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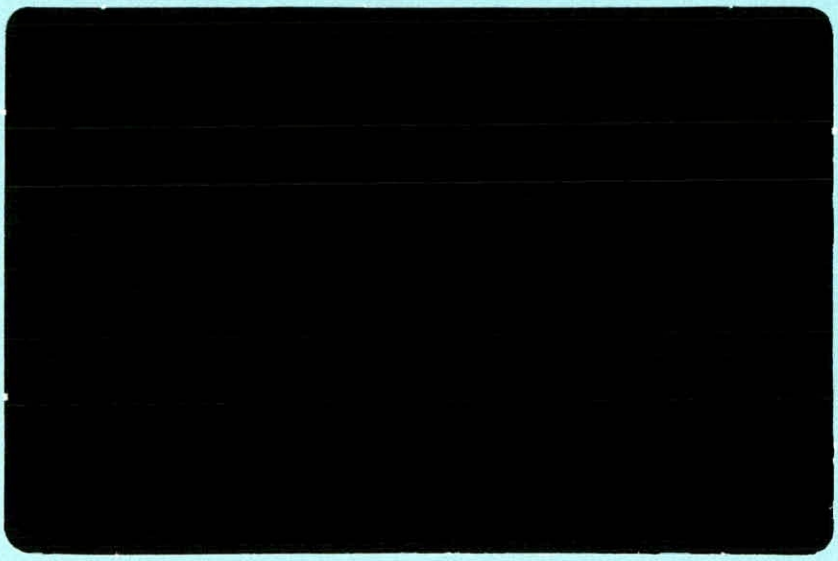

ENVIRONMENT AGENCY

An audit of performance in the analysis of biological Samples in 1998
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

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1. INTRODUCTION

In 1998 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. For each site the taxa present were recorded on a standard data sheet. 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 and 1997. 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 416 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 489 samples, are reported separately (Gunn *et al.*, 1999).

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:** 01/04/98

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)
VIAL	
BMWP taxa not found in vial	
Planorbidae	12
Terrestrial snail in vial	
Baetidae *	1
Limnephilidae	7
Additional BMWP taxa found in vial	
Lepidostomatidae	7
Lepidostoma hirtum (Fabricius)	
SAMPLE	
BMWP taxa not found in sample (for samples where vial is broken or absent)	
N/a	
Additional BMWP taxa found in sample	
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)
VIAL	
BMWP taxa not found in vial	
Baetidae *	1
Limnephilidae	7
Additional BMWP taxa found in vial	
Lepidostomatidae	7
Lepidostoma hirtum (Fabricius)	
SAMPLE	
BMWP taxa not found in sample (for samples where vial is broken or absent)	
N/a	
Additional BMWP taxa found in sample	
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 1998 for all Agency Regions are presented, Region by Region, in Tables 1 to 58. 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 1998 audit. Tables 59 and 60 summarise the statistics and effects of the 1998 AQC Audit for the whole of the Agency. Tables 61 and 62 give listings of all taxa, at family and species levels respectively, missed in sorting by all of the Agency's AQC analysts and Tables 63 and 64 give similar listings for all samples audited in 1998 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*, 1999).

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.*, 1999) 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 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 provided invaluable assistance in the development of the audit methodology and who has been a reliable source of helpful advice throughout the period of the audit.

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Gunn R J M, Blackburn J H, Winder J M, Wiggers R, Davy-Bowker J & Wright J F, (1999). An audit of performance in the analysis of biological samples in 1998. Environment Agency: Primary Audit. Report to the Environment Agency. IFE Report Ref. RL/T04071R7/17.

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
Ingol	Snettisham	LJS	0	1	0
Highlode	d/s Ramsey STW	LJS	0	1	0
Bourn Brook	Foxes Bridge	LJS	0	0	0
Ten Mile	Brandon Creek	LJS	0	0	0
Culford Stream	West Stowe Road Bridge	LJS	0	0	0
Wissey	Hilgay Bridge	LJS	0	1	0
Hexton Brook	Shillington Road Bridge	SEH	1	0	2
Running Water	Ruxox Bridge	SEH	0	0	0
Nar	Castle Acre Road Bridge	SEH	0	0	1
Grand Union Canal	Ivinghoe Bridge	SEH	0	0	0
Ouse	Sam Jones Mill	SEH	0	1	0
Tove	Cappenham Bridge	SEH	0	2	0
Wissey	Ickbury Bridge	SEH	1	1	0
Hiz	Cadwell Arch	SEH	0	1	1
Fenton Lode	Sewards Farm Bridge	SEH	1	1	0
Middleton Stop Drain	Middleton Town Bridge	SEH	0	2	1
Sixteen Foot Drain	Horseways Corner	WTC	0	0	0
Marley Gap Brook	Stocks Bridge	WTC	0	0	0
Rhee	Tadlow Bridge Farm	WTC	2	0	0
Wissey	Hilgay Bridge	WTC	3	1	2

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

River	Site	AQC Analyst	Losses	Gains	Omissions
Blackwater	China Bridge	CFW	0	0	0
Blackwater	Wickham Mill	CFW	0	2	0
Yare	Bawburgh	CFW	0	0	0
Alde	Bruisyard Arch Bridge	CFW	0	0	0
Chelmer-Blackwater Canal	Heybridge	CFW	0	0	0
Chelmer	Fleck Bridge	CSA	0	0	0
Stour	Brundon Mill	CSA	0	1	0
Roach	Rochford Reservoir	CSA	1	2	0
Toppesfield Brook	A604 Bridge	CSA	0	1	0
Chelmer	Springfield Mill	CSA	0	0	0
Mermaid	Brampton Bridge	JHS	1	0	0
Deben	Barley Farm	JHS	0	0	0
Intwood Stream	Intwood Church Ford	JHS	1	1	0
Pant	Petches Bridge	JHS	0	0	0
Chad Brook	Long Melford	JHS	0	0	0
Gipping	d/s ICI Weir	JHS	1	0	0
Belstead Brook	Brook Corner	JMG	0	1	0
Butley Creek	Low Corner	JMG	0	2	0
Chelmer	d/s Sandford Mill	JMG	0	0	0
Colne	Nunnery 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
Ise	Burton Latimer	CLP	0	1	0
Rase	Bishopbridge	CLP	0	0	1
Slea	Annick	CLP	1	2	0
South Forty Foot Drain	Donington Bridge	CLP	0	0	0
North Gwash	Upper Hambleton Road Bridge	CLP	0	2	0
Gwash	u/s Belmesthorpe	CLP	1	2	0
Swanspool Brook	Wellingborough	DMB	1	1	0
Lower Witham	Five Mile House	DMB	0	0	0
Glen	Kates Bridge	IMC	0	0	0
S. Forty Foot Drain	Swineshead Bridge	IMC	0	1	0
South Drove Drain	Horseshoe Bridge	IMC	0	0	0
Willoughby High Drain	Hogsthorpe	IMC	2	1	0
Whaplode	Whaplode Marsh	IMC	0	1	0
Nene	Warmington	IMC	2	1	0
Willow Brook	Pen Green Lane	IMC	0	0	0
Nene	Wollaston Mill	IMC	0	0	0
North Kelsey Beck	u/s R. Ancholme	RPC	1	1	0
Nene	White Mills	RPC	0	0	0
Welland	Sibbertoft	RPC	0	0	0
Hog Dyke	Raunds	RPC	0	0	0

Table 4 Statistics of the 1998 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**	**0.60**	**0.15**	**0**	**0**	**2**	**1.35**	**0.33**
LJS	6	0.50	0.22	0	0	1	0.50	0.22
SEH	10	0.80	0.25	0	0	2	1.60	0.34
WTC	4	0.25	0.25	0	0	1	2.00	1.41
Eastern	**20**	**0.50**	**0.17**	**0**	**0**	**2**	**0.70**	**0.21**
CFW	5	0.40	0.40	0	0	2	0.40	0.40
CSA	5	0.80	0.37	0	0	2	1.00	0.55
JHS	6	0.17	0.17	0	0	1	0.67	0.33
JMG	4	0.75	0.48	0	0	2	0.75	0.48
Northern	**20**	**0.65**	**0.17**	**0**	**0**	**2**	**1.10**	**0.27**
CLP	6	1.17	0.40	0	0	2	1.67	0.49
DMB	2	0.50	0.50	0	0	1	1.00	1.00
IMC	8	0.50	0.19	0	0	1	1.00	0.46
RPC	4	0.25	0.25	0	0	1	0.50	0.50
Anglian Region	**60**	**0.58**	**0.09**	**0**	**0**	**2**	**1.05**	**0.16**

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**	**1.00**	**5.00**	**15**	**0.20**	**0**	**2**
LJS	6	2.00	0	6	0.50	0	1
SEH	10	3.10	10.00	15	0.50	0	2
WTC	4	-5.75	0	0	-1.00	0	0
Eastern	**20**	**1.60**	**0**	**12**	**0.30**	**0**	**2**
CFW	5	1.60	0	8	0.40	0	2
CSA	5	2.80	0	6	0.60	0	1
JHS	6	-1.67	0	0	-0.33	0	0
JMG	4	5.00	0	12	0.75	0	2
Northern	**20**	**2.15**	**0**	**12**	**0.25**	**0**	**2**
CLP	6	6.50	0	12	0.83	0	2
DMB	2	0	0	0	0	0	0
IMC	8	0.50	0	7	0	0	1
RPC	4	0	0	0	0	0	0
Anglian Region	**60**	**1.58**	**1.67**	**15**	**0.25**	**0**	**2**

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

Family		**% of Anglian Region's missed families in AQC Audit**
Hydroptilidae	5	18.52
Planorbidae	4	14.81
Caenidae	2	7.41
Ancylidae (incl. Acroloxidae)	2	7.41
Leptoceridae	2	7.41
Unionidae	1	3.70
Tipulidae	1	3.70
Simuliidae	1	3.70
Psychomyiidae (incl. Ecnomidae)	1	3.70
Libellulidae	1	3.70
Hydropsychidae	1	3.70
Glossiphoniidae	1	3.70
Erpobdellidae	1	3.70
Ephemeridae	1	3.70
Ephemerellidae	1	3.70
Elmidae	1	3.70
Lymnaeidae	1	3.70
Total	**27**	**100**

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

Species	n	% of Anglian Region's missed species in AQC Audit
Ancylus fluviatilis Muller	2	6.90
Oxyethira sp.	2	6.90
Gyraulus albus (Muller)	2	6.90
Lymnaea stagnalis (L.)	1	3.45
Agraylea multipunctata Curtis	1	3.45
Simulium (Nevermannia) lundstromi (Enderlein)	1	3.45
Lype sp.	1	3.45
Libellulidae indet	1	3.45
Ithytrichia sp.	1	3.45
Hydropsyche sp.	1	3.45
Hippeutis complanatus (L.)	1	3.45
Glossiphonia complanata (L.)	1	3.45
Erpobdella octoculata (L.)	1	3.45
Armiger crista (L.)	1	3.45
Ephemerella ignita (Poda)	1	3.45
Anisus vortex (L.)	1	3.45
Anodonta sp.	1	3.45
Mystacides nigra (L.)	1	3.45
Antocha vitripennis (Meigen)	1	3.45
Agraylea sp.	1	3.45
Athripsodes aterrimus (Stephens)	1	3.45
Athripsodes cinereus (Curtis)	1	3.45
Caenis horaria (L.)	1	3.45
Caenis luctuosa group	1	3.45
Elmis aenea (Muller)	1	3.45
Ephemera sp.	1	3.45
Total	**29**	**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
Stourbridge	Roman Road	1	1	0	0
MW Brook	Rockhouse Inn	1	0	0	0
Mor Brook	Crosshouses	1	0	0	0
Teme	Leintwardine	1	1	1	0
Trannon	u/s Cilhaul	1	0	0	0
Perry	Wykey	1	0	1	0
Salwarpe	Stoke Prior	1	0	0	0
Newnes Brook	A 495	1	0	0	0
Mantllymsyryn	d/s Farm	1	0	0	0
Lake Tributary	u/s Glog	1	0	0	0
Tern	Longdon	1	0	2	0
Severn	Caersws	1	0	1	0
Morda	A483	1	0	1	0
Moelfre Tributary	u/s Moelfre Hall	1	0	1	0
Perry	Platt Bridge	1	0	1	0
Sundorne	Upper Astley	1	1	2	0
Blakedown Brook	Viaduct	1	0	1	0
Shrawley Brook	B4196 Bridge	1	0	2	0
Hartlebury Brook	Titton Bridge	1	0	0	0
Caebitra Brook	Brompton	1	0	0	0

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

River	Site	AQC Analyst	Losses	Gains	Omissions
Stockton Brook	u/s R.Stowe	11	0	0	0
Ban Brook	Salford Priors	11	1	0	0
Stowe	Browns Bridge	11	1	0	0
Sherbourne	Charterhouse	11	0	0	0
Withy Brook	High Bridge	11	0	0	0
Avon	Hampton Lucy	11	0	2	0
Alne	Wootton Wawen	11	0	0	0
Painswick Stream	Stratford Park	11	0	1	0
Clifton Brook	Post House Hotel	11	0	1	0
Noleham Brook	Welford Pastures	11	0	0	0
Bushley Longdon Brook	Queenhill	11	1	0	0
Wymans Brook	d/s Pittville Lakes	11	0	2	0
Cannop Brook	Newerne	11	1	1	0
Dene	d/s Kineton WRW	11	0	1	0
Bow Brook	Defford Bridge	11	1	1	0
Badsey Brook	Offenham	11	0	1	0
Dimore Brook	Elmore	11	0	1	0
Cinderford Brook	u/s Culvert	12	0	0	0
Pool Brook	Hanley Swan	12	0	0	0
Canley Brook	Kenilworth	39	0	0	0

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

River	Site	AQC Analyst	Losses	Gains	Omissions
Causeley Brook	Bucknall	3	0	0	0
Temple Balsall Brook	B4101 Bridge	3	0	0	0
Didgerley Brook	Fillongley Lodge	3	0	0	0
Moreton Brook	Confluence	3	0	0	0
Churnet	Middle Hulme	3	0	1	0
Tame	Kingsbury	3	0	0	0
Anker	Atherstone	3	0	1	0
Fowlea Brook	Longbridge Hayes	3	0	0	0
Sence	Ratcliffe Culey	3	2	2	0
Tame	Tipton	3	0	0	0
Saredon Brook	Great Wryley	3	0	1	0
Crane Brook	Ashcroft Farm	3	0	0	0
Griffins Brook	Bourneville	3	0	0	0
Bourne	u/s Shustoke Res	3	0	0	0
Cole	Houndsfield Lane	3	0	0	0
Blythe	Hampden in Arden	3	0	1	0
Dove	Glutton Bridge	3	0	0	0
Fowlea Brook	Longbridge Hayes	3	0	0	0
Blythe	Cheswick Green	3	0	1	0
Swarbourne	Yoxall	3	0	2	0

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

River	Site	AQC Analyst	Losses	Gains	Omissions
Peakshole Water	d/s Peak Cavern	5	0	0	0
Oakerthorpe Brook	Unspecified site	5	0	0	0
Lea Brook	Unspecified site	5	0	2	0
Alfreton Brook	Alfreton	5	0	0	0
Carr Brook	Bottle Brook confluence	5	0	0	0
Burton Brook	Burton Lazars	5	0	1	0
Eau	Scotter	5	0	1	0
Gallow Hole Dyke	Rufford Park	5	0	1	0
Bottle Brook	u/s Kilburn STW	5	0	0	0
Waterton Drain	Trent confluence	5	0	0	0
Repton Brook	u/s Woodville	5	0	0	0
Gotham Brook	Glebe Farm	5	0	2	0
Normanton Brook	d/s Newbold Verdon	5	0	0	0
Whitwell Brook	A60	5	0	1	0
Rainworth Water	Robin Dam Bridge	5	0	0	0
Wye	Wye Dale	5	0	1	0
Marton Drain	Torksey	5	0	0	0
Papermill Dyke	Tickhill	5	0	1	0
Enderby (Huncote) Brook	u/s R. Soar	5	0	0	0
Bailey Brook	Milnhay Road	5	0	0	0

Table 12 Statistics of the 1998 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**	**0.65**	**0.17**	**0**	**0**	**2**	**0.80**	**0.20**
1	20	0.65	0.17	0	0	2	0.80	0.20
Lower Severn	**20**	**0.55**	**0.15**	**0**	**0**	**2**	**0.80**	**0.17**
11	17	0.65	0.17	0	0	2	0.94	0.18
12	2	0	0	0	0	0	0	0
39	1	0	n/a	0	0	0	0	n/a
Upper Trent	**20**	**0.45**	**0.15**	**0**	**0**	**2**	**0.55**	**0.22**
3	20	0.45	0.15	0	0	2	0.55	0.22
Lower Trent	**20**	**0.50**	**0.15**	**0**	**0**	**2**	**0.50**	**0.15**
5	20	0.50	0.15	0	0	2	0.50	0.15
Midlands Region	**80**	**0.54**	**0.08**	**0**	**0**	**2**	**0.66**	**0.09**

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**	**2.95**	**0**	**11**	**0.50**	**0**	**2**
1	20	2.95	0	11	0.50	0	2
Lower Severn	**20**	**1.15**	**0**	**12**	**0.30**	**0**	**2**
11	17	1.35	0	12	0.35	0	2
12	2	0	0	0	0	0	0
39	1	0	0	0	0	0	0
Upper Trent	**20**	**1.85**	**0**	**11**	**0.35**	**0**	**2**
3	20	1.85	0	11	0.35	0	2
Lower Trent	**20**	**2.75**	**5.00**	**18**	**0.50**	**0**	**2**
5	20	2.75	5.00	18	0.50	0	2
Midlands Region	**80**	**2.18**	**1.25**	**18**	**0.41**	**0**	**2**

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

Family		**% of Midlands Region's missed families in AQC Audit**
Glossiphoniidae	5	12.50
Gammaridae (incl. Crangonyctidae)	4	10.00
Caenidae	4	10.00
Psychomyiidae (incl. Ecnomidae)	3	7.50
Simuliidae	3	7.50
Baetidae	2	5.00
Elmidae	2	5.00
Tipulidae	2	5.00
Sphaeriidae	2	5.00
Hydrobiidae (incl. Bithyniidae)	2	5.00
Sericostomatidae	1	2.50
Chloroperlidae	1	2.50
Planariidae (incl. Dugesiidae)	1	2.50
Notonectidae	1	2.50
Lymnaeidae	1	2.50
Limnephilidae	1	2.50
Hydroptilidae	1	2.50
Haliplidae	1	2.50
Goeridae	1	2.50
Dytiscidae (incl. Noteridae)	1	2.50
Gerridae	1	2.50
Total	**40**	**100**

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

Species	n	% of Midlands Region's missed species in AQC Audit
Gammarus pulex (L.)	3	7.50
Glossiphonia complanata (L.)	2	5.00
Potamopyrgus jenkinsi (Smith)	2	5.00
Caenis luctuosa group	2	5.00
Baetis rhodani (Pictet)	2	5.00
Pisidium sp.	2	5.00
Tinodes waeneri (L.)	1	2.50
Tinodes rostocki Mclachlan	1	2.50
Theromyzon tessulatum (Muller)	1	2.50
Simulium (Simulium) ornatum group	1	2.50
Simulium (Simulium) noelleri Friederichs	1	2.50
Simulium (Eusimulium) aureum group	1	2.50
Silo pallipes (Fabricius)	1	2.50
Sericostoma personatum (Spence)	1	2.50
Lype sp.	1	2.50
Potamonectes depressus (Fabricius)	1	2.50
Polycelis felina (Dalyell)	1	2.50
Tipula sp.	1	2.50
Elmis aenea (Muller)	1	2.50
Oulimnius sp.	1	2.50
Caenis rivulorum Eaton	1	2.50
Notonecta sp.	1	2.50
Dicranota sp.	1	2.50
Caenis horaria (L.)	1	2.50
Gammarus sp.	1	2.50
Gerris sp.	1	2.50
Glossiphonia heteroclita (L.)	1	2.50
Helobdella stagnalis (L.)	1	2.50
Hydroptila sp.	1	2.50
Limnephilus sp.	1	2.50
Lymnaea peregra (Muller)	1	2.50
Brychius elevatus (Panzer)	1	2.50
Chloroperla torrentium (Pictet)	1	2.50
Total	**40**	**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
Wharfe	Boston Spa	EA	0	0	0
Ouse	d/s Moor Monkton (Sweep)	EA	0	1	0
Ouse	Beningborough Hall (Sweep)	EA	0	1	0
Ouse	d/s Moor Monkton (Airlift)	EA	0	2	0
Ouse	Nether Poppleton (Airlift)	EA	1	2	0
Ouse	Acaster Malbis (Sweep)	EA	0	1	0
Ure	Hawes	EA	0	0	0
Ure	Aldwark Toll Bridge (Dredge)	EA	0	0	0
Ure	Boroughbridge (12.8.98)	EA	0	1	0
Ouse	d/s A64 Bridge (Airlift)	EA	0	0	0
Wharfe	Grassington	EA	0	2	0
Wharfe	Otley (28.7.98)	EA	0	0	0
Wharfe	Otley (30.9.98)	EA	0	0	0
Wharfe	Kettlewell	EA	0	0	0
Ure	West Tanfield	EA	0	0	0
Ure	d/s Kilgram Bridge	EA	0	0	0
Ouse	d/s Nidd Mouth (Sweep)	EA	0	1	0
Ouse	d/s Nidd Mouth (Airlift)	EA	0	1	0
Ure	Boroughbridge (30.11.98)	EA	0	0	0
Ure	Aldwark Toll Bridge	SW	1	1	0

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

River	Site	AQC Analyst	Losses	Gains	Omissions
East Howle Beck	u/s Poachers Pocket CSO	EC	0	1	0
Brierdene Burn	Whitley Bay	FC	0	0	0
Lewis Burn	u/s Visitor Centre	FC	0	1	0
Till	Doddington Bridge	FC	0	1	0
South Tyne	Warden	FC	1	0	0
Derwent	Clockburn	FC	0	1	0
Aln	Bridge of Aln	FC	0	1	0
Blyth	Bellasis Bridge	FC	1	2	0
Wear	Witton-Le-Wear	JL	0	1	1
Valley Burn	d/s Tudhoe Mill STW	JL	0	0	0
Don	Jarrow Cemetery	JL	0	0	0
Wear	u/s Vinovium	JL	0	2	0
Moors Burn	u/s Sedgeletch STW	JL	0	0	0
South Tyne	Alston	JL	0	1	0
East Allen	The Haining	JL	0	2	0
Gaunless	South Church	JL	0	0	0
Browney	A167 Bridge	VW	0	0	0
Smallhope Burn	d/s Lanchester STW	VW	0	1	0
Swinhope Burn	Swinhope	VW	0	0	0
Wansbeck	Bothal Steps	VW	0	0	0

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

River	Site	AQC Analyst	Losses	Gains	Omissions
Don	Oxspring Bridge	JB	0	0	0
Don	d/s Blackburn Meadows	JB	0	0	0
Hebden Water	u/s Crimsworth Dean Beck	JB	0	1	0
Dearne	u/s Clayton West	JB	0	1	0
Ramsden Clough	d/s Brownhill Reservoir	JB	0	0	0
Meanwood Beck	d/s CSO	JB	0	0	0
Ryeburn	Ripponden	JB	0	0	0
Hull	Sutton Road Bridge	JB	0	0	0
Aire	Beal (Airlift)	JB	0	0	0
Winestead Drain	Patrington Haven	RJJ	0	3	0
West Beck	Wansford Bridge	RJJ	0	1	0
Hebden Water	Hebden Stream Gauge	VH	0	1	0
Alcomden Water	d/s Walshaw Dean Reservoirs	VH	0	2	0
Colne	Colne Bridge	VH	0	0	0
Rons Cliff Dike	d/s Gunthwaite Bridge	VH	1	5	1
Don	u/s Morehall	VH	0	2	0
County Dike	d/s Woodall Beck	VH	0	1	0
Hebden Water	u/s Calder	VH	0	2	0
Hipper	Bobbin Mill Lane	VH	1	1	0
Hebble Brook	d/s Jumples	VH	0	0	0

Table 19 Statistics of the 1998 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**	**0.65**	**0.17**	**0**	**0**	**2**	**0.75**	**0.20**
EA	19	0.63	0.17	0	0	2	0.68	0.20
SW	1	1.00	n/a	0	0	1	2.00	n/a
Northumbria	**20**	**0.70**	**0.16**	**0**	**0**	**2**	**0.85**	**0.20**
EC	1	1.00	n/a	0	0	1	1.00	n/a
FC	7	0.86	0.26	0	0	2	1.14	0.34
JL	8	0.75	0.31	0	0	2	0.88	0.35
VW	4	0.25	0.25	0	0	1	0.25	0.25
Ridings	**20**	**1.00**	**0.29**	**2**	**10.00**	**5**	**1.15**	**0.37**
JB	9	0.22	0.15	0	0	1	0.22	0.15
RJJ	2	2.00	1.00	1	50.00	3	2.00	1.00
VH	9	1.56	0.50	1	11.11	5	1.89	0.70
North East Region	**60**	**0.78**	**0.12**	**2**	**3.33**	**5**	**0.92**	**0.15**

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**	**3.20**	**5.00**	**20**	**0.55**	**0**	**2**
EA	19	3.37	5.26	20	0.58	0	2
SW	1	0	0	0	0	0	0
Northumbria	**20**	**4.30**	**5.00**	**20**	**0.60**	**0**	**2**
EC	1	10.00	0	10	1.00	0	1
FC	7	3.71	0	10	0.57	0	1
JL	8	5.63	12.50	20	0.75	0	2
VW	4	1.25	0	5	0.25	0	1
Ridings	**20**	**6.05**	**15.00**	**37**	**0.90**	**10.00**	**4**
JB	9	1.89	0	10	0.22	0	1
RJJ	2	9.50	50.00	14	2.00	50.00	3
VH	9	9.44	22.22	37	1.33	11.11	4
North East Region	**60**	**4.52**	**8.33**	**37**	**0.68**	**3.33**	**4**

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

Family		% of North East Region's missed families in AQC Audit
Limnephilidae	3	7.50
Lepidostomatidae	3	7.50
Elmidae	2	5.00
Nemouridae	2	5.00
Leptoceridae	2	5.00
Hydroptilidae	2	5.00
Hydropsychidae	2	5.00
Sphaeriidae	2	5.00
Valvatidae	2	5.00
Chloroperlidae	2	5.00
Gammaridae (incl. Crangonyctidae)	2	5.00
Caenidae	1	2.50
Sericostomatidae	1	2.50
Psychomyiidae (incl. Ecnomidae)	1	2.50
Polycentropodidae	1	2.50
Piscicolidae	1	2.50
Perlidae	1	2.50
Asellidae	1	2.50
Beraeidae	1	2.50
Ephemerellidae	1	2.50
Leptophlebiidae	1	2.50
Chironomidae	1	2.50
Dendrocoelidae	1	2.50
Hydrophilidae (incl. Hydraenidae)	1	2.50
Hydrobiidae (incl. Bithyniidae)	1	2.50
Gyrinidae	1	2.50
Goeridae	1	2.50
Total	**40**	**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
Hydropsyche siltalai Dohler	2	5.00
Chloroperla tripunctata (Scopoli)	2	5.00
Elmis aenea (Muller)	2	5.00
Lepidostoma hirtum (Fabricius)	2	5.00
Hydroptila sp.	1	2.50
Ithytrichia sp.	1	2.50
Lepidostomatidae indet	1	2.50
Limnephilidae indet	1	2.50
Limnephilus lunatus Curtis	1	2.50
Lype sp.	1	2.50
Nemoura avicularis Morton	1	2.50
Hydraena gracilis Germar	1	2.50
Orectochilus villosus (Muller)	1	2.50
Piscicola geometra (L.)	1	2.50
Nemoura cambrica group	1	2.50
Habrophlebia fusca (Curtis)	1	2.50
Gammarus pulex (L.)	1	2.50
Ephemerella ignita (Poda)	1	2.50
Drusus annulatus (Stephens)	1	2.50
Dinocras cephalotes (Curtis)	1	2.50
Crangonyx pseudogracilis Bousfield	1	2.50
Chironomidae indet	1	2.50
Caenis rivulorum Eaton	1	2.50
Beraea maurus (Curtis)	1	2.50
Athripsodes sp.	1	2.50
Athripsodes albifrons (L.)	1	2.50
Asellus meridianus Racovitza	1	2.50
Potamopyrgus jenkinsi (Smith)	1	2.50
Polycentropus flavomaculatus (Pictet)	1	2.50
Dendrocoelum lacteum (Muller)	1	2.50
Pisidium sp.	1	2.50
Sericostoma personatum (Spence)	1	2.50
Silo sp.	1	2.50
Sphaeriidae indet	1	2.50
Valvata cristata Muller	1	2.50
Valvata piscinalis (Muller)	1	2.50
Total	**40**	**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
Duddle Brook	ptc R.Ribble	AM	0	1	0
Blundel Brook	Broughton	AM	1	0	0
Lune	Clapham Beck	AM	1	1	0
Tun Brook	ptc R.Ribble	AM	0	0	0
Wycoller Beck	ptc R.Laneshaw	AM	0	1	0
Barden Clough	ptc R.Calder	AM	0	1	0
Hillylaid Pool	d/s Royles Brook	EIG	1	1	0
Downholland Brook	Downholland Brook	EIG	0	0	0
Conder	Old Galgate Bridge	EIG	0	0	0
Liggard Brook	u/s Liggard Road Bridge	EIG	1	0	0
Ribble	Brockholes Bridge	EIG	0	1	0
Darwen	Hole Brook	EIG	0	1	0
Eller Brook	Burscough Bridge	EIG	0	0	0
Hyndburn	Tinker Brook	HFH	0	0	0
Wyre	Cam Brook	HFH	0	0	0
Pendle Water	u/s Barden Lane	HFH	0	0	0
Crossens	Tarleton Runner (11.5.98)	HFH	0	0	0
Pendle	R.Laneshaw	HFH	0	2	0
Calder	Townley Park	HFH	0	1	0
Crossens	Tarleton Runner (11.11.98)	HFH	0	1	0

Table 24 The 12 AQC'd samples audited for Northern Area of North West Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Poaka Beck	u/s WTP discharge	AJ	0	2	0
Lund Beck	d/s Ulverston SSO	AJ	0	0	0
Levy Beck	u/s Ulverston SSO	AJ	0	1	0
Dubwath Beck	NX 198 312	AJ	2	0	0
Tarn Beck	Tongue House	AJ	0	0	0
Sepulchre Beck	d/s Janet Bridge	AJ	4	2	0
Mosedale Beck	Wallthwaite	AJ	0	1	0
Briggle Beck	u/s TBM outfall pipe	AJ	0	0	0
Kent	u/s Barley Bridge	NTC	1	2	0
Newland Beck	A590 Bridge	NTC	0	0	0
Irt	Forest Bridge	NTC	0	0	0
Winster	Lindeth Road	NTC	0	0	0

Table 25 The 20 AQC'd samples audited for Southern Area of North West Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Wilson Brook	ptc Randal Brook	AG	0	1	0
Goyt	ptc R. Etherow	AG	0	0	1
Mersey	ptc Padgate Brook	AG	0	0	0
Sinderland Brook	u/s Altringham ETW	AG	0	0	0
Black Brook	ptc R. Goyt	AG	0	1	0
Harrop Brook	ptc Dean	AG	0	0	0
Borsdane Brook	u/s A58 Bridge	AG	0	0	0
Un-Named Watercourse	d/d Biddulph Park ETW	AG	0	1	1
Ditton Brook	Ditton	AG	0	1	0
Irwell	Limelight	AG	1	0	0
Irwell	u/s Bury ETW	AG	0	2	0
Weaver	Old Hoolgrave Farm	AG	0	0	0
Gowy	Stanney	AG	0	0	0
Bollin	u/s Railway Bridge	AG	0	0	0
Bollin	ptc R. Dean	DGH	0	0	1
Salters Brook	u/s Ashton Brook	DGH	0	0	0
Cotterill Clough	ptc Bollin	DGH	1	0	0
Birket	ptc The Fender	DGH	1	1	0
Stewards Brook	Ditton Road	DGH	0	0	0
The Fender	ptc Birket	DGH	0	1	0

Table 26 Statistics of the 1998 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**	**0.14**	**0**	**0**	**2**	**0.75**	**0.16**
AM	6	0.67	0.21	0	0	1	1.00	0.26
EIG	7	0.43	0.20	0	0	1	0.71	0.29
HFH	7	0.57	0.30	0	0	2	0.57	0.30
Northern	**12**	**0.67**	**0.26**	**0**	**0**	**2**	**1.25**	**0.52**
AJ	8	0.75	0.31	0	0	2	1.50	0.71
NTC	4	0.50	0.50	0	0	2	0.75	0.75
Southern	**20**	**0.40**	**0.13**	**0**	**0**	**2**	**0.70**	**0.16**
AG	14	0.43	0.17	0	0	2	0.64	0.20
DGH	6	0.33	0.21	0	0	1	0.83	0.31
North West Region	**52**	**0.52**	**0.09**	**0**	**0**	**2**	**0.85**	**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**	**1.90**	**5.00**	**15**	**0.35**	**0**	**2**
AM	6	0.83	0	5	0.33	0	1
EIG	7	0.57	0	6	0.14	0	1
HFH	7	4.14	14.29	15	0.57	0	2
Northern	**12**	**2.00**	**8.33**	**16**	**0.08**	**0**	**2**
AJ	8	1.38	12.50	16	0	0	2
NTC	4	3.25	0	13	0.25	0	1
Southern	**20**	**1.55**	**0**	**12**	**0.25**	**0**	**2**
AG	14	2.36	0	12	0.36	0	2
DGH	6	-0.33	0	3	0	0	1
North West Region	**52**	**1.79**	**3.85**	**16**	**0.25**	**0**	**2**

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

Family		**% of North West Region's missed families in AQC Audit**
Psychomyiidae (incl. Ecnomidae)	2	10.00
Taeniopterygidae	2	10.00
Physidae	2	10.00
Baetidae	1	5.00
Lymnaeidae	1	5.00
Asellidae	1	5.00
Simuliidae	1	5.00
Polycentropodidae	1	5.00
Limnephilidae	1	5.00
Leptoceridae	1	5.00
Hydroptilidae	1	5.00
Hydrophilidae (incl. Hydraenidae)	1	5.00
Hydrobiidae (incl. Bithyniidae)	1	5.00
Dendrocoelidae	1	5.00
Beraeidae	1	5.00
Ancylidae (incl. Acroloxidae)	1	5.00
Sericostomatidae	1	5.00
Total	**20**	**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
Brachyptera risi (Morton)	2	9.52
Mystacides azurea (L.)	1	4.76
Physa acuta group	1	4.76
Physa sp.	1	4.76
Plectrocnemia conspersa (Curtis)	1	4.76
Micropterna sp.	1	4.76
Tinodes unicolor (Pictet)	1	4.76
Potamopyrgus jenkinsi (Smith)	1	4.76
Tinodes waeneri (L.)	1	4.76
Sericostoma personatum (Spence)	1	4.76
Asellus aquaticus (L.)	1	4.76
Simulium (Simulium) ornatum group	1	4.76
Lymnaea sp.	1	4.76
Ancylus fluviatilis Muller	1	4.76
Baetis rhodani (Pictet)	1	4.76
Baetis vernus Curtis	1	4.76
Beraea maurus (Curtis)	1	4.76
Dendrocoelum lacteum (Muller)	1	4.76
Hydraena gracilis Germar	1	4.76
Hydroptila sp.	1	4.76
Total	**21**	**100**

AUDIT OF SOUTHERN REGION'S AQC INSPECTORS

Table 30 The 7 AQC'd samples audited for the Hampshire & Isle of Wight Area of Southern Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Meon	u/s Routine	W9	0	0	1
Bourne Rivulet	d/s SMB CF	W9	0	0	0
Effluent Channel	d/s The Nythe CF	W13	0	0	0
Warblington Stream No 2	Church Path	W13	0	0	0
Dever Drainage Ditch	d/s Confluence Ditch 1 & 2	W19	0	0	0
Titchfield Stream	Road Bridge	W19	0	0	0
Shirley Pond	West Margin	W19	1	0	0

Table 31 The 17 AQC'd samples audited for the Kent Area of Southern Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Wateringbury Stream	Pizien Well Road	E1	0	0	0
Gibbs Brook	Brook Farm	E1	0	0	0
Darent	Bridge Cottage	E1	0	0	0
Bartley Mill Stream	Win Bridge	E1	1	0	0
Darent	Shoreham	E1	0	0	0
Tide Brook	d/s Washwell Lane	E1	0	1	0
Medway	Teston Bridge	E1	0	0	0
Rother	Udiam	E1	0	1	0
Wateringbury Stream	Wateringbury	E1	2	0	0
Medway	Bramble Tye Bridge	E1	0	0	0
Dour	Russell Gardens	E1	1	0	0
Rother	Witherenden Bridge	E1	0	1	0
Grom	Burrswood	E1	0	0	0
Dour	d/s Lorne Road	E1	1	0	0
Great Stour	Shalmsford Street	E1	0	1	0
Bartley Mill Stream	Win Bridge	E1	0	0	0
Hammer Stream	Iborden Park	E1	0	0	0

Table 32 The 7 AQC'd samples audited for the Sussex Area of Southern Region

River	Site	Analyst	Losses	Gains	Omissions
Ouse	u/s Storm Outfall	W9	0	1	0
Rother	S.Ambersham Investigation	W9	0	0	0
Bevern Stream	u/s Roadbridge	W13	0	0	0
Bull Tributary	Site 5 d/s Vineyard	W15	0	0	0
Broad Rife	u/s Sidlesham STW	W15	1	0	0
Blakes Gill	Scolliers Bridge	W15	1	1	0
Black Sewer	Staplefields Bridge	W15	0	0	0

Table 33 Statistics of the 1998 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
Hants & I.O.W.	**7**	**0**	**0**	**0**	**0**	**0**	**0.29**	**0.18**
W9	2	0	0	0	0	0	0.50	0.50
W13	2	0	0	0	0	0	0	0
W19	3	0	0	0	0	0	0.33	0.33
Kent	**17**	**0.24**	**0.11**	**0**	**0**	**1**	**0.53**	**0.15**
E1	17	0.24	0.11	0	0	1	0.53	0.15
Sussex	**7**	**0.29**	**0.18**	**0**	**0**	**1**	**0.57**	**0.30**
W9	2	0.50	0.50	0	0	1	0.50	0.50
W13	1	0	n/a	0	0	0	0	n/a
W15	4	0.25	0.25	0	0	1	0.75	0.48
Southern Region	**31**	**0.19**	**0.07**	**0**	**0**	**1**	**0.48**	**0.11**

Table 34 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
Hants & I.O.W.	**7**	**-0.43**	**0**	**0**	**-0.14**	**0**	**0**
W9	2	0	0	0	0	0	0
W13	2	0	0	0	0	0	0
W19	3	-1.00	0	0	-0.33	0	0
Kent	**17**	**0.18**	**0**	**10**	**-0.06**	**0**	**1**
E1	17	0.18	0	10	-0.06	0	1
Sussex	**7**	**-0.29**	**0**	**3**	**0**	**0**	**1**
W9	2	1.50	0	3	0.50	0	1
W13	1	0	0	0	0	0	0
W15	4	-1.25	0	0	-0.25	0	0
Southern Region	**31**	**-0.06**	**0**	**10**	**-0.06**	**0**	**1**

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

Family	**n**	**% of Southern Region's missed families in AQC Audit**
Hydrometridae	1	25.00
Hydrophilidae (incl. Hydraenidae)	1	25.00
Planorbidae	1	25.00
Hydropsychidae	1	25.00
Total	**4**	**100**

Table 36 The species missed by Southern Region's AQC inspectors

Species	**n**	**% of Southern Region's missed species in AQC Audit**
Bathyomphalus contortus (L.)	1	25.00
Hydropsyche sp.	1	25.00
Hydrometra stagnorum (L.)	1	25.00
Hydraena testacea Curtis	1	25.00
Total	**4**	**100**

AUDIT OF SOUTH WEST REGION'S AQC INSPECTORS

Table 37 The 10 AQC'd samples audited for Cornwall Area of South West Region

River	Site	Analyst	Losses	Gains	Omissions
Tamar	Dexbeer Bridge	RJW	0	0	0
Tavy	Hill Bridge	RJW	1	1	0
Allen	Knightsmill	RJW	1	1	0
Thorndon Plantation Trib	d/s Starling Roost	RJW	0	0	0
Tehidy Stream	Coombe	SAG	0	0	0
Lympscott Tributary	Lympscott	SAG	0	0	0
Porthowan Stream	u/s Porthowan STW	SAG	0	0	0
Mink Farm Tributary	u/s Mink Farm	SAG	1	0	0
Pelynt Stream	u/s Pelynt STW	SAG	0	1	0
Camel	Hendra Barn	SAG	1	0	0

Table 38 The 20 AQC'd samples audited for Devon Area of South West Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Otter	Hoemoor Farm	AD	0	0	0
Umbourne Brook	u/s Coly confluence	AD	0	0	0
Dart	d/s Buckfastleigh STW	AD	0	0	0
Marwood Stream	u/s STW	AD	0	1	0
Mardle	Mardle Way	AD	0	1	0
Otter	Churchingford STW	AD	0	0	0
Culm	u/s F.E. Discharge	AD	0	0	0
Axe	Seaborough Bridge	AD	0	1	0
Mere	Site 1	LB	0	0	0
Dean Burn	u/s B3380 Bridge	LB	0	0	0
Caen Tributary	d/s Knowle STW	LB	0	0	0
Torridge	Rothern Bridge	LB	1	0	0
Lilley Brook	u/s Tedburn St Mary STW	LB	0	1	0
Erme	u/s Ivybridge STW	LB	0	0	0
Otter	Tipton St John	LB	0	0	0
Lew	Hatherleigh Bridge	LB	0	1	0
Liverton Brook	d/s Liverton PS	LB	0	1	0
Drimpton Stream	u/s Netherhay Ford	LB	1	0	0
Erme	Sequers Bridge	LB	0	2	0
Corry Brook	Old Coryton	LB	0	0	0

Table 39 The 8 AQC'd samples audited for North Wessex Area of South West Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Melbury Stream Trib 3	u/s Lewcombe Manor	AB	0	0	0
Cam	Brookhampton House	AB	0	0	0
Cam Tributary	d/s Lower Barton	AB	0	0	0
Parrett	Haselbury Bridge	AB	0	0	0
Parrett	Thorney	WO	0	0	0
Fivehead	Bulford	WO	0	0	0
Wall Brook	Cudworth	WO	0	0	0
Broughton Brook	Newbarn	WO	0	0	0

Table 40 The 20 AQC'd samples audited for South Wessex Area of South West Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Jordan	d/s Waterside Holiday Park	PRH	0	0	0
Winspit Stream	d/s Worth Matravers STW	PRH	0	0	0
Sharcott Stream	d/s Malmesbury Potatoes	PRH	1	1	0
Western Avon Tributary	u/s Stanton St Bernard STW	PRH	0	0	0
Cards Mill Tributary	Cards Mill Farm	PRH	0	0	0
Champernhayes Stream	Charmouth	PRH	0	0	0
Winspit Stream	u/s Worth Matravers STW	PRH	0	0	0
Charing Cross Tributary	Cards Mill Farm	PRH	0	0	0
Wylye	Kingston Deverill	PRH	0	1	0
Tarrant	d/s Manor Farm	PRH	0	2	0
Tarrant	Tarrant Monkton	PRH	0	0	0
Tarrant	Tarrant Rawston	PRH	0	1	0
Sharcott Stream	u/s Malmesbury Potatoes	PRH	0	0	0
South Winterbourne	West Stafford	PRH	1	0	0
South Winterbourne	Winterbourne Herringstone	PRH	0	0	0
Hampshire Avon	Stratford-sub-Castle	PRH	1	0	0
Moors	d/s Industrial Estate	PRH	0	2	0
North Winterbourne	Winterbourne Kingston	PRH	0	0	0
Bere Stream	Weatherby Castle	PRH	0	0	0
North Winterbourne	Marsh Bridge	PRH	0	1	0

Table 41 Statistics of the1998 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
Cornwall	**10**	**0.30**	**0.15**	**0**	**0**	**1**	**0.70**	**0.26**
RJW	4	0.50	0.29	0	0	1	1.00	0.58
SAG	6	0.17	0.17	0	0	1	0.50	0.22
Devon	**20**	**0.40**	**0.13**	**0**	**0**	**2**	**0.50**	**0.14**
AD	8	0.38	0.18	0	0	1	0.38	0.18
LB	12	0.42	0.19	0	0	2	0.58	0.19
North Wessex	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AB	4	0	0	0	0	0	0	0
WO	4	0	0	0	0	0	0	0
South Wessex	**20**	**0.40**	**0.15**	**0**	**0**	**2**	**0.55**	**0.17**
PRH	20	0.40	0.15	0	0	2	0.55	0.17
South West Region	**58**	**0.33**	**0.08**	**0**	**0**	**2**	**0.48**	**0.09**

Table 42 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
Cornwall	**10**	**0.30**	**0**	**7**	**-0.10**	**0**	**1**
RJW	4	1.00	0	5	0	0	0
SAG	6	-0.17	0	7	-0.17	0	1
Devon	**20**	**1.80**	**0**	**10**	**0.30**	**0**	**2**
AD	8	2.88	0	10	0.38	0	1
LB	12	1.08	0	8	0.25	0	2
North Wessex	**8**	**0**	**0**	**0**	**0**	**0**	**0**
AB	4	0	0	0	0	0	0
WO	4	0	0	0	0	0	0
South Wessex	**20**	**1.50**	**0**	**11**	**0.25**	**0**	**2**
PRH	20	1.50	0	11	0.25	0	2
South West Region	**58**	**1.19**	**0**	**11**	**0.17**	**0**	**2**

Table 43 The families missed by South West Region's AQC inspectors

Family	**n**	**% of South West Region's missed families in AQC Audit**
Elmidae	2	11.11
Baetidae	2	11.11
Simuliidae	2	11.11
Planariidae (incl. Dugesiidae)	1	5.56
Tipulidae	1	5.56
Sphaeriidae	1	5.56
Rhyacophilidae (incl. Glossosomatidae)	1	5.56
Psychomyiidae (incl. Ecnomidae)	1	5.56
Leptophlebiidae	1	5.56
Ancylidae (incl. Acroloxidae)	1	5.56
Goeridae	1	5.56
Hydroptilidae	1	5.56
Chloroperlidae	1	5.56
Asellidae	1	5.56
Limnephilidae	1	5.56
Total	**18**	**100**

Table 44 The species missed by South West Region's AQC inspectors

Species	**n**	**% of South West Region's missed species in AQC Audit**
Baetis rhodani (Pictet)	2	11.11
Tipula (Yamatotipula) montium group	1	5.56
Limnephilidae indet	1	5.56
Simulium (Wilhelmia) sp.	1	5.56
Simulium (Simulium) ornatum group	1	5.56
Psychomyia pusilla (Fabricius)	1	5.56
Polycelis felina (Dalyell)	1	5.56
Limnius volckmari (Panzer)	1	5.56
Sphaeriidae indet	1	5.56
Ithytrichia sp.	1	5.56
Habrophlebia fusca (Curtis)	1	5.56
Goera pilosa (Fabricius)	1	5.56
Chloroperla torrentium (Pictet)	1	5.56
Asellus aquaticus (L.)	1	5.56
Ancylus fluviatilis Muller	1	5.56
Agapetus sp.	1	5.56
Elmis aenea (Muller)	1	5.56
Total	**18**	**100**

AUDIT OF THAMES REGION'S AQC INSPECTORS

Table 45 The 20 AQC'd samples audited for the South East Area of Thames Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Thames	d/s Skiff Club	300	0	0	0
Hascombe Stream	d/s Roadbridge	307	1	0	1
Barkham Brook	Borfield	307	2	4	0
Compton Stream	u/s Culvert	307	0	0	0
The Cut	u/s Thames	307	0	0	0
Boveney Ditch	u/s Thames	307	0	1	0
Hinley Brook	Fleet	307	0	1	0
Stanford Brook	Smarts Heath Lane	307	0	5	1
Oakhanger Stream	u/s Priory Farm	307	0	1	0
Hart	Hartford Bridge	307	1	1	0
Cranleigh Waters	u/s Collins Brook	307	0	1	0
Gatwick Stream	u/s Mole	307	0	2	0
Hogsmill	Surbiton Hill Park	317	1	1	1
Mole	Leatherhead	317	1	1	0
Bourne	u/s Thames (21.5.98)	317	2	1	2
Beverley Brook	Richmond Park (14.7.98)	317	0	1	1
Beverley Brook	Richmond Park (7.9.98)	317	0	0	0
Bourne	u/s Thames (18.11.98)	317	0	2	1
Bull Brook	Warfield Park Farm	317	0	0	0
Blackwater	GS Swallowfield	317	2	3	1

Table 46 The 18 AQC'd samples audited for the North East Area of Thames Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Dollis Brook	Bell Lane	DJL	0	0	0
Duke of Northumberland	Worton Road	DJL	1	0	0
G.U.C.	Tring	DJL	0	0	0
Stort	d/s Meesden Bridge	DJL	0	1	0
Stanstead Brook	Gypsy Lane	DJL	0	1	0
Hunsden Brook	u/s R.Stort	DJL	0	2	0
G.U.C. (Denham)	u/s A40	DJL	1	2	0
Chess	Chesham	DJL	0	2	0
Ver	Chequers Lane	JE	0	4	0
Quin	Braughing Bridge	JE	0	2	0
Haley Hill Ditch	Buntingford	JE	0	0	0
Cuffley Brook	Cuffley Hill	JE	0	0	0
Lee	u/s Luton STW	JE	0	2	0
Ingrebourne	u/s Weald Brook	JE	0	1	0
Costons Brook	u/s R.Brent	JE	0	1	0
Beane	Watton-at-Stone	JE	0	1	0
Ingrebourne	Harold Court Road	JE	0	2	0
Ash	Much Hadham	JE	0	1	0

Table 47 The 7 AQC'd samples audited for the West Area of Thames Region

River	Site	Analyst	Losses	Gains	Omissions
Sars Brook	U/s Lake	DJB	0	1	0
Dun	Hungerford	DJB	0	5	0
Kennet	Stitchcombe Mill	DJB	0	1	0
Tuckmill Brook	d/s Shrivenham STW	DJB	0	2	0
Letcombe Brook	d/s Wantage STW	DJB	0	1	0
Tackley Stream	d/s Pumping Station	JAB	0	0	0
Worminghall Brook	Worminghall	JAB	0	2	0

Table 48 Statistics of the 1998 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
North East	**18**	**1.22**	**0.25**	**1**	**5.56**	**4**	**1.33**	**0.26**
DJL	8	1.00	0.33	0	0	2	1.25	0.37
JE	10	1.40	0.37	1	10.00	4	1.40	0.37
South East	**20**	**1.25**	**0.31**	**3**	**15.00**	**5**	**2.15**	**0.47**
300	1	0	n/a	0	0	0	0	n/a
307	11	1.45	0.49	2	18.18	5	2.00	0.63
317	8	1.13	0.35	1	12.50	3	2.63	0.75
West	**7**	**1.71**	**0.61**	**1**	**14.29**	**5**	**1.71**	**0.61**
DJB	5	2.00	0.77	1	20.00	5	2.00	0.77
JAB	2	1.00	1.00	0	0	2	1.00	1.00
Thames Region	**45**	**1.31**	**0.19**	**5**	**11.11**	**5**	**1.76**	**0.25**

Table 49 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
North East	**18**	**5.61**	**5.56**	**14**	**1.11**	**5.56**	**4**
DJL	8	3.75	0	10	0.75	0	2
JE	10	7.10	10.00	14	1.40	10.00	4
South East	**20**	**3.90**	**5.00**	**34**	**0.75**	**5.00**	**5**
300	1	0	0	0	0	0	0
307	11	6.00	9.09	34	1.09	9.09	5
317	8	1.50	0	10	0.38	0	2
West	**7**	**9.71**	**28.57**	**33**	**1.71**	**14.29**	**5**
DJB	5	10.60	20.00	33	2.00	20.00	5
JAB	2	7.50	50.00	15	1.00	0	2
Thames Region	**45**	**5.49**	**8.89**	**34**	**1.04**	**6.67**	**5**

Table 50 The families missed by Thames Region's AQC inspectors

Family	**n**	**% of Thames Region's missed families in AQC Audit**
Hydroptilidae	7	13.21
Planorbidae	5	9.43
Haliplidae	4	7.55
Planariidae (incl. Dugesiidae)	4	7.55
Limnephilidae	3	5.66
Ancylidae (incl. Acroloxidae)	3	5.66
Glossiphoniidae	3	5.66
Caenidae	3	5.66
Sphaeriidae	2	3.77
Beraeidae	2	3.77
Oligochaeta	1	1.89
Tipulidae	1	1.89
Simuliidae	1	1.89
Sialidae	1	1.89
Psychomyiidae (incl. Ecnomidae)	1	1.89
Physidae	1	1.89
Hydrophilidae (incl. Hydraenidae)	1	1.89
Gyrinidae	1	1.89
Piscicolidae	1	1.89
Hydrobiidae (incl. Bithyniidae)	1	1.89
Notonectidae	1	1.89
Hydropsychidae	1	1.89
Chironomidae	1	1.89
Lepidostomatidae	1	1.89
Leptophlebiidae	1	1.89
Libellulidae	1	1.89
Elmidae	1	1.89
Total	**53**	**100**

Table 51 The species missed by Thames Region's AQC inspectors

Species	n	% of Thames Region's missed species in AQC Audit
Hydroptila sp.	5	8.93
Helobdella stagnalis (L.)	3	5.36
Limnephilidae indet	3	5.36
Caenis luctuosa group	3	5.36
Polycelis nigra group	3	5.36
Oxyethira sp.	2	3.57
Pisidium sp.	2	3.57
Haliplus lineatocollis (Marsham)	2	3.57
Beraeodes minutus (L.)	2	3.57
Ancylus fluviatilis Muller	2	3.57
Acroloxus lacustris (L.)	2	3.57
Haliplus sp.	2	3.57
Planorbis sp.	1	1.79
Lype sp.	1	1.79
Potamopyrgus jenkinsi (Smith)	1	1.79
Oulimnius tuberculatus (Muller)	1	1.79
Planorbis carinatus/planorbis	1	1.79
Planariidae indet	1	1.79
Sialis sp.	1	1.79
Piscicola geometra (L.)	1	1.79
Physa sp.	1	1.79
Simulium (Simulium) ornatum group	1	1.79
Tubificidae	1	1.79
Habrophlebia fusca (Curtis)	1	1.79
Anisus vortex (L.)	1	1.79
Armiger crista (L.)	1	1.79
Orectochilus villosus (Muller)	1	1.79
Gyraulus albus (Muller)	1	1.79
Orthocladiinae	1	1.79
Hippeutis complanatus (L.)	1	1.79
Hydropsyche angustipennis (Curtis)	1	1.79
Laccobius (Macrolaccobius) bipunctatus (Fabricius)	1	1.79
Lepidostoma hirtum (Fabricius)	1	1.79
Libellulidae indet	1	1.79
Notonecta sp.	1	1.79
Ormosia sp.	1	1.79
Elmis aenea (Muller)	1	1.79
Total	**56**	**100**

AUDIT OF WELSH REGION'S AQC INSPECTORS

Table 52 The 5 AQC'd samples audited for Northern Area of Welsh Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Afon Cadnant	u/s Bethel STW	353	0	0	0
Afon Alyn	u/s STW Stream	367	0	0	0
Afon Crawcwellt North	u/s of Leat	377	0	0	0
Afon Ogwen	Nant Ffrancon Site 3	377	0	0	0
Afon Morwynion	d/s WTW Discharge	377	1	0	0

Table 53 The 15 AQC'd samples audited for South Eastern Area of Welsh Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Yazor Brook	u/s Wye at Bulmers	367	0	0	0
Nant Myddlyn	d/s Cwm Coke Works	367	0	1	0
Nant Merdogg	d/s Silent Valley	367	0	0	0
Cwm Brook	d/s Road Bridge	367	0	0	0
Ebbw	u/s Aiwa	367	0	0	0
Arrow	u/s Mayglothling	367	0	0	0
Nant LLwyn yr Eos	d/s Lagoons	367	1	0	0
Taff	u/s Llwynon Reservoir	367	0	0	0
Frome	u/s Bishops Frome STW	367	0	0	0
Frome	Avonbury Court	367	0	1	0
Tarell	Brecon	367	1	0	0
Nant Rhydhalog	u/s Nant Dyfrgi	367	0	0	0
Worm Brook	d/s Kenderchurch STW	367	0	0	0
Gwyddon	Picnic Site	367	0	0	0
Rhymney	u/s Trehir Tip	367	0	0	0

Table 54 The 10 AQC'd samples audited for South Western Area of Welsh Region

River	Site	AQC Analyst	Losses	Gains	Omissions
Goytre	d/s Discharge 2	361	1	0	0
Un-named Watercourse	d/s Cwm Mawr Metal Mine	363	1	1	1
Blaenpelenna	Blaenpelenna 5a	363	1	1	0
Afan	W037 Afan	363	0	0	0
Cwm Gwydyll	u/s Esgair Mywn	363	0	0	0
Castell	d/s Castell Metal Mine	363	0	0	0
Rheidol	u/s Cwm Rheidol Metal Mine	363	0	2	0
Daren/Peithyll	d/s Daren Farm	363	0	0	0
Taf	u/s Mansel Davies	363	0	0	0
Narberth Brook	Narberth	363	0	0	0

Table 55 Statistics of the 1998 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	**5**	**0**	**0**	**0**	**0**	**0**	**0.20**	**0.20**
353	1	0	n/a	0	0	0	0	n/a
367	1	0	n/a	0	0	0	0	n/a
377	3	0	0	0	0	0	0.33	0.33
South Eastern	**15**	**0.13**	**0.09**	**0**	**0**	**1**	**0.27**	**0.12**
367	15	0.13	0.09	0	0	1	0.27	0.12
South Western	**10**	**0.40**	**0.22**	**0**	**0**	**2**	**0.80**	**0.36**
361	1	0	n/a	0	0	0	1.00	n/a
363	9	0.44	0.24	0	0	2	0.78	0.40
Welsh Region	**30**	**0.20**	**0.09**	**0**	**0**	**2**	**0.43**	**0.14**

Table 56 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	**5**	**-0.60**	**0**	**0**	**-0.20**	**0**	**0**
353	1	0	0	0	0	0	0
367	1	0	0	0	0	0	0
377	3	-1.00	0	0	-0.33	0	0
South Eastern	**15**	**0**	**0**	**7**	**0**	**0**	**1**
367	15	0	0	7	0	0	1
South Western	**10**	**0.60**	**10.00**	**15**	**0.10**	**0**	**2**
361	1	-3.00	0	-3	-1.00	0	-1
363	9	1.00	11.11	15	0.22	0	2
Welsh Region	**30**	**0.10**	**3.33**	**15**	**0**	**0**	**2**

Table 57 The families missed by Welsh Region's AQC inspectors

Family		**% of Welsh Region's missed families in AQC Audit**
Taeniopterygidae	1	20.00
Baetidae	1	20.00
Coenagrionidae	1	20.00
Dytiscidae (incl. Noteridae)	1	20.00
Polycentropodidae	1	20.00
Total	**5**	**100**

Table 58 The species missed by Welsh Region's AQC inspectors

Species	**n**	**% of Welsh Region's missed species in AQC Audit**
Pyrrhosoma nymphula (Sulzer)	1	20.00
Baetis scambus group	1	20.00
Brachyptera risi (Morton)	1	20.00
Oreodytes sanmarkii (Sahlberg)	1	20.00
Plectrocnemia conspersa (Curtis)	1	20.00
Total	**5**	**100**

SUMMARY OF AQC AUDIT FOR ENVIRONMENT AGENCY

Table 59 Statistics of the 1998 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 (l+g+o)	Standard error
Anglian Region	**60**	**0.58**	**0.09**	**0**	**0**	**2**	**1.05**	**0.16**
Central	20	0.60	0.15	0	0	2	1.35	0.33
Eastern	20	0.50	0.17	0	0	2	0.70	0.21
Northern	20	0.65	0.17	0	0	2	1.10	0.27
Midlands Region	**80**	**0.54**	**0.08**	**0**	**0**	**2**	**0.66**	**0.09**
Upper Severn	20	0.65	0.17	0	0	2	0.80	0.20
Lower Severn	20	0.55	0.15	0	0	2	0.80	0.17
Upper Trent	20	0.45	0.15	0	0	2	0.55	0.22
Lower Trent	20	0.50	0.15	0	0	2	0.50	0.15
North East Region	**60**	**0.78**	**0.12**	**2**	**3.33**	**5**	**0.92**	**0.15**
Dales	20	0.65	0.17	0	0	2	0.75	0.20
Northumbria	20	0.70	0.16	0	0	2	0.85	0.20
Ridings	20	1.00	0.29	2	10.00	5	1.15	0.37
North West Region	**52**	**0.52**	**0.09**	**0**	**0**	**2**	**0.85**	**0.15**
Central	20	0.55	0.14	0	0	2	0.75	0.16
Northern	12	0.67	0.26	0	0	2	1.25	0.52
Southern	20	0.40	0.13	0	0	2	0.70	0.16
Southern Region	**31**	**0.19**	**0.07**	**0**	**0**	**1**	**0.48**	**0.11**
Hants & I.O.W.	7	0	0	0	0	0	0.29	0.18
Kent	17	0.24	0.11	0	0	1	0.53	0.15
Sussex	7	0.29	0.18	0	0	1	0.57	0.30
South West Region	**58**	**0.33**	**0.08**	**0**	**0**	**2**	**0.48**	**0.09**
Cornwall	10	0.30	0.15	0	0	1	0.70	0.26
Devon	20	0.40	0.13	0	0	2	0.50	0.14
North Wessex	8	0	0	0	0	0	0	0
South Wessex	20	0.40	0.15	0	0	2	0.55	0.17
Thames Region	**45**	**1.31**	**0.19**	**5**	**11.11**	**5**	**1.76**	**0.25**
North East	18	1.22	0.25	1	5.56	4	1.33	0.26
South East	20	1.25	0.31	3	15.00	5	2.15	0.47
West	7	1.71	0.61	1	14.29	5	1.71	0.61
Welsh Region	**30**	**0.20**	**0.09**	**0**	**0**	**2**	**0.43**	**0.14**
Northern	5	0	0	0	0	0	0.20	0.20
South Eastern	15	0.13	0.09	0	0	1	0.27	0.12
South Western	10	0.40	0.22	0	0	2	0.80	0.36
Whole of Agency	**416**	**0.58**	**0.04**	**7**	**1.68**	**5**	**0.84**	**0.06**

Table 60 Net effects of the 1998 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	**60**	**1.58**	**1.67**	**15**	**0.25**	**0**	**2**
Central	20	1.00	5.00	15	0.20	0	2
Eastern	20	1.60	0	12	0.30	0	2
Northern	20	2.15	0	12	0.25	0	2
Midlands	**80**	**2.18**	**1.25**	**18**	**0.41**	**0**	**2**
Upper Severn	20	2.95	0	11	0.50	0	2
Lower Severn	20	1.15	0	12	0.30	0	2
Upper Trent	20	1.85	0	11	0.35	0	2
Lower Trent	20	2.75	5.00	18	0.50	0	2
North East	**60**	**4.52**	**8.33**	**37**	**0.68**	**3.33**	**4**
Dales	20	3.20	5.00	20	0.55	0	2
Northumbria	20	4.30	5.00	20	0.60	0	2
Ridings	20	6.05	15.00	37	0.90	10.00	4
North West	**52**	**1.79**	**3.85**	**16**	**0.25**	**0**	**2**
Central	20	1.90	5.00	15	0.35	0	2
Northern	12	2.00	8.33	16	0.08	0	2
Southern	20	1.55	0	12	0.25	0	2
Southern	**31**	**-0.06**	**0**	**10**	**-0.06**	**0**	**1**
Hants & IOW	7	-0.43	0	0	-0.14	0	0
Kent	17	0.18	0	10	-0.06	0	1
Sussex	7	-0.29	0	3	0	0	1
South West	**58**	**1.19**	**0**	**11**	**0.17**	**0**	**2**
Cornwall	10	0.30	0	7	-0.10	0	1
Devon	20	1.80	0	10	0.30	0	2
North Wessex	8	0	0	0	0	0	0
South Wessex	20	1.50	0	11	0.25	0	2
Thames	**45**	**5.49**	**8.89**	**34**	**1.04**	**6.67**	**5**
North East	18	5.61	5.56	14	1.11	5.56	4
South East	20	3.90	5.00	34	0.75	5.00	5
West	7	9.71	28.57	33	1.71	14.29	5
Welsh	**30**	**0.10**	**3.33**	**15**	**0.00**	**0**	**2**
Northern	5	-0.60	0	0	-0.20	0	0
South Eastern	15	0	0	7	0	0	1
South Western	10	0.60	10.00	15	0.10	0	2
Whole of Agency	**416**	**2.28**	**3.37**	**37**	**0.38**	**1.20**	**5**

Table 61 The families missed by the Agency's AQC inspectors in the 1998 Audit

Family	n	% of Agency's missed families in AQC Audit
Hydroptilidae	17	8.21
Planorbidae	10	4.83
Caenidae	10	4.83
Glossiphoniidae	9	4.35
Limnephilidae	9	4.35
Psychomyiidae (incl. Ecnomidae)	9	4.35
Simuliidae	8	3.86
Elmidae	8	3.86
Sphaeriidae	7	3.38
Ancylidae (incl. Acroloxidae)	7	3.38
Gammaridae (incl. Crangonyctidae)	6	2.90
Baetidae	6	2.90
Planariidae (incl. Dugesiidae)	6	2.90
Hydrobiidae (incl. Bithyniidae)	5	2.42
Hydropsychidae	5	2.42
Leptoceridae	5	2.42
Haliplidae	5	2.42
Tipulidae	5	2.42
Beraeidae	4	1.93
Chloroperlidae	4	1.93
Lepidostomatidae	4	1.93
Hydrophilidae (incl. Hydraenidae)	4	1.93
Goeridae	3	1.45
Asellidae	3	1.45
Taeniopterygidae	3	1.45
Sericostomatidae	3	1.45
Polycentropodidae	3	1.45
Leptophlebiidae	3	1.45
Physidae	3	1.45
Lymnaeidae	3	1.45
Nemouridae	2	0.97
Chironomidae	2	0.97
Libellulidae	2	0.97
Dendrocoelidae	2	0.97
Dytiscidae (incl. Noteridae)	2	0.97
Ephemerellidae	2	0.97
Piscicolidae	2	0.97
Valvatidae	2	0.97
Notonectidae	2	0.97
Gyrinidae	2	0.97

Table 61 continued

Family	n	% of Agency's missed families in AQC Audit
Erpobdellidae	1	0.48
Sialidae	1	0.48
Gerridae	1	0.48
Perlidae	1	0.48
Coenagrionidae	1	0.48
Oligochaeta	1	0.48
Rhyacophilidae (incl. Glossosomatidae)	1	0.48
Unionidae	1	0.48
Hydrometridae	1	0.48
Ephemeridae	1	0.48
Total	**207**	**100**

Table 62 The species missed by the Agency's AQC inspectors in the 1998 Audit

Species	n	% of Agency's missed species in AQC Audit
Hydroptila sp.	8	3.76
Ancylus fluviatilis Muller	6	2.82
Caenis luctuosa group	6	2.82
Elmis aenea (Muller)	6	2.82
Baetis rhodani (Pictet)	5	2.35
Pisidium sp.	5	2.35
Limnephilidae indet	5	2.35
Potamopyrgus jenkinsi (Smith)	5	2.35
Helobdella stagnalis (L.)	4	1.88
Oxyethira sp.	4	1.88
Lype sp.	4	1.88
Simulium (Simulium) ornatum group	4	1.88
Gammarus pulex (L.)	4	1.88
Lepidostoma hirtum (Fabricius)	3	1.41
Ithytrichia sp.	3	1.41
Gyraulus albus (Muller)	3	1.41
Glossiphonia complanata (L.)	3	1.41
Brachyptera risi (Morton)	3	1.41
Polycelis nigra group	3	1.41
Habrophlebia fusca (Curtis)	3	1.41
Sericostoma personatum (Spence)	3	1.41
Chloroperla tripunctata (Scopoli)	2	0.94
Acroloxus lacustris (L.)	2	0.94
Hydropsyche sp.	2	0.94
Hydropsyche siltalai Dohler	2	0.94
Hydraena gracilis Germar	2	0.94
Haliplus sp.	2	0.94
Haliplus lineatocollis (Marsham)	2	0.94
Sphaeriidae indet	2	0.94
Ephemerella ignita (Poda)	2	0.94
Libellulidae indet	2	0.94
Dendrocoelum lacteum (Muller)	2	0.94
Hippeutis complanatus (L.)	2	0.94
Chloroperla torrentium (Pictet)	2	0.94
Caenis rivulorum Eaton	2	0.94
Caenis horaria (L.)	2	0.94
Beraeodes minutus (L.)	2	0.94
Beraea maurus (Curtis)	2	0.94
Asellus aquaticus (L.)	2	0.94
Armiger crista (L.)	2	0.94

Table 62 continued

Species	n	% of Agency's missed species in AQC Audit
Anisus vortex (L.)	2	0.94
Tinodes waeneri (L.)	2	0.94
Physa sp.	2	0.94
Polycelis felina (Dalyell)	2	0.94
Orectochilus villosus (Muller)	2	0.94
Plectrocnemia conspersa (Curtis)	2	0.94
Piscicola geometra (L.)	2	0.94
Notonecta sp.	2	0.94
Chironomidae indet	1	0.47
Tipula sp.	1	0.47
Brychius elevatus (Panzer)	1	0.47
Planorbis sp.	1	0.47
Ephemera sp.	1	0.47
Planorbis carinatus/planorbis	1	0.47
Baetis scambus group	1	0.47
Planariidae indet	1	0.47
Sialis sp.	1	0.47
Crangonyx pseudogracilis Bousfield	1	0.47
Dicranota sp.	1	0.47
Dinocras cephalotes (Curtis)	1	0.47
Drusus annulatus (Stephens)	1	0.47
Tipula (Yamatotipula) montium group	1	0.47
Polycentropus flavomaculatus (Pictet)	1	0.47
Agapetus sp.	1	0.47
Agraylea multipunctata Curtis	1	0.47
Agraylea sp.	1	0.47
Valvata cristata Muller	1	0.47
Pyrrhosoma nymphula (Sulzer)	1	0.47
Anodonta sp.	1	0.47
Bathyomphalus contortus (L.)	1	0.47
Potamonectes depressus (Fabricius)	1	0.47
Baetis vernus Curtis	1	0.47
Asellus meridianus Racovitza	1	0.47
Athripsodes albifrons (L.)	1	0.47
Athripsodes aterrimus (Stephens)	1	0.47
Athripsodes cinereus (Curtis)	1	0.47
Athripsodes sp.	1	0.47
Tubificidae	1	0.47
Tinodes unicolor (Pictet)	1	0.47
Antocha vitripennis (Meigen)	1	0.47

Table 62 continued

Species	n	% of Agency's missed species in AQC Audit
Lymnaea peregra (Muller)	1	0.47
Simulium (Simulium) noelleri Friederichs	1	0.47
Simulium (Nevermannia) lundstromi (Enderlein)	1	0.47
Valvata piscinalis (Muller)	1	0.47
Lepidostomatidae indet	1	0.47
Simulium (Eusimulium) aureum group	1	0.47
Limnephilus lunatus Curtis	1	0.47
Physa acuta group	1	0.47
Limnius volckmari (Panzer)	1	0.47
Hydropsyche angustipennis (Curtis)	1	0.47
Lymnaea sp.	1	0.47
Lymnaea stagnalis (L.)	1	0.47
Silo sp.	1	0.47
Micropterna sp.	1	0.47
Mystacides azurea (L.)	1	0.47
Mystacides nigra (L.)	1	0.47
Nemoura avicularis Morton	1	0.47
Limnephilus sp.	1	0.47
Oulimnius tuberculatus (Muller)	1	0.47
Erpobdella octoculata (L.)	1	0.47
Nemoura cambrica group	1	0.47
Gammarus sp.	1	0.47
Gerris sp.	1	0.47
Tinodes rostocki Mclachlan	1	0.47
Glossiphonia heteroclita (L.)	1	0.47
Goera pilosa (Fabricius)	1	0.47
Oreodytes sanmarkii (Sahlberg)	1	0.47
Silo pallipes (Fabricius)	1	0.47
Ormosia sp.	1	0.47
Laccobius (Macrolaccobius) bipunctatus (Fabricius)	1	0.47
Oulimnius sp.	1	0.47
Psychomyia pusilla (Fabricius)	1	0.47
Orthocladiinae	1	0.47
Hydraena testacea Curtis	1	0.47
Hydrometra stagnorum (L.)	1	0.47
Simulium (Wilhelmia) sp.	1	0.47
Theromyzon tessulatum (Muller)	1	0.47
Total	**213**	**100**

MISSED TAXA FOR ALL SAMPLES IN THE 1998 AUDIT

Table 63 Missed families for all samples in the 1998 Audit

Family	n	% of missed families in 1998 audit
Hydroptilidae	61	5.82
Planariidae (incl. Dugesiidae)	46	4.39
Sphaeriidae	45	4.29
Caenidae	44	4.20
Elmidae	40	3.82
Planorbidae	38	3.63
Limnephilidae	35	3.34
Psychomyiidae (incl. Ecnomidae)	35	3.34
Hydrophilidae (incl. Hydraenidae)	34	3.24
Lymnaeidae	32	3.05
Simuliidae	32	3.05
Ancylidae (incl. Acroloxidae)	31	2.96
Hydrobiidae (incl. Bithyniidae)	30	2.86
Glossiphoniidae	28	2.67
Baetidae	28	2.67
Leptoceridae	27	2.58
Nemouridae	27	2.58
Haliplidae	24	2.29
Tipulidae	22	2.10
Hydropsychidae	22	2.10
Dytiscidae (incl. Noteridae)	19	1.81
Gammaridae (incl. Crangonyctidae)	18	1.72
Lepidostomatidae	17	1.62
Goeridae	17	1.62
Polycentropodidae	17	1.62
Chloroperlidae	16	1.53
Ephemerellidae	16	1.53
Asellidae	15	1.43
Valvatidae	15	1.43
Sericostomatidae	14	1.34
Oligochaeta	14	1.34
Leptophlebiidae	14	1.34
Rhyacophilidae (incl. Glossosomatidae)	12	1.15
Taeniopterygidae	12	1.15
Beraeidae	12	1.15
Dendrocoelidae	11	1.05
Leuctridae	10	0.95
Piscicolidae	10	0.95
Physidae	10	0.95
Gyrinidae	10	0.95
Erpobdellidae	9	0.86

Table 63 continued

Family	n	% of missed families in 1998 audit
Scirtidae	8	0.76
Coenagrionidae	7	0.67
Libellulidae	7	0.67
Chironomidae	7	0.67
Hydrometridae	5	0.48
Corixidae	4	0.38
Sialidae	4	0.38
Notonectidae	4	0.38
Odontoceridae	4	0.38
Perlidae	3	0.29
Heptageniidae	3	0.29
Ephemeridae	3	0.29
Gerridae	3	0.29
Philopotamidae	3	0.29
Calopterygidae	3	0.29
Brachycentridae	3	0.29
Unionidae	3	0.29
Neritidae	2	0.19
Siphlonuridae	1	0.10
Capniidae	1	0.10
Perlodidae	1	0.10
Total	**1048**	**100**

Table 64 Missed species for all samples in the 1998 Audit

Species	n	% of missed species in 1998 audit
Hydroptila sp.	39	3.55
Pisidium sp.	39	3.55
Potamopyrgus jenkinsi (Smith)	30	2.73
Ancylus fluviatilis Muller	27	2.46
Elmis aenea (Muller)	26	2.37
Caenis luctuosa group	23	2.09
Polycelis nigra group	22	2.00
Lymnaea peregra (Muller)	21	1.91
Hydraena gracilis Germar	21	1.91
Baetis rhodani (Pictet)	21	1.91
Limnephilidae indet	19	1.73
Simulium (Simulium) ornatum group	17	1.55
Ephemerella ignita (Poda)	16	1.46
Haliplus sp.	15	1.36
Lype sp.	15	1.36
Caenis rivulorum Eaton	15	1.36
Sericostoma personatum (Spence)	14	1.27
Glossiphonia complanata (L.)	14	1.27
Gyraulus albus (Muller)	14	1.27
Gammarus pulex (L.)	13	1.18
Helobdella stagnalis (L.)	12	1.09
Lepidostoma hirtum (Fabricius)	12	1.09
Asellus aquaticus (L.)	12	1.09
Chloroperla torrentium (Pictet)	12	1.09
Valvata cristata Muller	11	1.00
Dendrocoelum lacteum (Muller)	11	1.00
Brachyptera risi (Morton)	10	0.91
Hydropsyche siltalai Dohler	10	0.91
Piscicola geometra (L.)	10	0.91
Habrophlebia fusca (Curtis)	9	0.82
Polycelis felina (Dalyell)	9	0.82
Armiger crista (L.)	9	0.82
Ithytrichia sp.	9	0.82
Plectrocnemia conspersa (Curtis)	8	0.73
Tinodes waeneri (L.)	8	0.73
Psychomyia pusilla (Fabricius)	8	0.73
Orectochilus villosus (Muller)	8	0.73
Oulimnius tuberculatus (Muller)	8	0.73
Oxyethira sp.	8	0.73
Hydropsyche sp.	8	0.73
Silo pallipes (Fabricius)	7	0.64

Table 64 continued

Species	n	% of missed species in 1998 audit
Caenis horaria (L.)	7	0.64
Elodes sp.	7	0.64
Oreodytes sanmarkii (Sahlberg)	6	0.55
Dicranota sp.	6	0.55
Libellulidae indet	6	0.55
Lumbriculidae	6	0.55
Potamonectes depressus (Fabricius)	6	0.55
Acroloxus lacustris (L.)	6	0.55
Erpobdella octoculata (L.)	6	0.55
Beraeodes minutus (L.)	6	0.55
Polycentropus flavomaculatus (Pictet)	6	0.55
Bathyomphalus contortus (L.)	6	0.55
Athripsodes aterrimus (Stephens)	6	0.55
Agapetus sp.	6	0.55
Sphaeriidae indet	6	0.55
Goera pilosa (Fabricius)	6	0.55
Athripsodes cinereus (Curtis)	6	0.55
Crangonyx pseudogracilis Bousfield	5	0.45
Crenobia alpina (Dana)	5	0.45
Anisus vortex (L.)	5	0.45
Hippeutis complanatus (L.)	5	0.45
Nemoura avicularis Morton	5	0.45
Oulimnius sp.	5	0.45
Mystacides azurea (L.)	5	0.45
Limnius volckmari (Panzer)	5	0.45
Lymnaea truncatula (Muller)	5	0.45
Lymnaea sp.	5	0.45
Haliplus lineatocollis (Marsham)	5	0.45
Chloroperla tripunctata (Scopoli)	5	0.45
Beraea maurus (Curtis)	5	0.45
Physa sp.	5	0.45
Baetis vernus Curtis	5	0.45
Protonemura sp.	5	0.45
Nemurella picteti Klapalek	4	0.36
Polycelis sp.	4	0.36
Valvata piscinalis (Muller)	4	0.36
Tubificidae	4	0.36
Brychius elevatus (Panzer)	4	0.36
Dugesia polychroa group	4	0.36
Naididae	4	0.36
Lepidostomatidae indet	4	0.36

Table 64 continued

Species	n	% of missed species in 1998 audit
Tipula (Yamatotipula) montium group	4	0.36
Simulium (Wilhelmia) sp.	4	0.36
Rhyacophila sp.	4	0.36
Notonecta sp.	4	0.36
Odontocerum albicorne (Scopoli)	4	0.36
Athripsodes sp.	4	0.36
Leuctra fusca (L.)	4	0.36
Laccobius (Macrolaccobius) bipunctatus (Fabricius)	4	0.36
Simulium (Simulium) noelleri Friederichs	4	0.36
Tipula sp.	4	0.36
Leuctra sp.	3	0.27
Limnephilus lunatus Curtis	3	0.27
Hydropsyche pellucidula (Curtis)	3	0.27
Hydrometra stagnorum (L.)	3	0.27
Pyrrhosoma nymphula (Sulzer)	3	0.27
Agraylea multipunctata Curtis	3	0.27
Amphinemura sulcicollis (Stephens)	3	0.27
Anodonta sp.	3	0.27
Antocha vitripennis (Meigen)	3	0.27
Asellus meridianus Racovitza	3	0.27
Simulium (Eusimulium) aureum group	3	0.27
Athripsodes bilineatus (L.)	3	0.27
Silo sp.	3	0.27
Rhyacophila dorsalis (Curtis)	3	0.27
Lymnaea stagnalis (L.)	3	0.27
Brachycentrus subnubilus Curtis	3	0.27
Planaria torva (Muller)	3	0.27
Micronecta sp.	3	0.27
Calopteryx splendens (Harris)	3	0.27
Physa acuta group	3	0.27
Drusus annulatus (Stephens)	3	0.27
Orthocladiinae	3	0.27
Planariidae indet	3	0.27
Nemoura cambrica group	3	0.27
Dinocras cephalotes (Curtis)	3	0.27
Gammarus sp.	2	0.18
Agabus sp.	2	0.18
Agraylea sp.	2	0.18
Anacaena bipustulata (Marsham)	2	0.18
Glossiphonia heteroclita (L.)	2	0.18
Cyrnus flavidus Mclachlan	2	0.18

Table 64 continued

Species	n	% of missed species in 1998 audit
Baetis scambus group	2	0.18
Athripsodes albifrons (L.)	2	0.18
Cloeon dipterum (L.)	2	0.18
Ephemera sp.	2	0.18
Chironomidae indet	2	0.18
Erpobdellidae indet	2	0.18
Bithynia tentaculata (L.)	2	0.18
Gerris sp.	2	0.18
Simulium (Boophthora) erythrocephalum (de Geer)	2	0.18
Wormaldia sp.	2	0.18
Leptophlebiidae indet	2	0.18
Leuctra geniculata (Stephens)	2	0.18
Micropterna sp.	2	0.18
Mystacides nigra (L.)	2	0.18
Nemoura cinerea (Retzius)	2	0.18
Ischnura elegans (Van der Linden)	2	0.18
Ormosia sp.	2	0.18
Limnephilus sp.	2	0.18
Paraleptophlebia submarginata (Stephens)	2	0.18
Sialis sp.	2	0.18
Protonemura meyeri (Pictet)	2	0.18
Ilybius sp.	2	0.18
Planorbis carinatus/planorbis	2	0.18
Potamophylax cingulatus/latipennis	2	0.18
Planorbis sp.	2	0.18
Nephrotoma sp.	2	0.18
Hydrometra sp.	2	0.18
Hydraena testacea Curtis	2	0.18
Hydraena riparia Kugelann	2	0.18
Triaenodes bicolor (Curtis)	2	0.18
Tinodes unicolor (Pictet)	2	0.18
Theromyzon tessulatum (Muller)	2	0.18
Tinodes rostocki Mclachlan	2	0.18
Heptagenia sulphurea (Muller)	2	0.18
Theodoxus fluviatilis (L.)	2	0.18
Hydropsyche angustipennis (Curtis)	2	0.18
Beraea pullata (Curtis)	1	0.09
Prodiamesinae	1	0.09
Agabus guttatus (Paykull)	1	0.09
Adicella reducta (Mclachlan)	1	0.09
Prosimulium hirtipes/latimucro	1	0.09

Table 64 continued

Species	n	% of missed species in 1998 audit
Potamophylax cingulatus (Stephens)	1	0.09
Baetis sp.	1	0.09
Sialis fuliginosa Pictet	1	0.09
Sialis lutaria (L.)	1	0.09
Silo nigricornis (Pictet)	1	0.09
Trocheta subviridis Dutrochet	1	0.09
Amphinemura standfussi Ris	1	0.09
Anabolia nervosa (Curtis)	1	0.09
Tanytarsini	1	0.09
Taeniopteryx nebulosa (L.)	1	0.09
Sympetrum sp.	1	0.09
Siphlonurus lacustris Eaton	1	0.09
Simulium (Nevermannia) cryophilum group	1	0.09
Potamonectes sp.	1	0.09
Aplexa hypnorum (L.)	1	0.09
Simulium sp.	1	0.09
Simulium (Simulium) reptans (L.)	1	0.09
Amphinemura sp.	1	0.09
Simulium (Simulium) argyreatum group	1	0.09
Anacaena globulus (Paykull)	1	0.09
Simulium (Nevermannia) lundstromi (Enderlein)	1	0.09
Ceraclea nigronervosa (Retzius)	1	0.09
Hydrobius fuscipes (L.)	1	0.09
Leuctra inermis Kempny	1	0.09
Enallagma cyathigerum (Charpentier)	1	0.09
Enchytraeidae	1	0.09
Ephemera danica Muller	1	0.09
Esolus parallelepipedus (Muller)	1	0.09
Hydrophilidae indet	1	0.09
Physa fontinalis (L.)	1	0.09
Hydrocyphon deflexicollis (Muller)	1	0.09
Diamesinae	1	0.09
Glossiphoniidae indet	1	0.09
Glossosoma sp.	1	0.09
Glyphotaelius pellucidus (Retzius)	1	0.09
Gyrinidae indet	1	0.09
Gyrinus sp.	1	0.09
Halesus radiatus (Curtis)	1	0.09
Helophorus (Atracthelophorus) brevipalpis Bedel	1	0.09
Gerris (Gerris) lacustris (L.)	1	0.09
Philopotamus montanus (Donovan)	1	0.09

Table 64 continued

Species	n	% of missed species in 1998 audit
Brachyptera sp.	1	0.09
Platambus maculatus (L.)	1	0.09
Caenis luctuosa (Burmeister)	1	0.09
Pilaria (Pilaria) sp.	1	0.09
Callicorixa praeusta (Fieber)	1	0.09
Capnia bifrons (Newman)	1	0.09
Helius sp.	1	0.09
Ecdyonurus sp.	1	0.09
Chaetopteryx villosa (Fabricius)	1	0.09
Nemouridae indet	1	0.09
Perlodes microcephala (Pictet)	1	0.09
Paraleptophlebia sp.	1	0.09
Coenagrionidae indet	1	0.09
Orthotrichia sp.	1	0.09
Crunoecia irrorata (Curtis)	1	0.09
Oreodytes sp.	1	0.09
Polycentropus sp.	1	0.09
Cercyon sp.	1	0.09
Total	**1099**	**100**