	2	0.16
<i>Notonecta</i> sp.	2	0.16
<i>Hippeutis complanatus</i> (L.)	2	0.16
<i>Oecetis lacustris</i> (Pictet)	2	0.16
<i>Helius</i> sp.	2	0.16
<i>Haliplus wehncke</i> (Gerhardt)	2	0.16
<i>Paraleptophlebia submarginata</i> (Stephens)	2	0.16
<i>Perlodes microcephala</i> (Pictet)	2	0.16
<i>Gerris</i> (<i>Gerris</i>) sp.	2	0.16
<i>Gerris</i> (<i>Gerris</i>) <i>gibbifer</i> Schummel	2	0.16
<i>Physa acuta</i> group	2	0.16

Table 61 continued

Species	n	% of missed species in 1997 audit
Gerris sp.	2	0.16
Ephemera sp.	1	0.08
Enchytraeidae	1	0.08
Baetis sp.	1	0.08
Diamesinae	1	0.08
Laccobius (Macrolaccobius) sinuatus/striatulus	1	0.08
Laccobius sp.	1	0.08
Lasiocephala basalis/Lepidostoma hirtum	1	0.08
Lymnaea sp.	1	0.08
Lymnaea palustris (Muller)	1	0.08
Lumbriculidae	1	0.08
Simulium sp.	1	0.08
Phagocata vitta (Duges)	1	0.08
Anodonta cygnea (L.)	1	0.08
Ochthebius minimus (Fabricius)	1	0.08
Leuctra inermis Kempny	1	0.08
Anisus leucostoma (Millet)	1	0.08
Plea leachi Mcgregor & Kirkaldy	1	0.08
Limonia sp.	1	0.08
Anacaena globulus (Paykull)	1	0.08
Anacaena bipustulata (Marsham)	1	0.08
Anabolia nervosa (Curtis)	1	0.08
Tinodes assimilis/machlachlani	1	0.08
Tipula (Acutipula) maxima/fulvipennis	1	0.08
Tipula (Tipula) paludosa Meigen	1	0.08
Limnephilus marmoratus Curtis	1	0.08
Agabus didymus (Olivier)	1	0.08
Limnephilus politus/rhombicus	1	0.08
Sphaerium sp.	1	0.08
Helophorus (Meghelophorus) grandis Illiger	1	0.08
Drusus annulatus/Ecclisopteryx guttulata	1	0.08
Gyrinus sp.	1	0.08
Corophium lacustre Vanhoffen	1	0.08
Haliplidae indet	1	0.08
Pedicia (Pedicia) rivosa (L.)	1	0.08
Prodiamesinae	1	0.08
Chloroperla tripunctata (Scopoli)	1	0.08
Potamophylax rotundipennis (Brauer)	1	0.08
Potamophylax latipennis (Curtis)	1	0.08
Oreodytes septentrionalis (Sahlberg)	1	0.08
Wormaldia sp.	1	0.08
Hydropsychidae indet	1	0.08
Glossiphonia heteroclita (L.)	1	0.08

Table 61 continued

Species	n	% of missed species in 1997 audit
Caenis pusilla Navas	1	0.08
Heptagenia lateralis (Curtis)	1	0.08
Heptagenia sulphurea (Muller)	1	0.08
Glyptotaelius pellucidus (Retzius)	1	0.08
Planaria torva (Muller)	1	0.08
Limnephilus sp.	1	0.08
Dytiscidae indet	1	0.08
Bithynia leachii (Sheppard)	1	0.08
Nepa cinerea L.	1	0.08
Beraea pullata (Curtis)	1	0.08
Ecnomus tenellus (Rambur)	1	0.08
Hydropsyche pellucidula (Curtis)	1	0.08
Phryganea sp.	1	0.08
Centroptilum luteolum (Muller)	1	0.08
Total	1258	100