EA-Water Quality

ENVIRONMENT AGENCY

# An audit of performance in the analysis of biological samples in 2000 Environment Agency: AQC Audit

Centre for Ecology and Hydrology

CEH Report Ref: C00158/11

# An audit of performance in the analysis of biological Samples in 2000
# 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. This covers 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

The collection of standard macro-invertebrate samples and their analysis to the level required for the Biological Monitoring Working Party (BMWP) system is the most widely used biological technique for evaluating water quality in the Environment Agency (The Agency). Used with the computer model RIVPACS (River Invertebrate Prediction and Classification System), they are the basis for the Agency's biological classification of water quality, which is used for national General Quality Assessment (GQA) river quality surveys as well as operational requirements, such as Catchment Management Plans and Biological Quality Objectives. These samples are also used for assessing pollution and setting priorities for capital investment. Data from these samples are made available to the public. An independent audit of these biological samples is required to ensure that a high and consistent standard of sorting and identification is maintained, to assess the proficiency of the internal laboratory analytical quality control (AQC) inspectors and to demonstrate the quality of the data to its users.

The 2000 GQA Survey of Rivers was undertaken by the Agency in England and Wales, the Scottish Environment Protection Agency (SEPA) in Scotland and the Industrial Research and Technology Unit (IRTU) in Northern Ireland. Each organisation employed standard collection procedures (Environment Agency 1999a) to ensure that the data collected were compatible with RIVPACS, the computer model developed by the Centre for Ecology and Hydrology (CEH). Each Agency laboratory appointed at least one experienced analyst to act as an internal analytical quality control (AQC) inspector. These inspectors re-sorted a random selection of about 10% of the laboratory's samples. In addition, CEH was contracted to undertake an independent, external audit of the quality of the laboratory analysis of the biological samples. 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 freshwater sites each year between 1991 and 1994 and again between 1996 and 1999. The audit for the Agency comprised two elements. The AQC Audit provides a measure of the quality of performance of the AQC inspectors. The Primary Audit provides an independent assessment of the quality of the data, since this was not adjusted for errors identified by the other quality assurance procedures.

This report presents the results of the audit of 520 samples that were internally AQCd by Agency staff. The results of the Primary Audit, detailing the quality of the primary analysis of these samples, are reported separately (Gunn *et al.*, 2001).

## 2. SAMPLE SELECTION

Samples for audit were selected internally by each of the organisations being monitored. The standard method of selection used by the Agency is described in Environment Agency (1999b). Each Agency laboratory randomly selected for audit 20 samples that had been processed twice (once for primary analysis and once for internal AQC inspection). The biologists processing these samples had no prior knowledge of which samples were to be audited. The precise 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 CEH was contracted to audit.

## 3. SAMPLE PROCESSING

The normal protocol for Agency biologists was to sort their samples, either live or preserved, within the laboratory. Samples were sorted for the families of macro-invertebrates included in the BMWP system and examples of each scoring taxon were removed. The invertebrates were placed in a vial of preservative (70% industrial alcohol) and the taxa present were recorded on a standard 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 were 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 CEH 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 CEH was as follows:

a) The remainder of the sample was sorted, without reference to the data sheet or to the vial of animals, and the BMWP families identified.
b) The families contained within the vial(s) were identified.
c) A comparison was made between the listing of families and those found in the sample by the CEH auditor.
d) A comparison was made between the listing of families and those identified from the vial(s) by the CEH auditor.
e) "Losses", "gains" and "omissions" 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) For each "loss" or "gain" the CEH auditor selected a code from a list at the foot of the result sheet to indicate the most likely cause of the error.

Definitions

Losses are taxa recorded as present by the analyst whose quality is being audited, but which were not found in the vial or sample by the auditors. Gains are taxa found in the vial or sample by the auditors, which were not recorded as present by the analyst whose quality is being audited. Omissions are taxa which were recorded as present by the analyst whose quality is being audited, and which the auditors find in the sample, but not in the vial.

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 CEH 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. 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 (see Figs 1 & 2) and sent to the Agency's Project Manager and the appropriate Regional Biologist. 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 CEH 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 CEH in the remainder of the sample were entered in the section of the report form headed "SAMPLE" under "Additional BMWP taxa found in sample". For Primary Audit results, this section also includes 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 CEH, 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 to highlight this fact. Such errors are noted as "omissions" and were generally caused by an analyst forgetting to place an example of the taxon in the vial, although occasionally, when an animal in the vial had been mis-identified that taxon was subsequently found in the sample by the CEH auditor.

Species identifications, state of development (eg adult or larval coleopterans) and the presence of a single representative of a family were recorded in the centre section of the report form.

CEH 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". Where an error was modified by the findings of the internal AQC inspector, a code to indicate this was selected instead (either code 11 or 12).

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" and "Additional BMWP taxa found in sample", as before. Families recorded on the list but not found by CEH were indicated in the section headed "BMWP taxa not found in sample." If the vial of animals had been 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:** 12 April 2000

**WATER-COURSE:** Beautiful River | **PRIMARY ANALYST:** XX | **AQC ANALYST:** YY

**SITE:** Utopia | **CODE:** 0001/AQC01 | **SORT/AQC METHOD:** Live/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 CEH 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:** 12 April 2000

**WATER-COURSE:** Beautiful River | **PRIMARY ANALYST:** XX | **AQC ANALYST:** YY

**SITE:** Utopia | **CODE:** 0001/AQC01 | **SORT/AQC METHOD:** Live/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 CEH in sample (no net loss or gain)**

## 5. RESULTS

The results of the AQC Audit for 2000 for the Agency 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 based on the target of acceptability for AQC inspectors of no more than 0.5 missed taxa per sample on average. These data are presented for each analyst, 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 scoring taxa. Following this are listings for the region of the taxa missed at family and species levels in the 2000 AQC Audit. Tables 59 and 60 summarise the statistics and net effects of the 2000 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 the Agency's AQC inspectors. Tables 63 and 64 give similar listings of taxa missed 5 times or more for the entire 2000 audit for the whole of the UK. Data for the Primary Audit are presented in a separate report (Gunn *et al*, 2001).

**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.*, 2001) 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 60 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 60 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 59). If the AQC inspection was of poor or varying quality, it is necessary to refer to the individual AQC Audit result sheets for individual audit 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

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# AUDIT OF ANGLIAN REGION'S AQC INSPECTORS

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Willingham Lode | Culvert at Rec Ground | BPM | 0 | 0 | 1 |
| Cam | Dimmocks Cotes Bridge | BPM | 0 | 1 | 0 |
| New River | 100 Acre Farm Bridge | EIS | 0 | 1 | 0 |
| Running Water | Ruxox Bridge | EIS | 0 | 0 | 0 |
| Alconbury Brook | Grindleys Bridge | EIS | 0 | 1 | 0 |
| Flood Relief Channel | Saddlebow Bridge | EIS | 3 | 1 | 0 |
| Ouse | Haversham Bridge | EIS | 0 | 1 | 1 |
| Little Ouse | Thetford Staunch | EIS | 0 | 2 | 0 |
| Granta | Bourn Bridge | MAC | 0 | 0 | 0 |
| Sapiston | Euston Bridge A1088 | MAC | 1 | 1 | 0 |
| Wretham Park Stream | B1111 Bridge | MAC | 0 | 0 | 0 |
| Tuddenham Mill Stream | Tuddenham Mill | MAC | 0 | 4 | 0 |
| Middle Level Main Drain | Thistle Hill Farm | SEH | 0 | 2 | 0 |
| Old Course Nene | March Town Bridge | SEH | 0 | 2 | 0 |
| Pophams Eau | Black Sluice | SEH | 0 | 2 | 0 |
| Deanshanger Brook | A422 Bridge | SEH | 0 | 0 | 0 |
| Rhee | Boot Lane | SEH | 2 | 2 | 1 |
| Sixteen Foot Drain | Horseways Corner Bridge | SEH | 0 | 1 | 0 |
| Wissey | Ickburgh Bridge | SEH | 0 | 3 | 0 |
| Bevills Leam | Chapel Bridge | SEH | 0 | 4 | 0 |

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Tenpenny Brook | East of Stable Wood | CFW | 0 | 1 | 0 |
| Bure | Ingworth | CFW | 0 | 2 | 0 |
| Mun | B1145 Bridge | CFW | 0 | 0 | 0 |
| Spickets Brook | Church Rd Bridge | CFW | 0 | 0 | 1 |
| Stambourne Brook | A604 Bridge, Gt.Yeldham | CFW | 0 | 0 | 0 |
| Wensum | Swanton Morley | CFW | 0 | 0 | 0 |
| Tas | Shotesham Ford | CFW | 0 | 0 | 0 |
| Gipping | Bramford Mill | CFW | 0 | 1 | 0 |
| Stour | Baythorne End | CFW | 0 | 0 | 0 |
| Blackwater | Greys Mill | CFW | 0 | 0 | 1 |
| Binham Tributary | Binham Ford | CFW | 0 | 0 | 0 |
| Tiffey | Carlton Forhoe Weir | CSA | 1 | 1 | 0 |
| Wattisham Watercourse | Badley Bridge | CSA | 0 | 1 | 0 |
| Bumpstead Brook | Watsoe Bridge | CSA | 0 | 4 | 0 |
| Alde | Langham Bridge | CSA | 1 | 2 | 0 |
| Mardyke | East at Harrow Inn | CSA | 0 | 0 | 0 |
| Ant | Tonnage Bridge | CSA | 0 | 0 | 0 |
| Stour | Bures Mill | JHS | 0 | 2 | 0 |
| The Mermaid | Brampton Bridge | JHS | 0 | 1 | 0 |
| Ter | Deres Bridge | JHS | 0 | 4 | 0 |

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Welland (Coronation | B1165 Spalding | CLP | 1 | 0 | 0 |
| Rase | u/s Market Rasen STW | CLP | 0 | 1 | 0 |
| Lower Witham | Bardney | CLP | 0 | 0 | 0 |
| Lymn/Steeping | Crow's Bridge | IMC | 0 | 0 | 0 |
| Harper's Brook | u/s Brigstock STW | IMC | 0 | 1 | 0 |
| Ise | Geddington | IMC | 1 | 2 | 0 |
| Thurlby Main Drain | Tongue End P.S. | IMC | 1 | 2 | 2 |
| Laceby Beck | Manor Top Farm Track | IMC | 1 | 0 | 0 |
| Lymn/Steeping | Crows Bridge | IMC | 1 | 0 | 1 |
| Upper Witham | Easton Park | RPC | 0 | 0 | 0 |
| Upper Witham | Easton Bridge | RPC | 0 | 1 | 0 |
| Gwash | Empingham | RPC | 2 | 0 | 0 |
| Lower Witham | Tattershall Bridge | RPC | 0 | 0 | 0 |
| Nene | u/s Broadholme STW | RPC | 0 | 1 | 0 |
| Sincil Dyke | Destructor | RPC | 0 | 0 | 0 |
| Buck Beck | A1031 | RPC | 1 | 0 | 0 |
| North Brook | Fort Henry Lake Outlet | RPC | 0 | 0 | 0 |
| Ruskington Brook | u/s R.Slea | RPC | 0 | 0 | 0 |
| Lymn | Partney | RPC | 0 | 1 | 0 |
| Chelveston Brook | Glebe Farm | RPC | 0 | 0 | 0 |

Table 4 Statistics of the 2000 AQC Audit for Anglian Region

| Analyst/Group | n | Mean gains | Standard error | Quality target achieved | Highest no. gains | Mean errors (l+g+o) | Standard error |
|---|---|---|---|---|---|---|---|
| **Central** | **20** | **1.40** | **0.28** | | **4** | **1.85** | **0.33** |
| BPM | 2 | 0.50 | 0.50 | ✓ | 1 | 1.00 | 0.00 |
| EIS | 6 | 1.00 | 0.26 | | 2 | 1.67 | 0.56 |
| MAC | 4 | 1.25 | 0.95 | | 4 | 1.50 | 0.96 |
| SEH | 8 | 2.00 | 0.42 | | 4 | 2.38 | 0.56 |
| **Eastern** | **20** | **0.95** | **0.29** | | **4** | **1.15** | **0.29** |
| CFW | 11 | 0.36 | 0.20 | ✓ | 2 | 0.55 | 0.21 |
| CSA | 6 | 1.33 | 0.61 | | 4 | 1.67 | 0.67 |
| JHS | 3 | 2.33 | 0.88 | | 4 | 2.33 | 0.88 |
| **Northern** | **20** | **0.45** | **0.15** | ✓ | **2** | **1.00** | **0.28** |
| CLP | 3 | 0.33 | 0.33 | ✓ | 1 | 0.67 | 0.33 |
| IMC | 6 | 0.83 | 0.40 | | 2 | 2.00 | 0.73 |
| RPC | 11 | 0.27 | 0.14 | ✓ | 1 | 0.55 | 0.21 |
| **Anglian Region** | **60** | **0.93** | **0.15** | | **4** | **1.33** | **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 | Standard error of net effect on score | Maximum underestimate of BMWP score | Mean net effect on no. of taxa | Standard error of net effect on no. of taxa | Maximum underestimate of no. of taxa |
|---|---|---|---|---|---|---|---|
| **Central** | **20** | **5.25** | **1.75** | **21** | **1.10** | **0.33** | **4** |
| BPM | 2 | 1.00 | 1.00 | 2 | 0.50 | 0.50 | 1 |
| EIS | 6 | 3.00 | 3.45 | 15 | 0.50 | 0.56 | 2 |
| MAC | 4 | 4.25 | 4.25 | 17 | 1.00 | 1.00 | 4 |
| SEH | 8 | 8.50 | 2.76 | 21 | 1.75 | 0.49 | 4 |
| **Eastern** | **20** | **4.15** | **1.51** | **24** | **0.85** | **0.28** | **4** |
| CFW | 11 | 1.64 | 1.27 | 14 | 0.36 | 0.20 | 2 |
| CSA | 6 | 5.17 | 2.63 | 17 | 1.00 | 0.63 | 4 |
| JHS | 3 | 11.33 | 6.44 | 24 | 2.33 | 0.88 | 4 |
| **Northern** | **20** | **-0.05** | **1.03** | **8** | **0.05** | **0.20** | **1** |
| CLP | 3 | -0.67 | 2.33 | 3 | 0.00 | 0.58 | 1 |
| IMC | 6 | 0.50 | 2.14 | 8 | 0.17 | 0.40 | 1 |
| RPC | 11 | -0.18 | 1.44 | 6 | 0.00 | 0.27 | 1 |
| **Anglian Region** | **60** | **3.12** | **0.88** | **24** | **0.67** | **0.17** | **4** |

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

| Family | n | % of Anglian Region's missed families in AQC Audit |
|---|---|---|
| Hydroptilidae | 5 | 10.87 |
| Hydrophilidae (incl. Hydraenidae) | 4 | 8.70 |
| Elmidae | 3 | 6.52 |
| Planariidae (incl. Dugesiidae) | 3 | 6.52 |
| Erpobdellidae | 2 | 4.35 |
| Haliplidae | 2 | 4.35 |
| Hydrobiidae (incl. Bithyniidae) | 2 | 4.35 |
| Ancylidae (incl. Acroloxidae) | 2 | 4.35 |
| Limnephilidae | 2 | 4.35 |
| Piscicolidae | 2 | 4.35 |
| Simuliidae | 1 | 2.17 |
| Calopterygidae | 1 | 2.17 |
| Chironomidae | 1 | 2.17 |
| Corixidae | 1 | 2.17 |
| Dryopidae | 1 | 2.17 |
| Dytiscidae (incl. Noteridae) | 1 | 2.17 |
| Tipulidae | 1 | 2.17 |
| Sphaeriidae | 1 | 2.17 |
| Leptophlebiidae | 1 | 2.17 |
| Gyrinidae | 1 | 2.17 |
| Sialidae | 1 | 2.17 |
| Rhyacophilidae (incl. Glossosomatidae) | 1 | 2.17 |
| Psychomyiidae (incl. Ecnomidae) | 1 | 2.17 |
| Planorbidae | 1 | 2.17 |
| Valvatidae | 1 | 2.17 |
| Lymnaeidae | 1 | 2.17 |
| Molannidae | 1 | 2.17 |
| Oligochaeta | 1 | 2.17 |
| Glossiphoniidae | 1 | 2.17 |
| **Total** | **46** | **100** |

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

| Species | n | % of Anglian Region's missed species in AQC Audit |
|---|---|---|
| Oulimnius sp. | 3 | 6.12 |
| Polycelis nigra group | 3 | 6.12 |
| Haliplus sp. | 2 | 4.08 |
| Potamopyrgus jenkinsi (Smith) | 2 | 4.08 |
| Piscicola geometra (L.) | 2 | 4.08 |
| Hydroptila sp. | 2 | 4.08 |
| Hydroporus angustatus Sturm | 1 | 2.04 |
| Hydrophilidae | 1 | 2.04 |
| Hydraena pulchella Germar | 1 | 2.04 |
| Hydraena nigrita Germar | 1 | 2.04 |
| Haliplus laminatus Schaller | 1 | 2.04 |
| Glossiphonia heteroclita (L.) | 1 | 2.04 |
| Erpobdellidae indet | 1 | 2.04 |
| Erpobdella octoculata (L.) | 1 | 2.04 |
| Dryopidae indet | 1 | 2.04 |
| Lymnaea sp. | 1 | 2.04 |
| Chironomini | 1 | 2.04 |
| Calopteryx splendens (Harris) | 1 | 2.04 |
| Bathyomphalus contortus (L.) | 1 | 2.04 |
| Ancylus fluviatilis Muller | 1 | 2.04 |
| Agraylea sp. | 1 | 2.04 |
| Agraylea multipunctata Curtis | 1 | 2.04 |
| Elmis aenea (Muller) | 1 | 2.04 |
| Orectochilus villosus (Muller) | 1 | 2.04 |
| Tubificidae | 1 | 2.04 |
| Tipula sp. | 1 | 2.04 |
| Simulium (Nevermannia) angustitarse group | 1 | 2.04 |
| Sialis lutaria (L.) | 1 | 2.04 |
| Rhyacophila dorsalis (Curtis) | 1 | 2.04 |
| Pisidium sp. | 1 | 2.04 |
| Limnephilus lunatus Curtis | 1 | 2.04 |
| Orthotrichia sp. | 1 | 2.04 |
| Acroloxus lacustris (L.) | 1 | 2.04 |
| Ochthebius minimus (Fabricius) | 1 | 2.04 |
| Naididae | 1 | 2.04 |
| Molanna angustata Curtis | 1 | 2.04 |
| Micronecta sp. | 1 | 2.04 |
| Lype sp. | 1 | 2.04 |
| Valvata piscinalis (Muller) | 1 | 2.04 |
| Limnephilus sp. | 1 | 2.04 |
| Paraleptophlebia submarginata (Stephens) | 1 | 2.04 |
| **Total** | **49** | **100** |

# AUDIT OF MIDLANDS REGION'S AQC INSPECTORS

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Sheinton Brook | Sheinton | 01 | 0 | 0 | 0 |
| Burlington Brook | Tong Forge | 01 | 0 | 0 | 0 |
| Onny | d/s Craven Arms STW | 01 | 0 | 0 | 1 |
| Leigh/Cradley Brook | Leigh | 01 | 0 | 0 | 0 |
| Bobs Brook | u/s CG STW | 01 | 0 | 0 | 1 |
| Salwarpe | Chapel Bridge | 01 | 3 | 2 | 0 |
| Morda | u/s Oswestry STW | 01 | 1 | 1 | 0 |
| Catshill Tributary | u/s Battlefield Brook | 01 | 0 | 0 | 0 |
| Severn | Coalport | 01 | 0 | 1 | 0 |
| Stour | Hayseech | 01 | 0 | 0 | 0 |
| Farley Brook | Rock House Inn | 01 | 0 | 0 | 0 |
| Iwrch | Pont Maes Mochnant | 01 | 0 | 0 | 0 |
| Nedge Brook | Naird Lane | 01 | 0 | 0 | 0 |
| Snakescroft Brook | u/s Bishops Castle | 07 | 2 | 2 | 0 |
| Hen Brook | A38 | 07 | 0 | 0 | 0 |
| Mad Brook | Beckbury Bridge | 07 | 1 | 0 | 0 |
| Cain | Llanfechain | 07 | 0 | 0 | 0 |
| Spadesbourne Brook | Bromsgrove | 07 | 0 | 0 | 0 |
| Teme | Ashford Carbonnel | 07 | 1 | 0 | 0 |
| Rhaeddr | B 4396 | 07 | 1 | 1 | 0 |

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Gran Brook | u/s Mickleton Brook | 11 | 0 | 1 | 0 |
| Cannop Brook | Lydney Harbour | 11 | 0 | 1 | 0 |
| Radway Brook | Radway | 11 | 0 | 0 | 0 |
| Frome | Beards Mill | 11 | 0 | 1 | 0 |
| Mill Brook | Hillworth | 11 | 0 | 2 | 0 |
| Gog Brook | Stratford Road | 11 | 0 | 0 | 0 |
| Severn | Tewkesbury | 11 | 1 | 1 | 0 |
| Rains Brook | Kilby | 11 | 0 | 0 | 0 |
| Swift | Churchover Sluice | 11 | 0 | 0 | 0 |
| Swift | Lutterworth | 11 | 0 | 1 | 0 |
| Clifton Brook | R.Avon confluence | 11 | 0 | 1 | 0 |
| Hall Brook | Manor Farm | 11 | 0 | 2 | 0 |
| Westbury Brook | Westbury | 11 | 0 | 0 | 0 |
| Avon | Clifton | 11 | 0 | 0 | 0 |
| Bow Brook | Shell Ford | 11 | 0 | 1 | 0 |
| Canley Brook | Coventry Road | 11 | 0 | 0 | 0 |
| Daniels Brook | Bristol Road | 11 | 0 | 0 | 0 |
| Oldberrow Brook | B4480 Bridge | 11 | 0 | 0 | 0 |
| Claverdon Brook | Hatton | 11 | 1 | 0 | 0 |
| Avon | u/s Rugby | 11 | 0 | 0 | 0 |

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Church Eaton Brook | Church Eaton | 03 | 1 | 6 | 0 |
| Blythe | Blythe Bridge | 03 | 0 | 4 | 0 |
| Whiston Brook | Mitton Manor | 03 | 0 | 0 | 0 |
| Whitacre Brook | u/s Furnace End WRW | 03 | 0 | 0 | 0 |
| Kingsbury Brook | Kingsbury | 03 | 0 | 0 | 0 |
| Pasturefields Dyke | Farley Bridge | 03 | 0 | 1 | 0 |
| Picknall/Hockley Brook | Woodford | 03 | 0 | 2 | 0 |
| Overseal Brook | Netherseal | 03 | 0 | 1 | 0 |
| Mease | Stretton Bridge | 03 | 0 | 2 | 0 |
| Anker | Polesworth | 03 | 0 | 2 | 0 |
| Kingsbury Brook | Kingsbury | 03 | 0 | 1 | 0 |
| Dove | Glutton | 03 | 0 | 2 | 0 |
| Scotia Brook | Westport Road | 03 | 0 | 4 | 0 |
| Trent | Norton Green | 03 | 1 | 2 | 0 |
| Tame | Two Gates Fazeley | 03 | 0 | 2 | 0 |
| Chitlings Brook | Trent Vale | 03 | 1 | 0 | 0 |
| Scotch Brook | Stone | 03 | 0 | 0 | 0 |
| Coombes Brook | Basford | 03 | 0 | 1 | 0 |
| Penmire Brook | Grendon | 03 | 1 | 0 | 0 |
| Manifold | Ilam | 03 | 0 | 0 | 0 |

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Ragdale Brook | Hoby | 05 | 0 | 1 | 0 |
| Skegby Brook | B6014 | 05 | 0 | 2 | 0 |
| Willow Brook | Soar confluence | 05 | 0 | 1 | 0 |
| Cuttail Brook | Salmon Lane | 05 | 0 | 0 | 0 |
| Burton Brook | Burton Lazars | 05 | 0 | 1 | 0 |
| Ryton | Scrooby | 05 | 0 | 0 | 0 |
| Burton Stather Drain | Confluence | 05 | 0 | 1 | 0 |
| Sence | Wigston | 05 | 0 | 3 | 0 |
| Noe | Shatton | 05 | 0 | 1 | 0 |
| Kingston Brook | Kingston on Soar | 05 | 1 | 0 | 0 |
| Idle | Mattersey | 05 | 0 | 0 | 0 |
| Cramfit Brook | Cramfit Bridge | 05 | 0 | 1 | 0 |
| Day Brook | Basford | 05 | 0 | 0 | 0 |
| Sence | Wigston | 05 | 0 | 2 | 0 |
| Queniborough Brook | Wreake confluence | 05 | 0 | 0 | 0 |
| Nut Brook | Confluence | 05 | 0 | 0 | 0 |
| Ashop | Ashop | 05 | 0 | 0 | 0 |
| Heage Brook | Ambergate | 05 | 0 | 0 | 0 |
| Twyford Brook | d/s Findern STW | 05 | 1 | 3 | 0 |
| Soar | Claybrooke | 05 | 1 | 1 | 0 |

Table 12 Statistics of the 2000 AQC Audit for Midlands Region

| Analyst/ Group | n | Mean gains | Standard error | Quality target achieved | Highest no. gains | Mean errors (l+g+o) | Standard error |
|---|---|---|---|---|---|---|---|
| **U. Severn** | **20** | **0.35** | **0.15** | ✓ | **2** | **0.90** | **0.32** |
| 01 | 13 | 0.31 | 0.17 | ✓ | 2 | 0.77 | 0.39 |
| 07 | 7 | 0.43 | 0.30 | ✓ | 2 | 1.14 | 0.55 |
| **L. Severn** | **20** | **0.55** | **0.15** | | **2** | **0.65** | **0.17** |
| 11 | 20 | 0.55 | 0.15 | | 2 | 0.65 | 0.17 |
| **U. Trent** | **20** | **1.50** | **0.37** | | **6** | **1.70** | **0.39** |
| 03 | 20 | 1.50 | 0.37 | | 6 | 1.70 | 0.39 |
| **L. Trent** | **20** | **0.85** | **0.22** | | **3** | **1.00** | **0.25** |
| 05 | 20 | 0.85 | 0.22 | | 3 | 1.00 | 0.25 |
| **Midlands Region** | **80** | **0.81** | **0.13** | | **6** | **1.06** | **0.15** |

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 | Standard error of net effect on score | Maximum underestimate of BMWP score | Mean net effect on no. of taxa | Standard error of net effect on no. of taxa | Maximum underestimate of no. of taxa |
|---|---|---|---|---|---|---|---|
| **U. Severn** | **20** | **-0.35** | **0.67** | **10** | **-0.10** | **0.10** | **1** |
| 01 | 13 | 0.54 | 0.82 | 10 | 0 | 0.11 | 1 |
| 07 | 7 | -2.00 | 0.95 | 0 | -0.29 | 0.18 | 0 |
| **L. Severn** | **20** | **2.70** | **0.87** | **10** | **0.45** | **0.17** | **2** |
| 11 | 20 | 2.70 | 0.87 | 10 | 0.45 | 0.17 | 2 |
| **U. Trent** | **20** | **7.00** | **2.10** | **30** | **1.30** | **0.36** | **5** |
| 03 | 20 | 7.00 | 2.10 | 30 | 1.30 | 0.36 | 5 |
| **L. Trent** | **20** | **4.40** | **1.31** | **16** | **0.70** | **0.22** | **3** |
| 05 | 20 | 4.40 | 1.31 | 16 | 0.70 | 0.22 | 3 |
| **Midlands Region** | **80** | **3.44** | **0.73** | **30** | **0.59** | **0.13** | **5** |

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

| Family | n | % of Midlands Region's missed families in AQC Audit |
|---|---|---|
| Elmidae | 6 | 10.34 |
| Planariidae (incl. Dugesiidae) | 5 | 8.62 |
| Simuliidae | 4 | 6.90 |
| Leptoceridae | 4 | 6.90 |
| Hydroptilidae | 3 | 5.17 |
| Ancylidae (incl. Acroloxidae) | 3 | 5.17 |
| Hydrophilidae (incl. Hydraenidae) | 2 | 3.45 |
| Valvatidae | 2 | 3.45 |
| Nemouridae | 2 | 3.45 |
| Hydrobiidae (incl. Bithyniidae) | 2 | 3.45 |
| Planorbidae | 2 | 3.45 |
| Dendrocoelidae | 2 | 3.45 |
| Rhyacophilidae (incl. Glossosomatidae) | 2 | 3.45 |
| Asellidae | 2 | 3.45 |
| Coenagrionidae | 1 | 1.72 |
| Calopterygidae | 1 | 1.72 |
| Ephemerellidae | 1 | 1.72 |
| Caenidae | 1 | 1.72 |
| Baetidae | 1 | 1.72 |
| Dytiscidae (incl. Noteridae) | 1 | 1.72 |
| Glossiphoniidae | 1 | 1.72 |
| Limnephilidae | 1 | 1.72 |
| Lymnaeidae | 1 | 1.72 |
| Physidae | 1 | 1.72 |
| Polycentropodidae | 1 | 1.72 |
| Psychomyiidae (incl. Ecnomidae) | 1 | 1.72 |
| Scirtidae | 1 | 1.72 |
| Sericostomatidae | 1 | 1.72 |
| Sphaeriidae | 1 | 1.72 |
| Tipulidae | 1 | 1.72 |
| Leuctridae | 1 | 1.72 |
| **Total** | **58** | **100** |

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

| Species | n | % of Midlands Region's missed species in AQC Audit |
|---|---|---|
| Elmis aenea (Muller) | 6 | 10.34 |
| Ancylus fluviatilis Muller | 3 | 5.17 |
| Hydroptila sp. | 3 | 5.17 |
| Polycelis nigra group | 2 | 3.45 |
| Agapetus sp. | 2 | 3.45 |
| Simulium sp. | 2 | 3.45 |
| Simulium (Simulium) ornatum group | 2 | 3.45 |
| Mystacides azurea (L.) | 2 | 3.45 |
| Polycelis sp. | 2 | 3.45 |
| Dendrocoelum lacteum (Muller) | 2 | 3.45 |
| Gyraulus albus (Muller) | 1 | 1.72 |
| Glossiphonia complanata (L.) | 1 | 1.72 |
| Ephemerella ignita (Poda) | 1 | 1.72 |
| Elodes sp. | 1 | 1.72 |
| Coenagrionidae indet | 1 | 1.72 |
| Caenis luctuosa group | 1 | 1.72 |
| Limnephilidae indet | 1 | 1.72 |
| Bithynia sp. | 1 | 1.72 |
| Baetis rhodani (Pictet) | 1 | 1.72 |
| Athripsodes aterrimus (Stephens) | 1 | 1.72 |
| Asellus meridianus Racovitza | 1 | 1.72 |
| Asellus aquaticus (L.) | 1 | 1.72 |
| Armiger crista (L.) | 1 | 1.72 |
| Calopteryx splendens (Harris) | 1 | 1.72 |
| Planariidae indet | 1 | 1.72 |
| Valvata cristata Muller | 1 | 1.72 |
| Tipulidae indet | 1 | 1.72 |
| Tinodes sp. | 1 | 1.72 |
| Sphaeriidae indet | 1 | 1.72 |
| Sericostoma personatum (Spence) | 1 | 1.72 |
| Protonemura praecox (Morton) | 1 | 1.72 |
| Hygrotus versicolor (Schaller) | 1 | 1.72 |
| Plectrocnemia sp. | 1 | 1.72 |
| Hydraena sp. | 1 | 1.72 |
| Physa fontinalis (L.) | 1 | 1.72 |
| Ochthebius bicolon Germar | 1 | 1.72 |
| Nemoura cambrica group | 1 | 1.72 |
| Mystacides sp. | 1 | 1.72 |
| Lymnaea peregra (Muller) | 1 | 1.72 |
| Valvata piscinalis (Muller) | 1 | 1.72 |
| Leuctra fusca (L.) | 1 | 1.72 |
| Potamopyrgus jenkinsi (Smith) | 1 | 1.72 |
| **Total** | **58** | **100** |

# AUDIT OF NORTH EAST REGION'S AQC INSPECTORS

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Ouse | Acaster Malbis (Airlift) | CJ | 0 | 0 | 0 |
| Wharfe | Otley | CJ | 0 | 0 | 0 |
| Skerne | d/s Winterton Hospital STW | EA | 0 | 1 | 0 |
| Swale | Skipton-on-Swale | EA | 0 | 1 | 0 |
| Derwent | Bubwith (Sweep) | EA | 0 | 3 | 0 |
| Thornton Beck | Thornton Dale | EA | 0 | 0 | 0 |
| Collingham Beck | Collingham | EA | 0 | 1 | 0 |
| Hertford | Ganton | EA | 0 | 2 | 0 |
| Firgreen Beck | A659 Bridge | SW | 0 | 2 | 0 |
| Shotton Beck | Shotton | SW | 0 | 0 | 0 |
| Leven | East Angrove | SW | 0 | 0 | 0 |
| Whitton Beck | Whitton | SW | 0 | 0 | 0 |
| Cowbridge Beck | d/s Billingham STW | SW | 0 | 0 | 0 |
| Wharfe | Harewood | SW | 0 | 1 | 0 |
| Tees | Egglestone Abbey | SW | 0 | 0 | 0 |
| Dove | Farndale | SW | 0 | 2 | 0 |
| Aldborough Beck | B6275 Bridge | SW | 0 | 0 | 0 |
| Oak Beck | Harrowgate | SW | 0 | 0 | 0 |
| Murk Esk | Grosmont | SW | 0 | 2 | 0 |
| Nidd | Walshford Bridge | SW | 0 | 0 | 0 |

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Gaunless | u/s Wear, Bishops Palace | AG | 0 | 0 | 0 |
| Croxdale Beck | Croxdale House | AG | 0 | 0 | 0 |
| N. Tyne | Bellingham | EWS | 0 | 1 | 0 |
| Beechburn Beck | Beechburn Farm | EWS | 0 | 1 | 0 |
| Twizell Burn | u/s Hustledown STW | EWS | 1 | 3 | 0 |
| Derwent | Allensford | FC | 0 | 2 | 0 |
| Pont | Foxcourt Lane | FC | 0 | 0 | 0 |
| How Burn | u/s Wansbeck | FC | 0 | 0 | 0 |
| Wooler Water | d/s Wooler STW | FC | 0 | 1 | 0 |
| Blackburn | Midleholme | FC | 0 | 0 | 0 |
| Roddam Burn | East Lilburn | FC | 0 | 0 | 0 |
| Embleton Burn | Embleton | JL | 0 | 0 | 0 |
| Don | u/s Leam SSO | JL | 0 | 0 | 0 |
| Hartley Burn | Burnfoot | JL | 0 | 0 | 0 |
| Wallishwalls Burn | u/s confluence R. Derwent | JL | 0 | 1 | 0 |
| Croxdale Beck | Tursdale House | VW | 0 | 0 | 0 |
| Blyth | Belassis | VW | 0 | 3 | 0 |
| Pont | Kirkley Mill | VW | 0 | 0 | 0 |
| Twizell Burn | u/s Hustledown STW | VW | 0 | 1 | 0 |
| Lumley Park Burn | Lumley Castle | VW | 0 | 0 | 0 |

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Dove | Wombwell Ings | JL | 0 | 0 | 0 |
| Ramsden Clough | d/s Brownhill Reservoir | JL | 0 | 0 | 0 |
| Little Don | Crookland Wood | JL | 1 | 2 | 0 |
| Dearne | d/s Carr Dyke | JL | 0 | 1 | 0 |
| Don | Dunford Bridge | JL | 1 | 2 | 0 |
| Colne | Ashgrove Road | MC | 0 | 0 | 0 |
| Greasborough Dike | By B6089 | MC | 0 | 2 | 0 |
| Midgelden Brook | By A681 | MC | 0 | 2 | 1 |
| Silkstone Beck | Pothouse Bridge | MC | 0 | 2 | 1 |
| Smithy Brook | Mitchell Campers | MC | 0 | 0 | 0 |
| Bradford Beck | Shipley | MC | 0 | 0 | 0 |
| Thick Hollings Dike | d/s David Brown Tractors | MC | 0 | 0 | 0 |
| Scout Dike | u/s Ingbirchwith Res. | MC | 0 | 2 | 0 |
| Banks Bottom Dike | u/s Norcroft Bridge | MC | 0 | 1 | 0 |
| West Beck | Whinhill Fish Farm | RJJ | 0 | 0 | 0 |
| West Beck | The Bottoms | RJJ | 0 | 0 | 0 |
| Ings & Tetherings Drain | u/s Bird Lane | VH | 0 | 0 | 0 |
| Alverthorpe Beck | Low Laithes Bridge | VH | 0 | 0 | 0 |
| Watton Beck | Watton Carrs | VH | 0 | 0 | 0 |
| Foulness | Hasholme Ford Bridge | VH | 0 | 1 | 0 |

Table 19 Statistics of the 2000 AQC Audit for North East Region

| Analyst/ Group | n | Mean gains | Standard error | Quality target achieved | Highest no. gains | Mean errors (l+g+o) | Standard error |
|---|---|---|---|---|---|---|---|
| **Dales** | **20** | **0.75** | **0.22** | | **3** | **0.75** | **0.22** |
| CJ | 2 | 0 | 0 | ✓ | 0 | 0 | 0 |
| EA | 6 | 1.33 | 0.42 | | 3 | 1.33 | 0.42 |
| SW | 12 | 0.58 | 0.26 | | 2 | 0.58 | 0.26 |
| **Northumbria** | **20** | **0.65** | **0.22** | | **3** | **0.70** | **0.25** |
| AG | 2 | 0 | 0 | | 0 | 0 | 0 |
| EWS | 3 | 1.67 | 0.67 | | 3 | 2.00 | 1.00 |
| FC | 6 | 0.50 | 0.34 | ✓ | 2 | 0.50 | 0.34 |
| JL | 4 | 0.25 | 0.25 | ✓ | 1 | 0.25 | 0.25 |
| VW | 5 | 0.80 | 0.58 | | 3 | 0.80 | 0.58 |
| **Ridings** | **20** | **0.75** | **0.20** | | **2** | **0.95** | **0.28** |
| JL | 5 | 1.00 | 0.45 | | 2 | 1.40 | 0.68 |
| MC | 9 | 1.00 | 0.33 | | 2 | 1.22 | 0.43 |
| RJJ | 2 | 0 | 0 | ✓ | 0 | 0 | 0 |
| VH | 4 | 0.25 | 0.25 | ✓ | 1 | 0.25 | 0.25 |
| **N. East Region** | **60** | **0.72** | **0.12** | | **3** | **0.80** | **0.14** |

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 | Standard error of net effect on score | Maximum underestimate of BMWP score | Mean net effect on no. of taxa | Standard error of net effect on no. of taxa | Maximum underestimate of no. of taxa |
|---|---|---|---|---|---|---|---|
| **Dales** | **20** | **4.50** | **1.42** | **22** | **0.75** | **0.22** | **3** |
| CJ | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| EA | 6 | 8.00 | 3.09 | 22 | 1.33 | 0.42 | 3 |
| SW | 12 | 3.50 | 1.64 | 15 | 0.58 | 0.26 | 2 |
| **Northumbria** | **20** | **3.50** | **1.10** | **16** | **0.60** | **0.20** | **3** |
| AG | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| EWS | 3 | 6.67 | 0.33 | 7 | 1.33 | 0.33 | 2 |
| FC | 6 | 3.67 | 2.33 | 12 | 0.50 | 0.34 | 2 |
| JL | 4 | 1.25 | 1.25 | 5 | 0.25 | 0.25 | 1 |
| VW | 5 | 4.60 | 3.16 | 16 | 0.80 | 0.58 | 3 |
| **Ridings** | **20** | **5.35** | **1.50** | **20** | **0.65** | **0.18** | **2** |
| JL | 5 | 5.80 | 2.42 | 11 | 0.60 | 0.24 | 1 |
| MC | 9 | 8.00 | 2.70 | 20 | 1.00 | 0.33 | 2 |
| RJJ | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| VH | 4 | 1.50 | 1.50 | 6 | 0.25 | 0.25 | 1 |
| **N. East Region** | **60** | **4.45** | **0.77** | **22** | **0.67** | **0.11** | **3** |

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

| Family | n | % of North East Region's missed families in AQC Audit |
|---|---|---|
| Hydroptilidae | 4 | 10.53 |
| Hydrophilidae (incl. Hydraenidae) | 3 | 7.89 |
| Nemouridae | 3 | 7.89 |
| Caenidae | 2 | 5.26 |
| Dytiscidae (incl. Noteridae) | 2 | 5.26 |
| Elmidae | 2 | 5.26 |
| Leptoceridae | 2 | 5.26 |
| Limnephilidae | 2 | 5.26 |
| Planorbidae | 2 | 5.26 |
| Scirtidae | 1 | 2.63 |
| Taeniopterygidae | 1 | 2.63 |
| Sialidae | 1 | 2.63 |
| Sericostomatidae | 1 | 2.63 |
| Ephemerellidae | 1 | 2.63 |
| Gammaridae (incl. Crangonyctidae) | 1 | 2.63 |
| Glossiphoniidae | 1 | 2.63 |
| Leuctridae | 1 | 2.63 |
| Hydrobiidae (incl. Bithyniidae) | 1 | 2.63 |
| Perlodidae | 1 | 2.63 |
| Hydropsychidae | 1 | 2.63 |
| Asellidae | 1 | 2.63 |
| Rhyacophilidae (incl. Glossosomatidae) | 1 | 2.63 |
| Unionidae | 1 | 2.63 |
| Planariidae (incl. Dugesiidae) | 1 | 2.63 |
| Heptageniidae | 1 | 2.63 |
| **Total** | **38** | **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 |
|---|---|---|
| Hydraena gracilis Germar | 3 | 7.89 |
| Hydroptila sp. | 3 | 7.89 |
| Oulimnius sp. | 2 | 5.26 |
| Nemoura avicularis Morton | 2 | 5.26 |
| Caenis luctuosa group | 2 | 5.26 |
| Helobdella stagnalis (L.) | 1 | 2.63 |
| Glossosoma sp. | 1 | 2.63 |
| Gammarus sp. | 1 | 2.63 |
| Hydropsyche angustipennis (Curtis) | 1 | 2.63 |
| Elodes sp. | 1 | 2.63 |
| Brachyptera risi (Morton) | 1 | 2.63 |
| Bathyomphalus contortus (L.) | 1 | 2.63 |
| Athripsodes bilineatus (L.) | 1 | 2.63 |
| Asellus aquaticus (L.) | 1 | 2.63 |
| Armiger crista (L.) | 1 | 2.63 |
| Ephemerella ignita (Poda) | 1 | 2.63 |
| Amphinemura sulcicollis (Stephens) | 1 | 2.63 |
| Leuctra sp. | 1 | 2.63 |
| Sialis lutaria (L.) | 1 | 2.63 |
| Limnephilidae indet | 1 | 2.63 |
| Mystacides azurea (L.) | 1 | 2.63 |
| Oreodytes sanmarkii (Sahlberg) | 1 | 2.63 |
| Oxyethira sp. | 1 | 2.63 |
| Polycelis nigra group | 1 | 2.63 |
| Potamonectes depressus (Fabricius) | 1 | 2.63 |
| Potamophylax cingulatus group | 1 | 2.63 |
| Potamopyrgus jenkinsi (Smith) | 1 | 2.63 |
| Pseudanodonta complanata (Rossmassler) | 1 | 2.63 |
| Rhithrogena sp. | 1 | 2.63 |
| Sericostoma personatum (Spence) | 1 | 2.63 |
| Isoperla grammatica (Poda) | 1 | 2.63 |
| **Total** | **38** | **100** |

# AUDIT OF NORTH WEST REGION'S AQC INSPECTORS

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Eaves Brook | Park Walk | AM | 1 | 0 | 0 |
| Darwen | Pleasington Fields | AM | 0 | 2 | 0 |
| Alt | ptc Downholland Brook | AM | 0 | 0 | 0 |
| Wade Brook | ptc Mill Brook | EIG | 0 | 0 | 0 |
| Cunscough Brook | d/s Cunscough Bridge West | EIG | 1 | 0 | 0 |
| Birk Beck | Birk Beck | EIG | 0 | 1 | 0 |
| Black Brook | d/s Drummersdale Drive | EIG | 0 | 0 | 0 |
| Eller Brook | ptc R.Yarrow | EIG | 0 | 1 | 0 |
| Smithy Brook | Lady Lane u/s A49 | EIG | 0 | 0 | 0 |
| Ribble | Duddle Brook | HFH | 0 | 0 | 0 |
| Chatburn Beck | d/s Chatburn | HFH | 0 | 0 | 1 |
| Alt | ptc Downholland Brook | HFH | 0 | 1 | 0 |
| Yarrow | Birkacre | HFH | 0 | 0 | 0 |
| Cocker | Ridgy Pool Bridge | HFH | 0 | 0 | 0 |
| Wenning | Keasden Beck | HFH | 0 | 0 | 0 |
| Hunts Brook | d/s Thornton ETW | HFH | 0 | 1 | 0 |
| Keer | u/s Keer Bridge | KCh | 0 | 0 | 0 |
| Pimlico Brook | Princess Ave, d/s Pimlico | KCh | 0 | 0 | 0 |
| Tun Brook | ptc R.Ribble | KCh | 0 | 0 | 0 |
| Darwen | u/s Hardman Way | KCh | 0 | 0 | 0 |

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Furnace Gill | NY 024 343 | GR | 0 | 0 | 1 |
| Esk | Whahouse Bridge | GR | 0 | 1 | 0 |
| Kent | u/s Kendal STW | GR | 0 | 0 | 0 |
| Liza | u/s Ennerdale Water | GR | 0 | 0 | 0 |
| Eden | d/s Grinsdale Church | GR | 1 | 1 | 0 |
| Duddon | u/s Duddon Bridge | GR | 1 | 2 | 0 |
| Sepulchre Beck | d/s Janet Bridge | GR | 0 | 0 | 0 |
| Petteril | Stoneyholme | GR | 1 | 1 | 0 |
| Dale Beck | NY 613 372 | GR | 0 | 0 | 0 |
| Scale Beck | NY 673 145 | GR | 0 | 0 | 0 |
| Wampool | Crofton Bridge | NTC | 0 | 0 | 0 |
| Bampton Beck | NY 275 549 | NTC | 0 | 0 | 0 |
| Tarn Beck | Tongue House | NTC | 0 | 1 | 0 |
| Blumer Beck | ptc R.Derwent | NTC | 0 | 0 | 0 |
| Eamont | d/s Udford GS | NTC | 0 | 0 | 0 |
| Back Burn | NY 407 732 | NTC | 1 | 0 | 0 |
| Brides Beck | ptc Carr Beck | NTC | 0 | 0 | 0 |
| Leith | Cliburn | NTC | 0 | 1 | 0 |
| Swindale Beck | NY 686 253 | NTC | 0 | 0 | 0 |
| Rothay | d/s Grassmere | NTC | 0 | 0 | 0 |

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Limy Water | u/s Love Clough Textiles | AG | 0 | 1 | 0 |
| Irk | PTC Wince Brook | AG | 1 | 0 | 0 |
| Kinder | ptc R.Sett | AG | 1 | 2 | 0 |
| Rams Brook | Near Hale Village | AG | 1 | 0 | 0 |
| Tame | d/s Readycon Dean Reservoir | AG | 0 | 5 | 0 |
| Timperley Brook | ptc Sinderland Brook | AG | 0 | 0 | 0 |
| Etherow | Compstall Bridge | AG | 0 | 2 | 0 |
| Rowath | ptc R.Sett | AG | 0 | 3 | 0 |
| Weaver | Saltersford Locks | KA | 0 | 0 | 0 |
| Croal | Farnworth Recording Station | KA | 0 | 1 | 0 |
| Swettenham Brook | d/s the Mill | KA | 0 | 0 | 0 |
| Weaver | d/s Frodsham Bridge | KA | 0 | 1 | 0 |
| Wirral Brooks | Arrowe Brook | KA | 0 | 0 | 0 |
| Hurst Brook | ptc Shelf Brook | KA | 1 | 0 | 0 |
| Gowy | Gowy Bridge | KA | 0 | 0 | 0 |
| Ditton Brook | Carr Lane | KA | 0 | 0 | 0 |
| Clatter Brook | ptc Thornton Stream | RMM | 0 | 0 | 0 |
| Day Green Stream | B5078 u/s Alsager ETW | RMM | 1 | 0 | 0 |
| Marsh Brook | ptc Hall Lane Brook | RMM | 0 | 2 | 0 |
| Poise Brook | ptc R.Goyt | RMM | 0 | 0 | 0 |

Table 26 Statistics of the 2000 AQC Audit for North West Region

| Analyst/ Group | n | Mean gains | Standard error | Quality target achieved | Highest no. gains | Mean errors (l+g+o) | Standard error |
|---|---|---|---|---|---|---|---|
| **Northern** | **20** | **0.35** | **0.13** | ✓ | **2** | **0.60** | **0.20** |
| GR | 10 | 0.50 | 0.22 | ✓ | 2 | 0.90 | 0.35 |
| NTC | 10 | 0.20 | 0.13 | ✓ | 1 | 0.30 | 0.15 |
| **Central** | **20** | **0.30** | **0.13** | ✓ | **2** | **0.45** | **0.14** |
| AM | 3 | 0.67 | 0.67 | | 2 | 1.00 | 0.58 |
| EIG | 6 | 0.33 | 0.21 | ✓ | 1 | 0.50 | 0.22 |
| HFH | 7 | 0.29 | 0.18 | ✓ | 1 | 0.43 | 0.20 |
| KCh | 4 | 0 | 0 | ✓ | 0 | 0 | 0 |
| **Southern** | **20** | **0.85** | **0.30** | | **5** | **1.10** | **0.30** |
| AG | 8 | 1.63 | 0.63 | | 5 | 2.00 | 0.57 |
| KA | 8 | 0.25 | 0.16 | ✓ | 1 | 0.38 | 0.18 |
| RMM | 4 | 0.50 | 0.50 | ✓ | 2 | 0.75 | 0.48 |
| **N. West Region** | **60** | **0.50** | **0.12** | ✓ | **5** | **0.72** | **0.13** |

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 | Standard error of net effect on score | Maximum underestimate of BMWP score | Mean net effect on no. of taxa | Standard error of net effect on no. of taxa | Maximum underestimate of no. of taxa |
|---|---|---|---|---|---|---|---|
| **Northern** | **20** | **1.15** | **0.82** | **10** | **0.15** | **0.11** | **1** |
| GR | 10 | 1.30 | 1.12 | 10 | 0.20 | 0.13 | 1 |
| NTC | 10 | 1.00 | 1.25 | 10 | 0.10 | 0.18 | 1 |
| **Central** | **20** | **1.35** | **0.97** | **13** | **0.20** | **0.16** | **2** |
| AM | 3 | 2.67 | 5.36 | 13 | 0.33 | 0.88 | 2 |
| EIG | 6 | 1.33 | 2.03 | 10 | 0.17 | 0.31 | 1 |
| HFH | 7 | 1.57 | 1.07 | 7 | 0.29 | 0.18 | 1 |
| KCh | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Southern** | **20** | **4.85** | **2.44** | **41** | **0.60** | **0.34** | **5** |
| AG | 8 | 10.75 | 5.32 | 41 | 1.25 | 0.73 | 5 |
| KA | 8 | 0.13 | 0.87 | 3 | 0.13 | 0.23 | 1 |
| RMM | 4 | 2.50 | 3.57 | 13 | 0.25 | 0.63 | 2 |
| **N. West Region** | **60** | **2.45** | **0.93** | **41** | **0.32** | **0.13** | **5** |

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

| Family | n | % of North West Region's missed families in AQC Audit |
|---|---|---|
| Hydrobiidae (incl. Bithyniidae) | 3 | 13.04 |
| Lymnaeidae | 3 | 13.04 |
| Leuctridae | 2 | 8.70 |
| Lepidostomatidae | 2 | 8.70 |
| Odontoceridae | 1 | 4.35 |
| Planariidae (incl. Dugesiidae) | 1 | 4.35 |
| Limnephilidae | 1 | 4.35 |
| Simuliidae | 1 | 4.35 |
| Psychomyiidae (incl. Ecnomidae) | 1 | 4.35 |
| Baetidae | 1 | 4.35 |
| Hydrophilidae (incl. Hydraenidae) | 1 | 4.35 |
| Scirtidae | 1 | 4.35 |
| Haliplidae | 1 | 4.35 |
| Gammaridae (incl. Crangonyctidae) | 1 | 4.35 |
| Ephemerellidae | 1 | 4.35 |
| Chloroperlidae | 1 | 4.35 |
| Leptoceridae | 1 | 4.35 |
| **Total** | **23** | **100** |

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

| Species | n | % of North West Region's missed species in AQC Audit |
|---|---|---|
| Potamopyrgus jenkinsi (Smith) | 3 | 12.50 |
| Lymnaea sp. | 2 | 8.33 |
| Leuctra sp. | 1 | 4.17 |
| Bithynia tentaculata (L.) | 1 | 4.17 |
| Chloroperla torrentium (Pictet) | 1 | 4.17 |
| Elodes sp. | 1 | 4.17 |
| Ephemerella ignita (Poda) | 1 | 4.17 |
| Gammarus pulex (L.) | 1 | 4.17 |
| Haliplus sp. | 1 | 4.17 |
| Hydraena gracilis Germar | 1 | 4.17 |
| Lepidostoma hirtum (Fabricius) | 1 | 4.17 |
| Baetis rhodani (Pictet) | 1 | 4.17 |
| Leuctra hippopus (Kempny) | 1 | 4.17 |
| Tinodes waeneri (L.) | 1 | 4.17 |
| Limnephilus lunatus Curtis | 1 | 4.17 |
| Lymnaea peregra (Muller) | 1 | 4.17 |
| Mystacides azurea (L.) | 1 | 4.17 |
| Odontocerum albicorne (Scopoli) | 1 | 4.17 |
| Polycelis felina (Dalyell) | 1 | 4.17 |
| Simulium (Nevermannia) cryophilum group | 1 | 4.17 |
| Lepidostomatidae indet | 1 | 4.17 |
| **Total** | **24** | **100** |

# AUDIT OF SOUTHERN REGION'S AQC INSPECTORS

Table 30 The 20 samples audited for the Hants & Isle of Wight Area of Southern Region

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Warblington Stream No 1 | Brook Farm | W9 | 1 | 0 | 0 |
| Test | Chilbolton | W9 | 0 | 1 | 0 |
| Walhampton Stream | Lisle Court | W9 | 0 | 0 | 0 |
| Itchen | Sewards Bridge | W9 | 0 | 0 | 0 |
| Test | Chilbolton | W9 | 1 | 1 | 0 |
| Bank Stream | Bank | W13 | 0 | 0 | 0 |
| Anton | Fullerton | W13 | 0 | 1 | 0 |
| Dever | Sutton Scotney | W13 | 0 | 0 | 0 |
| Titchfield | Broad Bridge | W23 | 0 | 0 | 0 |
| Ober Water | Aldridge Hill | W23 | 0 | 0 | 0 |
| Brownwich Stream | Titchfield | W23 | 0 | 0 | 0 |
| Dun | Dunbridge | W23 | 0 | 0 | 0 |
| Palmers Brook | Brock's Copse | W23 | 0 | 0 | 0 |
| Mopley Pond | Stanswood | W23 | 0 | 0 | 0 |
| Avon | Efford Bridge | W23 | 0 | 0 | 0 |
| Dever | Northbrook | W23 | 0 | 0 | 0 |
| Brighstone Stream | Brighstone Mill | W29 | 0 | 1 | 0 |
| Pillhill Brook | u/s Anna Valley Fish Farm | W29 | 0 | 0 | 0 |
| Itchen | Easton | W29 | 0 | 1 | 0 |
| Horton Heath Stream | Maddoxford Farm | W29 | 0 | 1 | 0 |

Table 31 The 20 samples audited for the Kent Area of Southern Region

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Loose Stream | Ivy Mill | E1 | 0 | 1 | 0 |
| Grom | d/s Tunbridge Wells STW | E1 | 0 | 2 | 0 |
| Doleham Ditch | Doleham Farm | E1 | 0 | 1 | 0 |
| Brede | A21 Road Bridge | E1 | 0 | 0 | 0 |
| Great Stour | Godmersham | E1 | 0 | 1 | 0 |
| Tillingham | Udimore Road | E1 | 0 | 1 | 0 |
| Pippingford Brook Trib | Half Moon Inn | E1 | 0 | 0 | 0 |
| Bourne | Hamptons Rd Bridge | E1 | 0 | 0 | 0 |
| Len | Lower Runham | E1 | 0 | 0 | 0 |
| Great Stour | Shalmsford St | E1 | 0 | 1 | 0 |
| Aylesford Stream | Newtown Road | E1 | 0 | 2 | 0 |
| Tillingham | Chitcombe | E1 | 0 | 1 | 0 |
| Hammer Stream Trib | Claybridge | E1 | 0 | 0 | 0 |
| Cradlebridge Sewer | d/s Woodchurch STW | E1 | 0 | 2 | 0 |
| Tillingham | 100 House Lane | E1 | 0 | 0 | 0 |
| Rother | Old Mill Farm | E28 | 0 | 3 | 0 |
| Rother | Boonshill | E28 | 0 | 1 | 0 |
| Len | d/s Leeds STW confluence | E28 | 1 | 0 | 0 |
| Ditton Stream | Ditton | E28 | 0 | 0 | 0 |
| Wadhurst Stream | d/s Washwell Lane | E28 | 0 | 0 | 0 |

Table 32 The 20 samples audited for the Sussex Area of Southern Region

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Bull | Bull Bridge | AG | 0 | 0 | 0 |
| Blakes Gill | u/s Scolliers Bridge | AG | 0 | 0 | 0 |
| Rother | Durford Bridge | AG | 0 | 2 | 0 |
| Newmill Channel | u/s Tenterden STW | AG | 0 | 0 | 0 |
| Newmill | d/s Benenden | AG | 0 | 0 | 0 |
| Wallington | Spurlings Farm | AG | 0 | 0 | 0 |
| Uck | Hastingford Bridge | AG | 0 | 1 | 0 |
| Arun | New Bridge | AG | 0 | 0 | 0 |
| Meon | Drayton | AG | 0 | 0 | 0 |
| Loxwood Stream | Whitebeech Bridge | AG | 0 | 0 | 0 |
| Elsted Stream | Dumpford Lane | JB | 0 | 0 | 0 |
| Arun | Bucks Green | JB | 0 | 0 | 0 |
| Brinsbury Stream | d/s Lake | JB | 0 | 1 | 0 |
| Rother | Selham Bridge | JB | 0 | 0 | 0 |
| North End Stream | North End | JB | 0 | 0 | 0 |
| Herrings Stream | Herrings Bridge | JB | 2 | 1 | 0 |
| Cuckmere | d/s Knockhatch confluence | JB | 0 | 0 | 0 |
| Adur East | d/s Folly Farm Tributary | JB | 0 | 0 | 0 |
| Cuckmere | Boship Bridge | JB | 0 | 0 | 0 |
| Kird | Kirdford Bridge | JB | 1 | 0 | 0 |

Table 33 Statistics of the 2000 AQC Audit for Southern Region

| Analyst/ Group | n | Mean gains | Standard error | Quality target achieved | Highest no. gains | Mean errors (l+g+o) | Standard error |
|---|---|---|---|---|---|---|---|
| **Hants & IOW** | **20** | **0.30** | **0.11** | ✓ | **1** | **0.40** | **0.13** |
| W9 | 5 | 0.40 | 0.24 | ✓ | 1 | 0.80 | 0.37 |
| W13 | 3 | 0.33 | 0.33 | ✓ | 1 | 0.33 | 0.33 |
| W23 | 8 | 0 | 0 | ✓ | 0 | 0 | 0 |
| W29 | 4 | 0.75 | 0.25 | | 1 | 0.75 | 0.25 |
| **Kent** | **20** | **0.80** | **0.20** | | **3** | **0.85** | **0.20** |
| E1 | 15 | 0.80 | 0.20 | | 2 | 0.80 | 0.20 |
| E28 | 5 | 0.80 | 0.58 | | 3 | 1.00 | 0.55 |
| **Sussex** | **20** | **0.25** | **0.12** | ✓ | **2** | **0.40** | **0.18** |
| AG | 10 | 0.30 | 0.21 | ✓ | 2 | 0.30 | 0.21 |
| JB | 10 | 0.20 | 0.13 | ✓ | 1 | 0.50 | 0.31 |
| **Southern Region** | **60** | **0.45** | **0.09** | ✓ | **3** | **0.55** | **0.10** |

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 | Standard error of net effect on score | Maximum underestimate of BMWP score | Mean net effect on no. of taxa | Standard error of net effect on no. of taxa | Maximum underestimate of no. of taxa |
|---|---|---|---|---|---|---|---|
| **Hants & IOW** | **20** | **1.35** | **0.69** | **8** | **0.20** | **0.12** | **1** |
| W9 | 5 | 1.00 | 2.10 | 8 | 0.00 | 0.32 | 1 |
| W13 | 3 | 1.67 | 1.67 | 5 | 0.33 | 0.33 | 1 |
| W23 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| W29 | 4 | 4.25 | 1.49 | 7 | 0.75 | 0.25 | 1 |
| **Kent** | **20** | **4.20** | **1.18** | **13** | **0.75** | **0.22** | **3** |
| E1 | 15 | 4.67 | 1.17 | 13 | 0.80 | 0.20 | 2 |
| E28 | 5 | 2.80 | 3.40 | 11 | 0.60 | 0.68 | 3 |
| **Sussex** | **20** | **1.10** | **0.90** | **14** | **0.10** | **0.14** | **2** |
| AG | 10 | 2.40 | 1.63 | 14 | 0.30 | 0.21 | 2 |
| JB | 10 | -0.20 | 0.61 | 4 | -0.10 | 0.18 | 1 |
| **Southern Region** | **60** | **2.22** | **0.57** | **14** | **0.35** | **0.10** | **3** |

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

| Family | n | % of Southern Region's missed families in AQC Audit |
|---|---|---|
| Leptoceridae | 3 | 13.04 |
| Nemouridae | 2 | 8.70 |
| Psychomyiidae (incl. Ecnomidae) | 2 | 8.70 |
| Baetidae | 1 | 4.35 |
| Erpobdellidae | 1 | 4.35 |
| Goeridae | 1 | 4.35 |
| Hydrobiidae (incl. Bithyniidae) | 1 | 4.35 |
| Hydrophilidae (incl. Hydraenidae) | 1 | 4.35 |
| Leptophlebiidae | 1 | 4.35 |
| Asellidae | 1 | 4.35 |
| Piscicolidae | 1 | 4.35 |
| Valvatidae | 1 | 4.35 |
| Planariidae (incl. Dugesiidae) | 1 | 4.35 |
| Planorbidae | 1 | 4.35 |
| Rhyacophilidae (incl. Glossosomatidae) | 1 | 4.35 |
| Sericostomatidae | 1 | 4.35 |
| Sphaeriidae | 1 | 4.35 |
| Tipulidae | 1 | 4.35 |
| Lymnaeidae | 1 | 4.35 |
| **Total** | **23** | **100** |

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

| Species | n | % of Southern Region's missed species in AQC Audit |
|---|---|---|
| Nemurella picteti Klapalek | 1 | 4.35 |
| Asellus meridianus Racovitza | 1 | 4.35 |
| Athripsodes sp. | 1 | 4.35 |
| Baetis muticus (L.) | 1 | 4.35 |
| Erpobdella octoculata (L.) | 1 | 4.35 |
| Gyraulus albus (Muller) | 1 | 4.35 |
| Habrophlebia fusca (Curtis) | 1 | 4.35 |
| Hydraena gracilis Germar | 1 | 4.35 |
| Lymnaea peregra (Muller) | 1 | 4.35 |
| Lype sp. | 1 | 4.35 |
| Antocha vitripennis (Meigen) | 1 | 4.35 |
| Nemoura cinerea (Retzius) | 1 | 4.35 |
| Valvata cristata Muller | 1 | 4.35 |
| Oecetis lacustris (Pictet) | 1 | 4.35 |
| Piscicola geometra (L.) | 1 | 4.35 |
| Pisidium sp. | 1 | 4.35 |
| Polycelis nigra group | 1 | 4.35 |
| Potamopyrgus jenkinsi (Smith) | 1 | 4.35 |
| Rhyacophila sp. | 1 | 4.35 |
| Sericostoma personatum (Spence) | 1 | 4.35 |
| Silo pallipes (Fabricius) | 1 | 4.35 |
| Tinodes waeneri (L.) | 1 | 4.35 |
| Mystacides azurea (L.) | 1 | 4.35 |
| **Total** | **23** | **100** |

# AUDIT OF SOUTH WEST REGION'S AQC INSPECTORS

Table 37 The 20 samples audited for Cornwall Area of South West Region

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Silverbridge Lake | Brixton | AB | 0 | 0 | 0 |
| Marazion | Nancledra | AB | 0 | 0 | 0 |
| Newlyn East Stream | Rosecliston | AB | 0 | 0 | 0 |
| Issey Brook | Mellingey | AB | 0 | 0 | 0 |
| Camel | Pencarrow Bridge | AB | 0 | 0 | 0 |
| Trevellas Stream | u/s Trevellas Cove | JMB | 0 | 1 | 0 |
| Stannon Stream | Trecarne | JMB | 0 | 0 | 0 |
| St Lawrence Stream | u/s Pendewey Bridge | JMB | 0 | 0 | 0 |
| Canworthy Water | u/s R.Ottery | JMB | 0 | 0 | 0 |
| Burn | u/s Tavy | LMD | 0 | 0 | 0 |
| Mylor Creek | Mylor Bridge | LMD | 0 | 0 | 0 |
| Crinnis Stream | u/s adits | TG | 0 | 0 | 0 |
| River Fal | below Melbur Plant leat CP3/1 | TG | 0 | 0 | 0 |
| Fal | d/s Trerice Bridge | TG | 0 | 0 | 0 |
| Par River | Luxulyan Bridge | TG | 0 | 0 | 0 |
| Trebant Water | East Trencreek | TG | 0 | 0 | 0 |
| Deer | Deer Bridge | TG | 0 | 0 | 0 |
| Tory Brook | Portworthy Bridge | TG | 0 | 0 | 0 |
| Carnon | Bissoe Bridge | TG | 0 | 0 | 0 |
| Penberth Stream | Penberth Bridge | TG | 0 | 0 | 0 |

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Offwell Brook | d/s Offwell Footbridge | AD | 0 | 0 | 0 |
| Taw | Chenson | AD | 0 | 1 | 0 |
| Taw | Sticklepath | AD | 0 | 0 | 0 |
| Rye Stream | Loxhore Cross | AD | 0 | 0 | 0 |
| Weaver | u/s B3181 Bridge | AD | 1 | 0 | 0 |
| Polly Brook | d/s A376 Bridge | AD | 0 | 0 | 0 |
| Molland Yeo | Bish Mill | AD | 1 | 0 | 0 |
| Langtree Lake | Servis Farm | AD | 0 | 0 | 0 |
| Exe | u/s Halfpenny Bridge | AH | 0 | 0 | 0 |
| Otter | u/s Hoe More Farm Brisge | AH | 0 | 0 | 0 |
| Lowman | d/s A376 Bridge | AH | 1 | 0 | 0 |
| Scotley Brook | u/s Teign | AH | 0 | 0 | 0 |
| North Brook | North Brook Park | AH | 0 | 0 | 0 |
| East Wilder | The Vicarage | AH | 0 | 0 | 0 |
| Northlew Stream | Northlew | AJH | 0 | 1 | 0 |
| Heddon Stream | d/s Trentishoe confluence | AJH | 0 | 0 | 0 |
| Taw | Umberleigh | APH | 0 | 0 | 0 |
| Mole | North Molton | APH | 0 | 0 | 0 |
| Dalch | u/s Calves Bridge | APH | 0 | 1 | 0 |
| Clapton Stream | Clapton | APH | 0 | 0 | 0 |

Table 39 The 20 samples audited for North Wessex Area of South West Region

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Bydemill Brook | u/s Corsham STW | AB | 0 | 0 | 0 |
| Boyd | Golden Valley | AB | 0 | 0 | 0 |
| Nunney Brook | Vallis Farm | AB | 0 | 0 | 0 |
| Axe | u/s of Ford | AB | 0 | 0 | 0 |
| Brue/Sheppey | Woodford | JS | 0 | 0 | 0 |
| Bristol Avon | Limpley Stoke | JS | 1 | 0 | 0 |
| Somerset Frome | u/s Oldford Creamery | JS | 0 | 0 | 0 |
| Maiden Bradley Brook | Highcruff Farm | JS | 0 | 1 | 0 |
| Portbury Ditch | u/s Bridge | JS | 0 | 0 | 0 |
| Tone | Greenham | WO | 0 | 1 | 0 |
| Kilve Street | Rectory Br, Kilve | WO | 0 | 0 | 0 |
| Little Avon | Charfield | WO | 0 | 0 | 0 |
| Norton Sub Hamdon | d/s Manor Farm | WO | 0 | 0 | 0 |
| Wootton Courtney Stream | Wootton Courtney | WO | 0 | 0 | 0 |
| Worton Stream | d/s Urchfont STW | WO | 0 | 0 | 0 |
| Conygre Brook | Priston Mill | WO | 0 | 0 | 0 |
| Wellhams Brook | Nr Martock | WO | 1 | 0 | 0 |
| Marden | Buckhill | WO | 0 | 1 | 0 |
| Brinkworth Brook | Brinkworth | WO | 0 | 0 | 0 |
| Yeo | Sherborne STW | WO | 0 | 3 | 1 |

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

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Devils Brook | Dewlish | PRH | 0 | 2 | 0 |
| Hooke | Hooke | PRH | 0 | 1 | 0 |
| Char | Whitchurch Canonicorum | PRH | 0 | 0 | 0 |
| Chitterne | Codford St Mary | PRH | 0 | 0 | 0 |
| Wylye | Steeple Langford | PRH | 0 | 0 | 0 |
| Nadder | d/s Tisbury | PRH | 0 | 0 | 0 |
| Piddle | Piddlehinton | PRH | 0 | 1 | 0 |
| Eastern Avon | u/s Scales Bridge | PRH | 0 | 1 | 0 |
| Ashfield Water | Burton | PRH | 0 | 0 | 0 |
| Hants Avon | Durrington | PRH | 0 | 0 | 0 |
| Western Avon | u/s Etchilhampton | PRH | 0 | 0 | 0 |
| Stour | Wyndham Farm | PRH | 0 | 2 | 0 |
| Brit | Oxbridge | PRH | 0 | 1 | 0 |
| Ashford Water | d/s Fordingbridge | PRH | 0 | 0 | 0 |
| Nadder | Panters Bridge | PRH | 0 | 0 | 0 |
| Shreen Water | Colesbrook | PRH | 0 | 0 | 0 |
| Frome | East Stoke | PRH | 0 | 0 | 0 |
| Wylye | Quidhampton | PRH | 0 | 0 | 0 |
| Ripley Brook | Court Farm | PRH | 0 | 0 | 0 |
| Wylye | Boreham | PRH | 0 | 1 | 0 |

Table 41 Statistics of the 2000 AQC Audit for South West Region

| Analyst/Group | n | Mean gains | Standard error | Quality target achieved | Highest no. gains | Mean errors (l+g+o) | Standard error |
|---|---|---|---|---|---|---|---|
| **Cornwall** | **20** | **0.05** | **0.05** | ✓ | **1** | **0.05** | **0.05** |
| AB | 5 | 0 | 0 | ✓ | 0 | 0 | 0 |
| JMB | 4 | 0.25 | 0.25 | ✓ | 1 | 0.25 | 0.25 |
| LMD | 2 | 0 | 0 | ✓ | 0 | 0 | 0 |
| TG | 9 | 0 | 0 | ✓ | 0 | 0 | 0 |
| **Devon** | **20** | **0.15** | **0.08** | ✓ | **1** | **0.30** | **0.11** |
| AD | 8 | 0.13 | 0.13 | ✓ | 1 | 0.38 | 0.18 |
| AH | 6 | 0 | 0 | ✓ | 0 | 0.17 | 0.17 |
| AJH | 2 | 0.50 | 0.50 | ✓ | 1 | 0.50 | 0.50 |
| APH | 4 | 0.25 | 0.25 | ✓ | 1 | 0.25 | 0.25 |
| **N. Wessex** | **20** | **0.30** | **0.16** | ✓ | **3** | **0.45** | **0.21** |
| AB | 4 | 0 | 0 | ✓ | 0 | 0 | 0 |
| JS | 5 | 0.20 | 0.20 | ✓ | 1 | 0.40 | 0.24 |
| WO | 11 | 0.45 | 0.28 | ✓ | 3 | 0.64 | 0.36 |
| **S. Wessex** | **20** | **0.45** | **0.15** | ✓ | **2** | **0.45** | **0.15** |
| PRH | 20 | 0.45 | 0.15 | ✓ | 2 | 0.45 | 0.15 |
| **S. West Region** | **80** | **0.24** | **0.06** | ✓ | **3** | **0.31** | **0.07** |

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 | Standard error of net effect on score | Maximum underestimate of BMWP score | Mean net effect on no. of taxa | Standard error of net effect on no. of taxa | Maximum underestimate of no. of taxa |
|---|---|---|---|---|---|---|---|
| **Cornwall** | **20** | **0.25** | **0.25** | **5** | **0.05** | **0.05** | **1** |
| AB | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| JMB | 4 | 1.25 | 1.25 | 5 | 0.25 | 0.25 | 1 |
| LMD | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| TG | 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Devon** | **20** | **0.40** | **0.73** | **10** | **0** | **0.13** | **1** |
| AD | 8 | -0.50 | 1.10 | 5 | -0.13 | 0.23 | 1 |
| AH | 6 | -0.50 | 0.50 | 0 | -0.17 | 0.17 | 0 |
| AJH | 2 | 5.00 | 5.00 | 10 | 0.50 | 0.50 | 1 |
| APH | 4 | 1.25 | 1.25 | 5 | 0.25 | 0.25 | 1 |
| **N. Wessex** | **20** | **1.80** | **1.11** | **14** | **0.20** | **0.19** | **3** |
| AB | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| JS | 5 | 1.40 | 2.23 | 10 | 0 | 0.32 | 1 |
| WO | 11 | 2.64 | 1.77 | 14 | 0.36 | 0.31 | 3 |
| **S. Wessex** | **20** | **3.40** | **1.29** | **20** | **0.45** | **0.15** | **2** |
| PRH | 20 | 3.40 | 1.29 | 20 | 0.45 | 0.15 | 2 |
| **S. West Region** | **80** | **1.46** | **0.48** | **20** | **0.17** | **0.07** | **3** |

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

| Family | n | % of South West Region's missed families in AQC Audit |
|---|---|---|
| Planariidae (incl. Dugesiidae) | 3 | 16.67 |
| Hydrophilidae (incl. Hydraenidae) | 3 | 16.67 |
| Leptoceridae | 2 | 11.11 |
| Hydroptilidae | 2 | 11.11 |
| Simuliidae | 1 | 5.56 |
| Physidae | 1 | 5.56 |
| Odontoceridae | 1 | 5.56 |
| Nemouridae | 1 | 5.56 |
| Leuctridae | 1 | 5.56 |
| Lepidostomatidae | 1 | 5.56 |
| Goeridae | 1 | 5.56 |
| Beraeidae | 1 | 5.56 |
| **Total** | **18** | **100** |

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

| Species | n | % of South West Region's missed species in AQC Audit |
|---|---|---|
| Hydraena gracilis Germar | 2 | 10.53 |
| Hydroptila sp. | 2 | 10.53 |
| Nemoura sp. | 1 | 5.26 |
| Beraeodes minutus (L.) | 1 | 5.26 |
| Helophorus (Helophorus) obscurus Mulsant | 1 | 5.26 |
| Ithytrichia sp. | 1 | 5.26 |
| Lepidostoma hirtum (Fabricius) | 1 | 5.26 |
| Adicella reducta (Mclachlan) | 1 | 5.26 |
| Mystacides azurea (L.) | 1 | 5.26 |
| Simulium (Simulium) ornatum group | 1 | 5.26 |
| Odontocerum albicorne (Scopoli) | 1 | 5.26 |
| Physa sp. | 1 | 5.26 |
| Polycelis felina (Dalyell) | 1 | 5.26 |
| Polycelis nigra group | 1 | 5.26 |
| Polycelis sp. | 1 | 5.26 |
| Silo pallipes (Fabricius) | 1 | 5.26 |
| Leuctra fusca (L.) | 1 | 5.26 |
| **Total** | **19** | **100** |

# AUDIT OF THAMES REGION'S AQC INSPECTORS

Table 45 The 20 samples audited for the Frimley Laboratory of Thames Region

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Pettys Brook | d/s Long Copse Ditch | 307 | 0 | 1 | 0 |
| Oakhanger Stream | Oakhanger | 307 | 0 | 0 | 0 |
| Farnham Park Tributary | u/s Wey | 307 | 0 | 2 | 0 |
| Thames | d/s Boulter's Weir | 307 | 0 | 4 | 0 |
| Maidenhead Ditch | Hibbert Rd, Bray | 307 | 0 | 1 | 0 |
| Mole | Wick Farm, Horley | 307 | 0 | 3 | 0 |
| Blackwater | Frimley Bridges | 307 | 0 | 1 | 0 |
| Green Level Dyke | Mulberry Way | 317 | 0 | 1 | 0 |
| Cove Brook | B3014 Farnborough | 317 | 0 | 1 | 0 |
| Blackwater | d/s Sandhurst | 317 | 0 | 1 | 0 |
| Mole | Stoke D'Abernon | 317 | 0 | 0 | 0 |
| Cranleigh Waters | u/s Collins Brook | 317 | 0 | 1 | 0 |
| Wey (N) | u/s Caker Stream | 317 | 0 | 0 | 0 |
| Wey (S) | Hammer Vale | MJW | 0 | 0 | 0 |
| Bourne | u/s Thames | MJW | 0 | 0 | 0 |
| Blackwater | Frimley Bridges | MJW | 0 | 1 | 0 |
| Whitewater | Heckfield | MJW | 0 | 2 | 0 |
| Wandle | Beddington Park | MJW | 0 | 1 | 0 |
| Wey (N) | d/s Bentley STW | MJW | 0 | 3 | 0 |
| Wey (N) | Fielder's Court | TJ | 2 | 1 | 0 |

Table 46 The 20 samples audited for the Hatfield Laboratory of Thames Region

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Brent | d/s Barnhill Rd | DJL | 0 | 1 | 0 |
| Brent/GUC | Trumpeters Way | DJL | 0 | 2 | 0 |
| Cripsey Brook | Delved Bridge | JE | 0 | 1 | 0 |
| Gade | d/s Cassiobury Park | JE | 0 | 2 | 0 |
| Tykes Water | u/s Colne | JE | 0 | 3 | 0 |
| Chess | u/s Chesham STW | JE | 0 | 0 | 0 |
| Hartsbourne | Hampermill Rd | JE | 0 | 1 | 0 |
| Ingrebourne | A12 Roadbridge | JE | 0 | 1 | 0 |
| Dukes | River Gardens | JE | 0 | 1 | 0 |
| Dollis Brook | Bell Lane | JE | 0 | 0 | 0 |
| Small Lee | u/s Turkey Brook | JE | 0 | 2 | 0 |
| Hartsbourne | Hampermill Lane | JE | 1 | 3 | 0 |
| New Years Green Bourne | u/s Frays | JE | 0 | 3 | 0 |
| Colne/GUC | Coppermill Lane | JE | 0 | 2 | 0 |
| Rom/Beam | A125, Hornchurch | JE | 0 | 1 | 1 |
| Rib | Westmill | JE | 0 | 0 | 0 |
| Salmons Brook | u/s Montague Rd | JE | 0 | 2 | 0 |
| Ver | u/s Colne | JE | 0 | 1 | 0 |
| Wraysbury | Staines Moor | JE | 0 | 0 | 0 |
| GUC | Horsenden Lane South | KLG | 0 | 0 | 0 |

Table 47 The 20 samples audited for the Wallingford Laboratory of Thames Region

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Showells Brook | Crawley | 001 | 0 | 3 | 0 |
| Milton Ditch | Great Milton Road | 001 | 0 | 1 | 0 |
| Cornwell Brook | Kingham | 002 | 1 | 1 | 0 |
| Scotsgrove Brook | Scotsgrove Mill | 002 | 0 | 4 | 0 |
| Harcourt Brook | u/s Limb Brook | 002 | 0 | 1 | 0 |
| Tramroad Ditch | Wooton Underwood | 002 | 0 | 0 | 0 |
| Coln | G.S. Bibury | 002 | 0 | 1 | 0 |
| Ecchinswell Brook | A339 Headley | 004 | 0 | 4 | 1 |
| Dorn | u/s Glyme at Wooton | 004 | 0 | 1 | 0 |
| Enborne | Ford, Thornton Road | 004 | 0 | 1 | 1 |
| Thames | Waterhay Bridge | 004 | 0 | 1 | 0 |
| Farthinghoe Stream | u/s Cherwell | 004 | 0 | 3 | 0 |
| Hornton Stream | Horley | 004 | 0 | 0 | 0 |
| Shill Brook | Fishers Bridge | 004 | 0 | 3 | 0 |
| Thame | u/s Eythrope | 004 | 0 | 0 | 0 |
| South Marston Brook | Nightingale Lane | 005 | 0 | 0 | 0 |
| Chacombe Brook | u/s Cherwell | 007 | 0 | 2 | 0 |
| Kennet | Stitchcombe Mill | KG | 1 | 5 | 0 |
| Kencot Brook | B4020, Alvescot | KG | 0 | 1 | 0 |
| Coln | Withington | KG | 0 | 1 | 0 |

Table 48 Statistics of the 2000 AQC Audit for Thames Region

| Analyst/ Group | n | Mean gains | Standard error | Quality target achieved | Highest no. gains | Mean errors (l+g+o) | Standard error |
|---|---|---|---|---|---|---|---|
| **Frimley** | **20** | **1.20** | **0.25** | | **4** | **1.30** | **0.26** |
| 307 | 7 | 1.71 | 0.52 | | 4 | 1.71 | 0.52 |
| 317 | 6 | 0.67 | 0.21 | | 1 | 0.67 | 0.21 |
| MJW | 6 | 1.17 | 0.48 | | 3 | 1.17 | 0.48 |
| TJ | 1 | 1.00 | n/a | | 1 | 3.00 | n/a |
| **Hatfield** | **20** | **1.30** | **0.23** | | **3** | **1.40** | **0.26** |
| DJL | 2 | 1.50 | 0.50 | | 2 | 1.50 | 0.50 |
| JE | 17 | 1.35 | 0.26 | | 3 | 1.47 | 0.29 |
| KLG | 1 | 0 | n/a | ✓ | 0 | 0 | n/a |
| **Wallingford** | **20** | **1.65** | **0.33** | | **5** | **1.85** | **0.38** |
| 001 | 2 | 2.00 | 1.00 | | 3 | 2.00 | 1.00 |
| 002 | 5 | 1.40 | 0.68 | | 4 | 1.60 | 0.68 |
| 004 | 8 | 1.63 | 0.53 | | 4 | 1.88 | 0.61 |
| 005 | 1 | 0 | n/a | ✓ | 0 | 0 | n/a |
| 007 | 1 | 2.00 | n/a | | 2 | 2.00 | n/a |
| KG | 3 | 2.33 | 1.33 | | 5 | 2.67 | 1.67 |
| **Thames Region** | **60** | **1.38** | **0.16** | | **5** | **1.52** | **0.18** |

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 | Standard error of net effect on score | Maximum underestimate of BMWP score | Mean net effect on no. of taxa | Standard error of net effect on no.of taxa | Maximum underestimate of no. of taxa |
|---|---|---|---|---|---|---|---|
| **Frimley** | **20** | **6.30** | **1.31** | **22** | **1.10** | **0.27** | **4** |
| 307 | 7 | 10.00 | 2.54 | 22 | 1.71 | 0.52 | 4 |
| 317 | 6 | 3.67 | 1.33 | 8 | 0.67 | 0.21 | 1 |
| MJW | 6 | 5.67 | 2.22 | 13 | 1.17 | 0.48 | 3 |
| TJ | 1 | 0 | n/a | 0 | -1.00 | n/a | -1 |
| **Hatfield** | **20** | **6.65** | **1.24** | **18** | **1.25** | **0.22** | **3** |
| DJL | 2 | 8.50 | 5.50 | 14 | 1.50 | 0.50 | 2 |
| JE | 17 | 6.82 | 1.32 | 18 | 1.29 | 0.24 | 3 |
| KLG | 1 | 0 | n/a | 0 | 0 | n/a | 0 |
| **Wallingford** | **20** | **9.45** | **1.86** | **27** | **1.55** | **0.32** | **4** |
| 001 | 2 | 16.00 | 11.00 | 27 | 2.00 | 1.00 | 3 |
| 002 | 5 | 7.00 | 3.62 | 21 | 1.20 | 0.73 | 4 |
| 004 | 8 | 9.50 | 2.94 | 24 | 1.63 | 0.53 | 4 |
| 005 | 1 | 0 | n/a | 0 | 0 | n/a | 0 |
| 007 | 1 | 15.00 | n/a | 15 | 2.00 | n/a | 2 |
| KG | 3 | 10.33 | 3.84 | 18 | 2.00 | 1.00 | 4 |
| **Thames Region** | **60** | **7.47** | **0.87** | **27** | **1.30** | **0.16** | **4** |

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

| Family | n | % of Thames Region's missed families in AQC Audit |
|---|---|---|
| Hydroptilidae | 6 | 7.69 |
| Planariidae (incl. Dugesiidae) | 6 | 7.69 |
| Caenidae | 5 | 6.41 |
| Ancylidae (incl. Acroloxidae) | 5 | 6.41 |
| Lymnaeidae | 5 | 6.41 |
| Elmidae | 4 | 5.13 |
| Leptoceridae | 4 | 5.13 |
| Limnephilidae | 4 | 5.13 |
| Hydrophilidae (incl. Hydraenidae) | 3 | 3.85 |
| Simuliidae | 3 | 3.85 |
| Hydrobiidae (incl. Bithyniidae) | 3 | 3.85 |
| Nemouridae | 2 | 2.56 |
| Planorbidae | 2 | 2.56 |
| Psychomyiidae (incl. Ecnomidae) | 2 | 2.56 |
| Baetidae | 2 | 2.56 |
| Valvatidae | 2 | 2.56 |
| Dendrocoelidae | 2 | 2.56 |
| Dytiscidae (incl. Noteridae) | 2 | 2.56 |
| Asellidae | 1 | 1.28 |
| Tipulidae | 1 | 1.28 |
| Coenagrionidae | 1 | 1.28 |
| Physidae | 1 | 1.28 |
| Ephemerellidae | 1 | 1.28 |
| Gyrinidae | 1 | 1.28 |
| Hydrometridae | 1 | 1.28 |
| Leptophlebiidae | 1 | 1.28 |
| Molannidae | 1 | 1.28 |
| Piscicolidae | 1 | 1.28 |
| Hydropsychidae | 1 | 1.28 |
| Sialidae | 1 | 1.28 |
| Scirtidae | 1 | 1.28 |
| Leuctridae | 1 | 1.28 |
| Libellulidae | 1 | 1.28 |
| Heptageniidae | 1 | 1.28 |
| **Total** | **78** | **100** |

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

| Species | n | % of Thames Region's missed species in AQC Audit |
|---|---|---|
| Caenis luctuosa group | 5 | 5.95 |
| Hydroptila sp. | 5 | 5.95 |
| Polycelis nigra group | 5 | 5.95 |
| Limnephilidae indet | 4 | 4.76 |
| Ancylus fluviatilis Muller | 3 | 3.57 |
| Lymnaea truncatula (Muller) | 3 | 3.57 |
| Mystacides azurea (L.) | 3 | 3.57 |
| Dendrocoelum lacteum (Muller) | 2 | 2.38 |
| Elmis aenea (Muller) | 2 | 2.38 |
| Hydraena riparia Kugelann | 2 | 2.38 |
| Ithytrichia sp. | 2 | 2.38 |
| Acroloxus lacustris (L.) | 2 | 2.38 |
| Lymnaea peregra (Muller) | 2 | 2.38 |
| Oulimnius sp. | 2 | 2.38 |
| Valvata cristata Muller | 2 | 2.38 |
| Potamopyrgus jenkinsi (Smith) | 2 | 2.38 |
| Simulium (Simulium) ornatum group | 2 | 2.38 |
| Coenagrionidae indet | 1 | 1.19 |
| Heptagenia sulphurea (Muller) | 1 | 1.19 |
| Helophorus (Atracthelophorus) brevipalpis Bedel | 1 | 1.19 |
| Gyraulus albus (Muller) | 1 | 1.19 |
| Ephemerella ignita (Poda) | 1 | 1.19 |
| Elodes sp. | 1 | 1.19 |
| Libellulidae indet | 1 | 1.19 |
| Tinodes waeneri (L.) | 1 | 1.19 |
| Hydropsyche angustipennis (Curtis) | 1 | 1.19 |
| Cloeon dipterum (L.) | 1 | 1.19 |
| Tipula sp. | 1 | 1.19 |
| Bithynia tentaculata (L.) | 1 | 1.19 |
| Baetis vernus Curtis | 1 | 1.19 |
| Asellus meridianus Racovitza | 1 | 1.19 |
| Asellus aquaticus (L.) | 1 | 1.19 |
| Armiger crista (L.) | 1 | 1.19 |
| Dugesia polychroa group | 1 | 1.19 |
| Lymnaea sp. | 1 | 1.19 |
| Orectochilus villosus (Muller) | 1 | 1.19 |
| Oecetis testacea (Curtis) | 1 | 1.19 |
| Nemurella picteti Klapalek | 1 | 1.19 |
| Nemoura sp. | 1 | 1.19 |
| Physa sp. | 1 | 1.19 |

Table 51 continued

| Species | n | % of Thames Region's missed species in AQC Audit |
|---|---|---|
| Molanna angustata Curtis | 1 | 1.19 |
| Lype sp. | 1 | 1.19 |
| Simulium (Nevermannia) angustitarse group | 1 | 1.19 |
| Lymnaea stagnalis (L.) | 1 | 1.19 |
| Hydrometra stagnorum (L.) | 1 | 1.19 |
| Valvata piscinalis (Muller) | 1 | 1.19 |
| Platambus maculatus (L.) | 1 | 1.19 |
| Leuctra sp. | 1 | 1.19 |
| Sialis lutaria (L.) | 1 | 1.19 |
| Ilybius fuliginosus (Fabricius) | 1 | 1.19 |
| Simulium (Boophthora) erythrocephalum (de Geer) | 1 | 1.19 |
| Paraleptophlebia submarginata (Stephens) | 1 | 1.19 |
| Piscicola geometra (L.) | 1 | 1.19 |
| **Total** | **84** | **100** |

# AUDIT OF AQC INSPECTORS FOR WALES

Table 52 The 20 samples audited for Northern Area of Wales

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Pill Brook | Gwernesney | 360 | 0 | 1 | 0 |
| Afon Erch | Aber Erch | 376 | 0 | 3 | 0 |
| Hiraeth Lyn | Ty Gwyn Pont Newydd | 376 | 0 | 0 | 0 |
| Afon Merddwr | Pentre Foelas | 376 | 0 | 0 | 0 |
| Teirw | u/s Ceiriog | 376 | 0 | 1 | 0 |
| Afon Dulas | u/s Crewi | 376 | 0 | 2 | 0 |
| Shell Brook | u/s Kilhendre Brook | 376 | 1 | 1 | 0 |
| Merddwr | Pentrefoelas | 376 | 0 | 1 | 0 |
| Builth Dulas Brook | u/s Builth Road STW | 376 | 1 | 0 | 0 |
| Alyn | Gwersyllt Park | 376 | 0 | 1 | 0 |
| Afon Llyfnant | Caerhedyn | 377 | 0 | 1 | 0 |
| Afon Morwynion | Carrog | 377 | 0 | 1 | 0 |
| Afon Llynor | Hendwr | 377 | 0 | 2 | 0 |
| Afon Caledffrwd | u/s Brynrefail | 377 | 0 | 2 | 0 |
| Afon Seiont | Pont y Gromlech | 377 | 0 | 1 | 0 |
| Afon Caseg | Braichmelyn | 377 | 0 | 2 | 0 |
| Afon Llafar | Pont y Llafar | 377 | 0 | 0 | 0 |
| Afon Hesbin | Eyarth Hesbin | 377 | 0 | 0 | 0 |
| Olway Brook | Llandenny | 377 | 0 | 0 | 0 |
| Monks Ditch | Ford Farm | 377 | 2 | 1 | 0 |

Table 53 The 20 samples audited for South Eastern Area of Wales

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Ely | St Fagans | 370 | 0 | 1 | 0 |
| Ely | Near Bryn Farm | 370 | 0 | 0 | 0 |
| Kinnersley Brook | Kinley | 370 | 0 | 0 | 0 |
| Wye | Ross on Wye | 370 | 1 | 1 | 0 |
| Usk | Llanellen | 370 | 0 | 0 | 0 |
| Lugg | Whitton | 370 | 0 | 0 | 0 |
| Llwyd | u/s Cwmavon | 370 | 0 | 0 | 0 |
| Pinsley Brook | Shobdon Marsh | 370 | 0 | 0 | 0 |
| Rhiangoll | Pont-y-Bryn-Hurt | 370 | 0 | 0 | 0 |
| Myddlyn | Ystrad Barwig | 370 | 0 | 1 | 0 |
| How Caple Brook | Alfords Mill | 370 | 0 | 0 | 0 |
| Taff | d/s Radyr Weir | 370 | 1 | 0 | 0 |
| Dowlais | d/s Tregurnog Farm | 370 | 1 | 0 | 0 |
| Taff | Ynysangharad Park | 370 | 1 | 3 | 0 |
| Sirhowy | Pont Gwaithyrhaearn | 370 | 0 | 0 | 0 |
| Trothy | Dingestow | 370 | 0 | 2 | 0 |
| Ffrud Oer | Plas y Coed | 370 | 0 | 0 | 0 |
| Taf Bargoed | Tir-Tan | 370 | 0 | 0 | 0 |
| Llwyd | Pontncwynydd | 375 | 0 | 0 | 0 |
| Usk | d/s Cilieni | 375 | 0 | 1 | 0 |

Table 54 The 20 samples audited for South Western Area of Wales

| River | Site | AQC inspector | Losses | Gains | Omissions |
|---|---|---|---|---|---|
| Gwendraeth Fawr | Ponthenri Road Bridge | 361 | 0 | 4 | 0 |
| Gwendraeth Fawr | Pontyberem Road Bridge | 361 | 0 | 0 | 0 |
| Llynfi | Pandy Park | 361 | 0 | 0 | 0 |
| Clydach | Neath Abbey | 361 | 0 | 2 | 0 |
| Tywi | Fish Trap @ Brianne | 361 | 0 | 0 | 0 |
| Ystwyth | Esgair-Wen Bridge | 361 | 0 | 0 | 0 |
| Afon Llechwedd Mawr | u/s Nant-y-Moch Reservoir | 361 | 0 | 0 | 0 |
| Lash | Aberlash RB | 362 | 0 | 1 | 0 |
| Nant-y-Cerdin | Cwmfecin | 362 | 0 | 1 | 0 |
| Llynfell | Upper Cwmtwrch | 362 | 0 | 0 | 0 |
| Nant Gwys | Cwmtwrch | 362 | 0 | 3 | 0 |
| Syfynwy | u/s Rosebush WTW | 362 | 0 | 2 | 0 |
| Dafen | Glyngwernan | 362 | 0 | 2 | 0 |
| Tawe | u/s Trebanos STW | 362 | 0 | 1 | 0 |
| Llynfell | Cwmllynfell | 362 | 0 | 1 | 0 |
| Llanddowror Brook | In Village | 362 | 0 | 1 | 0 |
| Neath | u/s Nant Pergwm | NCW | 0 | 1 | 0 |
| Hengwm | d/s Hyddgen | NCW | 0 | 0 | 0 |
| Teifi | d/s Strata Florida WTW | W27 | 0 | 1 | 0 |
| Upper Clydach | u/s Nant y Gasseg | W27 | 0 | 2 | 0 |

Table 55 Statistics of the 2000 AQC Audit for Wales

| Analyst/ Group | n | Mean gains | Standard error | Quality target achieved | Highest no. gains | Mean errors (l+g+o) | Standard error |
|---|---|---|---|---|---|---|---|
| **Northern** | **20** | **1.00** | **0.19** | | **3** | **1.20** | **0.21** |
| 360 | 1 | 1.00 | | | 1 | 1.00 | |
| 376 | 9 | 1.00 | 0.33 | | 3 | 1.22 | 0.32 |
| 377 | 10 | 1.00 | 0.26 | | 2 | 1.20 | 0.33 |
| **S. Eastern** | **20** | **0.45** | **0.18** | ✓ | **3** | **0.65** | **0.23** |
| 370 | 18 | 0.44 | 0.20 | ✓ | 3 | 0.67 | 0.26 |
| 375 | 2 | 0.50 | 0.50 | ✓ | 1 | 0.50 | 0.50 |
| **S. Western** | **20** | **1.10** | **0.25** | | **4** | **1.10** | **0.25** |
| 361 | 7 | 0.86 | 0.59 | | 4 | 0.86 | 0.59 |
| 362 | 9 | 1.33 | 0.29 | | 3 | 1.33 | 0.29 |
| W27 | 2 | 1.50 | 0.50 | | 2 | 1.50 | 0.50 |
| NCW | 2 | 0.50 | 0.50 | ✓ | 1 | 0.50 | 0.50 |
| **Wales** | **60** | **0.85** | **0.13** | | **4** | **0.98** | **0.14** |

Table 56 Net effects of the AQC Audit on BMWP score and number of scoring taxa for Wales

| Analyst/ Group | n | Mean net effect on BMWP score | Standard error of net effect on score | Maximum underestimate of BMWP score | Mean net effect on no. of taxa | Standard error of net effect on no.of taxa | Maximum underestimate of no. of taxa |
|---|---|---|---|---|---|---|---|
| **Northern** | **20** | **5.65** | **1.70** | **20** | **0.80** | **0.24** | **3** |
| 360 | 1 | 6.00 | n/a | 6 | 1.00 | n/a | 1 |
| 376 | 9 | 5.89 | 2.40 | 20 | 0.78 | 0.40 | 3 |
| 377 | 10 | 5.40 | 2.75 | 17 | 0.80 | 0.33 | 2 |
| **S. Eastern** | **20** | **1.65** | **0.91** | **12** | **0.25** | **0.18** | **2** |
| 370 | 18 | 1.67 | 1.01 | 12 | 0.22 | 0.19 | 2 |
| 375 | 2 | 1.50 | 1.50 | 3 | 0.50 | 0.50 | 1 |
| **S. Western** | **20** | **7.80** | **1.79** | **28** | **1.10** | **0.25** | **4** |
| 361 | 7 | 6.29 | 4.26 | 28 | 0.86 | 0.59 | 4 |
| 362 | 9 | 8.78 | 1.96 | 18 | 1.33 | 0.29 | 3 |
| W27 | 2 | 13.50 | 3.50 | 17 | 1.50 | 0.50 | 2 |
| NCW | 2 | 3.00 | 3.00 | 6 | 0.50 | 0.50 | 1 |
| **Wales** | **60** | **5.03** | **0.92** | **28** | **0.72** | **0.13** | **4** |

Table 57 The families missed in sorting by Wales' AQC inspectors

| Family | n | % of Wales' missed families in AQC Audit |
|---|---|---|
| Goeridae | 4 | 8.51 |
| Nemouridae | 3 | 6.38 |
| Sphaeriidae | 3 | 6.38 |
| Hydrophilidae (incl. Hydraenidae) | 3 | 6.38 |
| Ancylidae (incl. Acroloxidae) | 3 | 6.38 |
| Hydroptilidae | 3 | 6.38 |
| Tipulidae | 2 | 4.26 |
| Ephemerellidae | 2 | 4.26 |
| Limnephilidae | 2 | 4.26 |
| Chloroperlidae | 2 | 4.26 |
| Calopterygidae | 2 | 4.26 |
| Psychomyiidae (incl. Ecnomidae) | 2 | 4.26 |
| Rhyacophilidae (incl. Glossosomatidae) | 2 | 4.26 |
| Caenidae | 2 | 4.26 |
| Dytiscidae (incl. Noteridae) | 1 | 2.13 |
| Erpobdellidae | 1 | 2.13 |
| Dryopidae | 1 | 2.13 |
| Glossiphoniidae | 1 | 2.13 |
| Leptoceridae | 1 | 2.13 |
| Leptophlebiidae | 1 | 2.13 |
| Leuctridae | 1 | 2.13 |
| Lymnaeidae | 1 | 2.13 |
| Physidae | 1 | 2.13 |
| Piscicolidae | 1 | 2.13 |
| Scirtidae | 1 | 2.13 |
| Lepidostomatidae | 1 | 2.13 |
| **Total** | **47** | **100** |

Table 58 The species missed in sorting by Wales' AQC inspectors

| Species | n | % of Wales' missed species in AQC Audit |
|---|---|---|
| Ancylus fluviatilis Muller | 3 | 6.25 |
| Silo pallipes (Fabricius) | 3 | 6.25 |
| Hydraena gracilis Germar | 3 | 6.25 |
| Hydroptila sp. | 3 | 6.25 |
| Dicranota sp. | 2 | 4.17 |
| Limnephilidae indet | 2 | 4.17 |
| Ephemerella ignita (Poda) | 2 | 4.17 |
| Pisidium sp. | 2 | 4.17 |
| Chloroperla torrentium (Pictet) | 2 | 4.17 |
| Caenis rivulorum Eaton | 2 | 4.17 |
| Calopteryx splendens (Harris) | 1 | 2.08 |
| Hydrocyphon deflexicollis (Muller) | 1 | 2.08 |
| Erpobdellidae indet | 1 | 2.08 |
| Glossiphonia complanata (L.) | 1 | 2.08 |
| Habrophlebia fusca (Curtis) | 1 | 2.08 |
| Helichus substriatus (Muller) | 1 | 2.08 |
| Calopteryx sp. | 1 | 2.08 |
| Elodes sp. | 1 | 2.08 |
| Oreodytes sanmarkii (Sahlberg) | 1 | 2.08 |
| Silo sp. | 1 | 2.08 |
| Rhyacophila sp. | 1 | 2.08 |
| Rhyacophila dorsalis (Curtis) | 1 | 2.08 |
| Psychomyia pusilla (Fabricius) | 1 | 2.08 |
| Protonemura meyeri (Pictet) | 1 | 2.08 |
| Lepidostomatidae indet | 1 | 2.08 |
| Physa sp. | 1 | 2.08 |
| Amphinemura sulcicollis (Stephens) | 1 | 2.08 |
| Oecetis testacea (Curtis) | 1 | 2.08 |
| Nemurella picteti Klapalek | 1 | 2.08 |
| Lype sp. | 1 | 2.08 |
| Lymnaea sp. | 1 | 2.08 |
| Sphaeriidae indet | 1 | 2.08 |
| Leuctra inermis Kempny | 1 | 2.08 |
| Piscicola geometra (L.) | 1 | 2.08 |
| **Total** | **48** | **100** |

# SUMMARY OF AQC AUDIT FOR ENVIRONMENT AGENCY

Table 59 Statistics of the 2000 AQC Audit for each Agency laboratory

| Region/Area | n | Mean gains | Standard error | Quality target achieved | Highest no. gains | Mean errors (l+g+o) | Standard error |
|---|---|---|---|---|---|---|---|
| **Anglian Region** | **60** | **0.93** | **0.15** | | **4** | **1.33** | **0.18** |
| Central | 20 | 1.40 | 0.28 | | 4 | 1.85 | 0.33 |
| Eastern | 20 | 0.95 | 0.29 | | 4 | 1.15 | 0.29 |
| Northern | 20 | 0.45 | 0.15 | ✓ | 2 | 1.00 | 0.28 |
| **Midlands Region** | **60** | **0.81** | **0.13** | | **6** | **1.06** | **0.15** |
| Upper Severn | 20 | 0.35 | 0.15 | ✓ | 2 | 0.90 | 0.32 |
| Lower Severn | 20 | 0.55 | 0.15 | | 2 | 0.65 | 0.17 |
| Upper Trent | 20 | 1.50 | 0.37 | | 6 | 1.70 | 0.39 |
| Lower Trent | 20 | 0.85 | 0.22 | | 3 | 1.00 | 0.25 |
| **N. East Region** | **60** | **0.72** | **0.12** | | **3** | **0.80** | **0.14** |
| Dales | 20 | 0.75 | 0.22 | | 3 | 0.75 | 0.22 |
| Northumbria | 20 | 0.65 | 0.22 | | 3 | 0.70 | 0.25 |
| Ridings | 20 | 0.75 | 0.20 | | 2 | 0.95 | 0.28 |
| **N. West Region** | **60** | **0.50** | **0.12** | ✓ | **5** | **0.72** | **0.13** |
| Northern | 20 | 0.35 | 0.13 | ✓ | 2 | 0.60 | 0.20 |
| Central | 20 | 0.30 | 0.13 | ✓ | 2 | 0.45 | 0.14 |
| Southern | 20 | 0.85 | 0.30 | | 5 | 1.10 | 0.30 |
| **Southern Region** | **60** | **0.45** | **0.09** | ✓ | **3** | **0.55** | **0.10** |
| Hants & I.O.W. | 20 | 0.30 | 0.11 | ✓ | 1 | 0.40 | 0.13 |
| Kent | 20 | 0.80 | 0.20 | | 3 | 0.85 | 0.20 |
| Sussex | 20 | 0.25 | 0.12 | ✓ | 2 | 0.40 | 0.18 |
| **S. West Region** | **60** | **0.24** | **0.06** | ✓ | **3** | **0.31** | **0.07** |
| Cornwall | 20 | 0.05 | 0.05 | ✓ | 1 | 0.05 | 0.05 |
| Devon | 20 | 0.15 | 0.08 | ✓ | 1 | 0.30 | 0.11 |
| North Wessex | 20 | 0.30 | 0.16 | ✓ | 3 | 0.45 | 0.21 |
| South Wessex | 20 | 0.45 | 0.15 | ✓ | 2 | 0.45 | 0.15 |
| **Thames Region** | **60** | **1.38** | **0.16** | | **5** | **1.52** | **0.18** |
| Frimley | 20 | 1.20 | 0.25 | | 4 | 1.30 | 0.26 |
| Hatfield | 20 | 1.30 | 0.23 | | 3 | 1.40 | 0.26 |
| Wallingford | 20 | 1.65 | 0.33 | | 5 | 1.85 | 0.38 |
| **Wales** | **60** | **0.85** | **0.13** | | **4** | **0.98** | **0.14** |
| Northern | 20 | 1.00 | 0.19 | | 3 | 1.20 | 0.21 |
| South Eastern | 20 | 0.45 | 0.18 | ✓ | 3 | 0.65 | 0.23 |
| South Western | 20 | 1.10 | 0.25 | | 4 | 1.10 | 0.25 |
| **Whole of Agency** | **520** | **0.72** | **0.04** | | **6** | **0.89** | **0.05** |

Table 60 Net effects of the 2000 AQC Audit on BMWP score and no. of scoring taxa for each Agency lab.

| Region/Area | n | Mean net effect on BMWP score | Standard error of net effect on score | Maximum underestimate of BMWP score | Mean net effect on no. of taxa | Standard error of net effect on no.of taxa | Maximum underestimate of no. of taxa |
|---|---|---|---|---|---|---|---|
| **Anglian** | **60** | **3.12** | **0.88** | **24** | **0.67** | **0.17** | **4** |
| Central | 20 | 5.25 | 1.75 | 21 | 1.10 | 0.33 | 4 |
| Eastern | 20 | 4.15 | 1.51 | 24 | 0.85 | 0.28 | 4 |
| Northern | 20 | -0.05 | 1.03 | 8 | 0.05 | 0.20 | 1 |
| **Midlands** | **60** | **3.44** | **0.73** | **30** | **0.59** | **0.13** | **5** |
| U. Severn | 20 | -0.35 | 0.67 | 10 | -0.10 | 0.10 | 1 |
| L. Severn | 20 | 2.70 | 0.87 | 10 | 0.45 | 0.17 | 2 |
| U. Trent | 20 | 7.00 | 2.10 | 30 | 1.30 | 0.36 | 5 |
| L. Trent | 20 | 4.40 | 1.31 | 16 | 0.70 | 0.22 | 3 |
| **North East** | **60** | **4.45** | **0.77** | **22** | **0.67** | **0.11** | **3** |
| Dales | 20 | 4.50 | 1.42 | 22 | 0.75 | 0.22 | 3 |
| Northumbria | 20 | 3.50 | 1.10 | 16 | 0.60 | 0.20 | 3 |
| Ridings | 20 | 5.35 | 1.50 | 20 | 0.65 | 0.18 | 2 |
| **North West** | **60** | **2.45** | **0.93** | **41** | **0.32** | **0.13** | **5** |
| Northern | 20 | 1.15 | 0.82 | 10 | 0.15 | 0.11 | 1 |
| Central | 20 | 1.35 | 0.97 | 13 | 0.20 | 0.16 | 2 |
| Southern | 20 | 4.85 | 2.44 | 41 | 0.60 | 0.34 | 5 |
| **Southern** | **60** | **2.22** | **0.57** | **14** | **0.35** | **0.10** | **3** |
| Hants & I.O.W. | 20 | 1.35 | 0.69 | 8 | 0.20 | 0.12 | 1 |
| Kent | 20 | 4.20 | 1.18 | 13 | 0.75 | 0.22 | 3 |
| Sussex | 20 | 1.10 | 0.90 | 14 | 0.10 | 0.14 | 2 |
| **South West** | **60** | **1.46** | **0.48** | **20** | **0.17** | **0.07** | **3** |
| Cornwall | 20 | 0.25 | 0.25 | 5 | 0.05 | 0.05 | 1 |
| Devon | 20 | 0.40 | 0.73 | 10 | 0 | 0.13 | 1 |
| N. Wessex | 20 | 1.80 | 1.11 | 14 | 0.20 | 0.19 | 3 |
| S. Wessex | 20 | 3.40 | 1.29 | 20 | 0.45 | 0.15 | 2 |
| **Thames** | **60** | **7.47** | **0.87** | **27** | **1.30** | **0.16** | **4** |
| Frimley | 20 | 6.30 | 1.31 | 22 | 1.10 | 0.27 | 4 |
| Hatfield | 20 | 6.65 | 1.24 | 18 | 1.25 | 0.22 | 3 |
| Wallingford | 20 | 9.45 | 1.86 | 27 | 1.55 | 0.32 | 4 |
| **Wales** | **60** | **5.03** | **0.92** | **28** | **0.72** | **0.13** | **4** |
| Northern | 20 | 5.65 | 1.70 | 20 | 0.80 | 0.24 | 3 |
| S. Eastern | 20 | 1.65 | 0.91 | 12 | 0.25 | 0.18 | 2 |
| S. Western | 20 | 7.80 | 1.79 | 28 | 1.10 | 0.25 | 4 |
| **Whole of Agency** | **520** | **3.61** | **0.28** | **41** | **0.58** | **0.13** | **5** |

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

| Family | n | % of Agency's missed families in AQC Audit |
|---|---|---|
| Hydroptilidae | 23 | 6.95 |
| Hydrophilidae (incl. Hydraenidae) | 20 | 6.04 |
| Planariidae (incl. Dugesiidae) | 20 | 6.04 |
| Leptoceridae | 17 | 5.14 |
| Elmidae | 15 | 4.53 |
| Ancylidae (incl. Acroloxidae) | 13 | 3.93 |
| Nemouridae | 13 | 3.93 |
| Lymnaeidae | 12 | 3.63 |
| Hydrobiidae (incl. Bithyniidae) | 12 | 3.63 |
| Limnephilidae | 12 | 3.63 |
| Caenidae | 10 | 3.02 |
| Simuliidae | 10 | 3.02 |
| Psychomyiidae (incl. Ecnomidae) | 9 | 2.72 |
| Planorbidae | 8 | 2.42 |
| Rhyacophilidae (incl. Glossosomatidae) | 7 | 2.11 |
| Dytiscidae (incl. Noteridae) | 7 | 2.11 |
| Leuctridae | 7 | 2.11 |
| Valvatidae | 6 | 1.81 |
| Sphaeriidae | 6 | 1.81 |
| Tipulidae | 6 | 1.81 |
| Ephemerellidae | 6 | 1.81 |
| Goeridae | 6 | 1.81 |
| Piscicolidae | 5 | 1.51 |
| Baetidae | 5 | 1.51 |
| Asellidae | 5 | 1.51 |
| Scirtidae | 5 | 1.51 |
| Glossiphoniidae | 4 | 1.21 |
| Lepidostomatidae | 4 | 1.21 |
| Dendrocoelidae | 4 | 1.21 |
| Erpobdellidae | 4 | 1.21 |
| Calopterygidae | 4 | 1.21 |
| Physidae | 4 | 1.21 |
| Leptophlebiidae | 4 | 1.21 |
| Sialidae | 3 | 0.91 |
| Sericostomatidae | 3 | 0.91 |
| Haliplidae | 3 | 0.91 |
| Chloroperlidae | 3 | 0.91 |
| Coenagrionidae | 2 | 0.60 |
| Dryopidae | 2 | 0.60 |
| Molannidae | 2 | 0.60 |
| Odontoceridae | 2 | 0.60 |
| Gammaridae (incl. Crangonyctidae) | 2 | 0.60 |
| Hydropsychidae | 2 | 0.60 |
| Heptageniidae | 2 | 0.60 |
| Gyrinidae | 2 | 0.60 |
| Hydrometridae | 1 | 0.30 |

Table 61 continued

| Family | n | % of Agency's missed families in AQC Audit |
|---|---|---|
| Libellulidae | 1 | 0.30 |
| Corixidae | 1 | 0.30 |
| Unionidae | 1 | 0.30 |
| Oligochaeta | 1 | 0.30 |
| Perlodidae | 1 | 0.30 |
| Beraeidae | 1 | 0.30 |
| Taeniopterygidae | 1 | 0.30 |
| Polycentropodidae | 1 | 0.30 |
| Chironomidae | 1 | 0.30 |
| **Total** | **331** | **100** |

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

| Species | n | % of Agency's missed species in AQC Audit |
|---|---|---|
| Hydroptila sp. | 18 | 5.25 |
| Polycelis nigra group | 13 | 3.79 |
| Ancylus fluviatilis Muller | 10 | 2.92 |
| Potamopyrgus jenkinsi (Smith) | 10 | 2.92 |
| Hydraena gracilis Germar | 10 | 2.92 |
| Mystacides azurea (L.) | 9 | 2.62 |
| Elmis aenea (Muller) | 9 | 2.62 |
| Limnephilidae indet | 8 | 2.33 |
| Caenis luctuosa group | 8 | 2.33 |
| Oulimnius sp. | 7 | 2.04 |
| Ephemerella ignita (Poda) | 6 | 1.75 |
| Elodes sp. | 5 | 1.46 |
| Piscicola geometra (L.) | 5 | 1.46 |
| Silo pallipes (Fabricius) | 5 | 1.46 |
| Lymnaea peregra (Muller) | 5 | 1.46 |
| Lymnaea sp. | 5 | 1.46 |
| Simulium (Simulium) ornatum group | 5 | 1.46 |
| Pisidium sp. | 4 | 1.17 |
| Valvata cristata Muller | 4 | 1.17 |
| Dendrocoelum lacteum (Muller) | 4 | 1.17 |
| Lype sp. | 4 | 1.17 |
| Physa sp. | 3 | 0.87 |
| Acroloxus lacustris (L.) | 3 | 0.87 |
| Haliplus sp. | 3 | 0.87 |

Table 62 continued

| Species | n | % of Agency's missed species in AQC Audit |
|---|---|---|
| Ithytrichia sp. | 3 | 0.87 |
| Nemurella picteti Klapalek | 3 | 0.87 |
| Lymnaea truncatula (Muller) | 3 | 0.87 |
| Valvata piscinalis (Muller) | 3 | 0.87 |
| Gyraulus albus (Muller) | 3 | 0.87 |
| Leuctra sp. | 3 | 0.87 |
| Sericostoma personatum (Spence) | 3 | 0.87 |
| Tinodes waeneri (L.) | 3 | 0.87 |
| Armiger crista (L.) | 3 | 0.87 |
| Asellus aquaticus (L.) | 3 | 0.87 |
| Asellus meridianus Racovitza | 3 | 0.87 |
| Sialis lutaria (L.) | 3 | 0.87 |
| Calopteryx splendens (Harris) | 3 | 0.87 |
| Polycelis sp. | 3 | 0.87 |
| Chloroperla torrentium (Pictet) | 3 | 0.87 |
| Lepidostomatidae indet | 2 | 0.58 |
| Agapetus sp. | 2 | 0.58 |
| Amphinemura sulcicollis (Stephens) | 2 | 0.58 |
| Glossiphonia complanata (L.) | 2 | 0.58 |
| Limnephilus lunatus Curtis | 2 | 0.58 |
| Leuctra fusca (L.) | 2 | 0.58 |
| Dicranota sp. | 2 | 0.58 |
| Lepidostoma hirtum (Fabricius) | 2 | 0.58 |
| Bathyomphalus contortus (L.) | 2 | 0.58 |
| Bithynia tentaculata (L.) | 2 | 0.58 |
| Erpobdella octoculata (L.) | 2 | 0.58 |
| Coenagrionidae indet | 2 | 0.58 |
| Erpobdellidae indet | 2 | 0.58 |
| Hydropsyche angustipennis (Curtis) | 2 | 0.58 |
| Hydraena riparia Kugelann | 2 | 0.58 |
| Caenis rivulorum Eaton | 2 | 0.58 |
| Habrophlebia fusca (Curtis) | 2 | 0.58 |
| Baetis rhodani (Pictet) | 2 | 0.58 |
| Simulium sp. | 2 | 0.58 |
| Rhyacophila sp. | 2 | 0.58 |
| Polycelis felina (Dalyell) | 2 | 0.58 |
| Rhyacophila dorsalis (Curtis) | 2 | 0.58 |
| Oreodytes sanmarkii (Sahlberg) | 2 | 0.58 |
| Orectochilus villosus (Muller) | 2 | 0.58 |
| Paraleptophlebia submarginata (Stephens) | 2 | 0.58 |
| Oecetis testacea (Curtis) | 2 | 0.58 |
| Odontocerum albicorne (Scopoli) | 2 | 0.58 |
| Simulium (Nevermannia) angustitarse group | 2 | 0.58 |
| Sphaeriidae indet | 2 | 0.58 |
| Nemoura avicularis Morton | 2 | 0.58 |
| Nemoura sp. | 2 | 0.58 |

Table 62 continued

| Species | n | % of Agency's missed species in AQC Audit |
|---|---|---|
| Molanna angustata Curtis | 2 | 0.58 |
| Tipula sp. | 2 | 0.58 |
| Calopteryx sp. | 1 | 0.29 |
| Potamonectes depressus (Fabricius) | 1 | 0.29 |
| Potamophylax cingulatus group | 1 | 0.29 |
| Chironomini | 1 | 0.29 |
| Protonemura meyeri (Pictet) | 1 | 0.29 |
| Psychomyia pusilla (Fabricius) | 1 | 0.29 |
| Cloeon dipterum (L.) | 1 | 0.29 |
| Pseudanodonta complanata (Rossmassler) | 1 | 0.29 |
| Dugesia polychroa group | 1 | 0.29 |
| Dryopidae indet | 1 | 0.29 |
| Silo sp. | 1 | 0.29 |
| Protonemura praecox (Morton) | 1 | 0.29 |
| Rhithrogena sp. | 1 | 0.29 |
| Athripsodes bilineatus (L.) | 1 | 0.29 |
| Adicella reducta (Mclachlan) | 1 | 0.29 |
| Tubificidae | 1 | 0.29 |
| Agraylea multipunctata Curtis | 1 | 0.29 |
| Agraylea sp. | 1 | 0.29 |
| Tipulidae indet | 1 | 0.29 |
| Antocha vitripennis (Meigen) | 1 | 0.29 |
| Baetis vernus Curtis | 1 | 0.29 |
| Athripsodes aterrimus (Stephens) | 1 | 0.29 |
| Brachyptera risi (Morton) | 1 | 0.29 |
| Athripsodes sp. | 1 | 0.29 |
| Baetis muticus (L.) | 1 | 0.29 |
| Glossiphonia heteroclita (L.) | 1 | 0.29 |
| Simulium (Nevermannia) cryophilum group | 1 | 0.29 |
| Beraeodes minutus (L.) | 1 | 0.29 |
| Bithynia sp. | 1 | 0.29 |
| Simulium (Boophthora) erythrocephalum (de Geer) | 1 | 0.29 |
| Tinodes sp. | 1 | 0.29 |
| Leuctra inermis Kempny | 1 | 0.29 |
| Gammarus sp. | 1 | 0.29 |
| Hydrophilidae | 1 | 0.29 |
| Hydroporus angustatus Sturm | 1 | 0.29 |
| Hygrotus versicolor (Schaller) | 1 | 0.29 |
| Ilybius fuliginosus (Fabricius) | 1 | 0.29 |
| Isoperla grammatica (Poda) | 1 | 0.29 |
| Oecetis lacustris (Pictet) | 1 | 0.29 |
| Hydrocyphon deflexicollis (Muller) | 1 | 0.29 |
| Ochthebius bicolon Germar | 1 | 0.29 |
| Hydraena sp. | 1 | 0.29 |
| Libellulidae indet | 1 | 0.29 |
| Nemoura cinerea (Retzius) | 1 | 0.29 |

Table 62 continued

| Species | n | % of Agency's missed species in AQC Audit |
|---|---|---|
| Nemoura cambrica group | 1 | 0.29 |
| Limnephilus sp. | 1 | 0.29 |
| Naididae | 1 | 0.29 |
| Lymnaea stagnalis (L.) | 1 | 0.29 |
| Mystacides sp. | 1 | 0.29 |
| Ochthebius minimus (Fabricius) | 1 | 0.29 |
| Helobdella stagnalis (L.) | 1 | 0.29 |
| Gammarus pulex (L.) | 1 | 0.29 |
| Leuctra hippopus (Kempny) | 1 | 0.29 |
| Platambus maculatus (L.) | 1 | 0.29 |
| Micronecta sp. | 1 | 0.29 |
| Glossosoma sp. | 1 | 0.29 |
| Planariidae indet | 1 | 0.29 |
| Physa fontinalis (L.) | 1 | 0.29 |
| Hydrometra stagnorum (L.) | 1 | 0.29 |
| Helichus substriatus (Muller) | 1 | 0.29 |
| Plectrocnemia sp. | 1 | 0.29 |
| Helophorus (Atracthelophorus) brevipalpis Bedel | 1 | 0.29 |
| Helophorus (Helophorus) obscurus Mulsant | 1 | 0.29 |
| Heptagenia sulphurea (Muller) | 1 | 0.29 |
| Oxyethira sp. | 1 | 0.29 |
| Hydraena nigrita Germar | 1 | 0.29 |
| Hydraena pulchella Germar | 1 | 0.29 |
| Orthotrichia sp. | 1 | 0.29 |
| Haliplus laminatus Schaller | 1 | 0.29 |
| **Total** | **343** | **100** |

# MISSED TAXA FOR ALL SAMPLES IN THE 2000 AUDIT

Table 63 Families missed 5 times or more for all samples in the 2000 Audit

| Family | n | % of missed families in 2000 audit |
|---|---|---|
| Hydroptilidae | 74 | 5.85 |
| Planariidae (incl. Dugesiidae) | 71 | 5.61 |
| Hydrophilidae (incl. Hydraenidae) | 66 | 5.21 |
| Leptoceridae | 62 | 4.90 |
| Hydrobiidae (incl. Bithyniidae) | 51 | 4.03 |
| Caenidae | 49 | 3.87 |
| Simuliidae | 46 | 3.63 |
| Elmidae | 45 | 3.55 |
| Nemouridae | 42 | 3.32 |
| Ancylidae (incl. Acroloxidae) | 40 | 3.16 |
| Psychomyiidae (incl. Ecnomidae) | 39 | 3.08 |
| Limnephilidae | 38 | 3.00 |
| Sphaeriidae | 38 | 3.00 |
| Lymnaeidae | 34 | 2.69 |
| Dytiscidae (incl. Noteridae) | 29 | 2.29 |
| Planorbidae | 29 | 2.29 |
| Valvatidae | 27 | 2.13 |
| Tipulidae | 25 | 1.97 |
| Goeridae | 25 | 1.97 |
| Leuctridae | 24 | 1.90 |
| Asellidae | 24 | 1.90 |
| Leptophlebiidae | 22 | 1.74 |
| Lepidostomatidae | 21 | 1.66 |
| Ephemerellidae | 20 | 1.58 |
| Rhyacophilidae (incl. Glossosomatidae) | 20 | 1.58 |
| Haliplidae | 19 | 1.50 |
| Baetidae | 18 | 1.42 |
| Hydropsychidae | 17 | 1.34 |
| Physidae | 17 | 1.34 |
| Piscicolidae | 17 | 1.34 |
| Scirtidae | 16 | 1.26 |
| Chloroperlidae | 15 | 1.18 |
| Dendrocoelidae | 14 | 1.11 |
| Glossiphoniidae | 14 | 1.11 |
| Sericostomatidae | 14 | 1.11 |
| Gyrinidae | 13 | 1.03 |
| Calopterygidae | 12 | 0.95 |
| Erpobdellidae | 12 | 0.95 |
| Coenagrionidae | 11 | 0.87 |
| Odontoceridae | 9 | 0.71 |
| Gammaridae (incl. Crangonyctidae) | 8 | 0.63 |
| Taeniopterygidae | 7 | 0.55 |
| Sialidae | 7 | 0.55 |
| Heptageniidae | 7 | 0.55 |
| Chironomidae | 6 | 0.47 |
| Beraeidae | 6 | 0.47 |

Table 63 continued

| Family | n | % of missed families in 2000 audit |
|---|---|---|
| Corixidae | 6 | 0.47 |
| Dryopidae | 5 | 0.39 |
| Polycentropodidae | 5 | 0.39 |
| Oligochaeta | 5 | 0.39 |
| Molannidae | 5 | 0.39 |

Table 64 Species missed 5 times or more for all samples in the 2000 Audit

| Species | n | % of missed species in 2000 audit |
|---|---|---|
| Hydroptila sp. | 54 | 4.04 |
| Potamopyrgus jenkinsi (Smith) | 47 | 3.52 |
| Hydraena gracilis Germar | 38 | 2.84 |
| Polycelis nigra group | 36 | 2.69 |
| Pisidium sp. | 32 | 2.39 |
| Ancylus fluviatilis Muller | 29 | 2.17 |
| Caenis luctuosa group | 28 | 2.09 |
| Mystacides azurea (L.) | 28 | 2.09 |
| Elmis aenea (Muller) | 28 | 2.09 |
| Simulium (Simulium) ornatum group | 23 | 1.72 |
| Ephemerella ignita (Poda) | 20 | 1.50 |
| Limnephilidae indet | 20 | 1.50 |
| Caenis rivulorum Eaton | 19 | 1.42 |
| Asellus aquaticus (L.) | 19 | 1.42 |
| Silo pallipes (Fabricius) | 18 | 1.35 |
| Valvata cristata Muller | 18 | 1.35 |
| Piscicola geometra (L.) | 17 | 1.27 |
| Oulimnius sp. | 16 | 1.20 |
| Lype sp. | 15 | 1.12 |
| Lymnaea peregra (Muller) | 15 | 1.12 |
| Tinodes waeneri (L.) | 15 | 1.12 |
| Dendrocoelum lacteum (Muller) | 14 | 1.05 |
| Chloroperla torrentium (Pictet) | 14 | 1.05 |
| Sericostoma personatum (Spence) | 14 | 1.05 |
| Haliplus sp. | 13 | 0.97 |
| Ithytrichia sp. | 13 | 0.97 |
| Valvata piscinalis (Muller) | 13 | 0.97 |
| Elodes sp. | 13 | 0.97 |
| Orectochilus villosus (Muller) | 12 | 0.90 |
| Acroloxus lacustris (L.) | 12 | 0.90 |
| Lepidostoma hirtum (Fabricius) | 12 | 0.90 |
| Lymnaea sp. | 11 | 0.82 |
| Oreodytes sanmarkii (Sahlberg) | 11 | 0.82 |
| Polycelis felina (Dalyell) | 11 | 0.82 |
| Calopteryx splendens (Harris) | 10 | 0.75 |
| Armiger crista (L.) | 10 | 0.75 |
| Polycelis sp. | 10 | 0.75 |
| Odontocerum albicorne (Scopoli) | 9 | 0.67 |
| Glossiphonia complanata (L.) | 9 | 0.67 |
| Paraleptophlebia submarginata (Stephens) | 9 | 0.67 |
| Physa sp. | 9 | 0.67 |
| Amphinemura sulcicollis (Stephens) | 9 | 0.67 |
| Lepidostomatidae indet | 9 | 0.67 |
| Rhyacophila dorsalis (Curtis) | 8 | 0.60 |
| Hydraena riparia Kugelann | 8 | 0.60 |
| Habrophlebia fusca (Curtis) | 8 | 0.60 |
| Hydropsyche angustipennis (Curtis) | 8 | 0.60 |

Table 64 continued

| Species | n | % of missed species in 2000 audit |
|---|---|---|
| Bathyomphalus contortus (L.) | 8 | 0.60 |
| Dicranota sp. | 8 | 0.60 |
| Lymnaea truncatula (Muller) | 8 | 0.60 |
| Nemoura avicularis Morton | 7 | 0.52 |
| Sialis lutaria (L.) | 7 | 0.52 |
| Nemurella picteti Klapalek | 7 | 0.52 |
| Baetis rhodani (Pictet) | 7 | 0.52 |
| Asellus meridianus Racovitza | 7 | 0.52 |
| Physa fontinalis (L.) | 7 | 0.52 |
| Gyraulus albus (Muller) | 7 | 0.52 |
| Leuctra sp. | 7 | 0.52 |
| Leuctra fusca (L.) | 6 | 0.45 |
| Tipula sp. | 6 | 0.45 |
| Oxyethira sp. | 6 | 0.45 |
| Psychomyia pusilla (Fabricius) | 6 | 0.45 |
| Erpobdella octoculata (L.) | 6 | 0.45 |
| Adicella reducta (Mclachlan) | 6 | 0.45 |
| Agapetus sp. | 6 | 0.45 |
| Brachyptera risi (Morton) | 6 | 0.45 |
| Sphaeriidae indet | 6 | 0.45 |
| Helophorus (Atracthelophorus) brevipalpis Bedel | 6 | 0.45 |
| Limnephilus lunatus Curtis | 6 | 0.45 |
| Nemoura sp. | 5 | 0.37 |
| Protonemura meyeri (Pictet) | 5 | 0.37 |
| Simulium (Nevermannia) angustitarse group | 5 | 0.37 |
| Dugesia polychroa group | 5 | 0.37 |
| Oecetis testacea (Curtis) | 5 | 0.37 |
| Antocha vitripennis (Meigen) | 5 | 0.37 |
| Athripsodes bilineatus (L.) | 5 | 0.37 |
| Erpobdellidae indet | 5 | 0.37 |
| Leuctra hippopus (Kempny) | 5 | 0.37 |
| Athripsodes sp. | 5 | 0.37 |
| Silo sp. | 5 | 0.37 |
| Coenagrionidae indet | 5 | 0.37 |
| Molanna angustata Curtis | 5 | 0.37 |
| Bithynia tentaculata (L.) | 5 | 0.37 |
| Beraeodes minutus (L.) | 5 | 0.37 |
| Hydropsyche siltalai Dohler | 5 | 0.37 |