



An Audit of Performance in the Analysis of Biological Samples in 1997 SEPA North Region

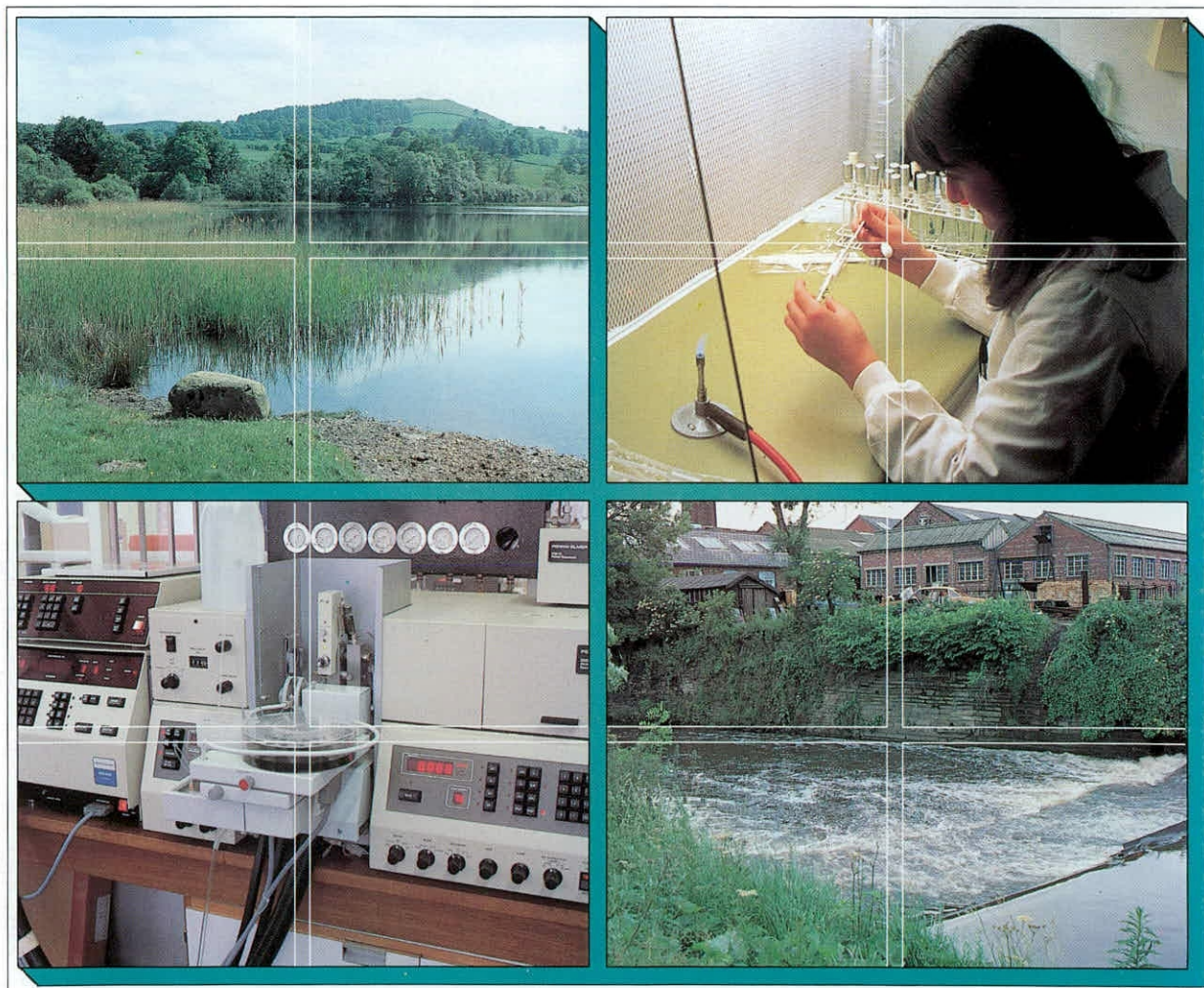
R J M Gunn, BA
J F Wright, PhD

J H Blackburn, BSc
K L Symes, HND

J M Winder, PhD
J Davy-Bowker, MSc

Report To:
IFE Report Ref. No:

Scottish Environment Protection Agency, North Region
RL/T04071R7/13





**Institute of
Freshwater
Ecology**

River Laboratory
East Stoke, Wareham
Dorset BH20 6BB

Telephone 01929 462314
Facsimile 01929 462180

An Audit of Performance in the Analysis of Biological Samples in 1997 SEPA North Region

**R J M Gunn, J H Blackburn, J M Winder, J F Wright, K L Symes and
J Davy-Bowker**

Project Leader:
Report Date:
Report To:
IFE Report Ref. No:

R.J.M. Gunn
August 1998
Scottish Environment Protection Agency, North Region
RL/T04071R7/13

**Centre for
Ecology &
Hydrology**

Institute of Freshwater Ecology
Institute of Hydrology
Institute of Terrestrial Ecology
Institute of Virology & Environmental Microbiology

Natural Environmental Research Council

INTELLECTUAL PROPERTY RIGHTS

CONFIDENTIALITY STATEMENT

'In accordance with our normal practice, this report is for the use only of the party to whom it is addressed, and no responsibility is accepted to any third party for the whole or any part of its contents. Neither the whole nor any part of this report or any reference thereto may be included in any published document, circular or statement, nor published or referred to in any way without our written approval of the form and context in which it may appear.'

1. INTRODUCTION

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

Each organisation employed standard collection procedures as used in the 1995 General Quality Assessment (GQA) Survey. The sampling strategy was therefore compatible with RIVPACS (River InVertebrate Prediction And Classification System), a computer model developed by the Institute of Freshwater Ecology (IFE). Samples were sorted for the families of macro-invertebrates included in the Biological Monitoring Working Party (BMWP) system. Taxa present were recorded on site data sheets. Although attempts had been made to standardise sample processing and recording techniques, these did vary somewhat from region to region.

In view of the number of staff involved and the variability of sample processing techniques, it was recognised that a quality assurance exercise was necessary to minimise and quantify errors. Each laboratory appointed at least one experienced analyst to act as an internal analytical quality control (AQC) inspector. For most agencies, these inspectors re-sorted about 10% of the laboratory's samples, those samples chosen for re-sorting being selected at random. In addition, IFE was contracted to undertake an independent, external audit of the quality of the laboratory analysis of biological samples for each EA and SEPA region and for IRTU. This commission was consistent with the audit performed by IFE for the National River Quality Surveys in 1990 and 1995 and for the routine biological monitoring of river sites each year between 1991 and 1994 and again in 1996. Where samples sent to IFE had been subjected to an internal AQC inspection, the audit provided a measure of the quality of performance of the AQC analyst.

This report presents the results of the audit of 44 samples analysed by staff employed by SEPA North Region.

2. SAMPLE SELECTION

Samples for audit were selected internally by each of the agencies being monitored. The number of samples selected for audit varied between the different agencies and the biologists processing these samples had no prior knowledge of which samples were to be audited. Some agencies only sent to IFE samples that had been processed twice. Others adopted a random selection process, whereby some samples had been analysed just once and some had been re-sorted. The manner of sample selection, which biologists would be monitored and the number of audit samples from each season, were left to the discretion of the agency, within the limits of the total number of samples that IFE was contracted to audit.

3. SAMPLE PROCESSING

The normal protocol for EA, SEPA and IRTU biologists was to sort their samples within the laboratory and to select examples of each scoring taxon within the BMWP system. In most cases, the invertebrates were placed in a vial of preservative (4% formaldehyde solution or 70% industrial alcohol) and the BMWP taxa were listed on a data sheet. The vial of animals and the sorted material were then returned to the sample container and preservative added. Thus, each sample available to IFE for audit should have included:

- i) a data sheet containing a list of the BMWP families found in the sample.
- ii) a vial containing representatives from each family.
- iii) the preserved sample.

When these three elements were present, the sequence of operations at IFE was as follows:

- a) The remainder of the sample was sorted, without reference to the data sheet or to the vial of animals, and the BMWP families identified.
- b) The families contained within the vial were identified.
- c) A comparison was made between the listing of families and those found in the sample by IFE.
- d) A comparison was made between the listing of families and those identified from the vial by IFE.
- e) "Losses" or "gains" from the original listing of families were noted. In the case of "gains", each additional family was identified, where possible, to species level, in order to clarify any specific repetitive errors. Single representatives of a "gained" taxon were noted as such.
- f) An error code, selected from a list on the result sheet, was assigned by the IFE auditor for each "loss" or "gain".

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

Several directives were issued to IFE relating to the treatment of BMWP taxa. Every taxon recorded on the data sheet must be supported by a voucher specimen of that family in the vial (or, for very large specimens, left in the sample). The only exceptions to this rule were the native crayfish, *Austropotamobius pallipes*, the medicinal leech, *Hirudo medicinalis* and the pearl mussel, *Margaritifera margaritifera* (which does not belong to a BMWP family), all of which are protected species. Where possible, IFE gave the benefit of doubt to the analyst in cases of the "loss" of Planariidae, specimens of which have been known to disintegrate in preservative. Animals deemed to have been dead at the time of sampling, cast insect skins, pupal exuviae and empty mollusc shells were to be excluded from the listing of families present. Isolated posterior ends of "living" specimens were not acceptable as records of a taxon. In these cases, thorax plus abdomen was deemed acceptable but abdomen only was deemed unacceptable. Terrestrial representatives of BMWP scoring families were also to be excluded from the audit. For this reason, Clambidae, Chrysomelidae and Curculionidae, which appear in the BMWP list, were excluded for the purposes of the audit since most representatives of these families are, at best, only semi-aquatic. Trichopteran pupae, although not routinely identified by many biologists, were to be included in the listing of families.

4. REPORTING

The results of each sample audit were recorded on a standard report form (see Appendix) and sent to the Quality Control Manager. For audit samples where a vial of animals was included, the comparison between the listing of families and the taxa found in the vial by IFE was shown in the section of the report form headed "VIAL". Discrepancies could be due to carelessness, misidentifications or errors in completing the data sheet listing the families present. Families not on the listing but found by IFE in the remainder of the sample were entered in the section of the report form headed "SAMPLE" under "Additional BMWP taxa found by IFE". This section also 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 IFE, some apparent losses from the vial were offset by the presence of those families in the remainder of the sample. These taxa were therefore listed both as "losses" from the vial and as "gains" from the sample and were neither a net loss nor a net gain. In these cases, the families were marked with an asterisk in both boxes. Such errors are noted as "omissions".

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

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

For those samples in which the vial of animals was damaged or missing, the "VIAL" sections of the report form were not applicable (N/a). Families not on the list but present in the sample were entered in the section under "SAMPLE" : "Additional taxa" as before. Families recorded on the list but not found by IFE were indicated in the section above this. If the vial of animals was retained by the sorter, entries in this box could include the sole representative of a family which was removed, a family seen at the site which escaped or was released (without mention being made on the data sheet), inaccurate identification or the wrong family box being ticked on the data sheet.

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

5. RESULTS

The results of the audit for the two SEPA North laboratories are summarised in Tables 1 and 2. Table 3 displays the statistics of these audit results centred around the target of acceptability of no more than two missed taxa per sample. These data are presented for each analyst, for each laboratory and for the Region as a whole. Table 4 presents data for SEPA North for the net effects of the audit on the BMWP score and number of taxa. This table is again based on the target of no more than two missed taxa per sample. The figure of 13 for an acceptable underestimate of BMWP score is based on twice the average score of all taxa in the BMWP listing (excluding Clambidae, Chrysomelidae and Curculionidae, which are excluded from the audit). This average score is 6.57. Table 5 lists, at family level, the taxa missed in sorting by SEPA North's analysts in the 1997 audit. Table 6 lists the species most frequently missed by SEPA North's biologists, as found by the 1997 audit. Tables 7 and 8 list missed taxa at family and species level for all SEPA analysts and Tables 9 and 10 give similar listings for the entire 1997 audit for the whole of the United Kingdom.

6. ACKNOWLEDGEMENTS

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

Table 1 The 30 samples audited for the Aberdeen Laboratory of SEPA North

River	Site	Analyst	Losses	Gains	Omissions
Don	u/s Inverurie	DH	0	2	0
Leochel Burn	A980 Bridge	DH	0	4	0
Blackdog Burn	d/s Potterton WWTP	DH	0	1	0
Green Burn	u/s FIS	DH	0	2	0
S.Ugie Tributary	d/s Cleansing Depot	DH	0	2	0
Urie	Urie Cottage	DH	0	8	0
Leppie Burn	d/s Fordoun WWTP	DH	0	6	0
Spey	Arndilly	DH	0	1	0
Allt Ruadh	u/s Balachroick	JP	0	1	1
Insh Drain	d/s Insh WWTP	JP	0	0	0
Feshie	Feshie Bridge	JP	0	0	0
Knockando Burn	Confluence	JP	0	1	0
Tyock Burn	Playing Fields	JP	1	2	1
Allt na Baranachd	u/s Dunachton	JP	0	0	1
Tyock Burn	d/s East City Sawmills	JP	0	2	0
South Mondurno Burn	u/s Murcar SWS	LC	0	1	0
Bronie Burn	u/s Pitmedden	LC	0	1	0
Crooko Burn	Artlaw	LC	0	6	0
Clunie Water Tributary	d/s Reservoir	LC	0	5	0
Ythan	Ellon Car Park	LC	0	3	0
Mains Burn	Allt a'Bhainne	LC	0	4	0
Invernettie Burn	d/s Dales	LC	0	7	0
Keithfield Burn	B9005 Bridge	LC	0	3	0
Durris Burn	Durris Cottage	MAD	0	1	0
Brodiach Burn	Mill of Brotherfield	MAD	0	2	0
Deveron	d/s Knockiemill	MAD	0	7	0
Kirkton Burn	d/s Kirkton of Skene	MAD	0	0	0
Isla	d/s Strathmill	MAD	0	1	0
Cairnie Burn	Littlemill	MAD	0	1	0
Deveron	Marnoch	MAD	0	1	0

Table 2

The 14 samples audited for the Dingwall Laboratory of SEPA North

River	Site	Analyst	Losses	Gains	Omissions
Bennadrove	d/s Tip	AR	0	2	0
Burgie Burn	d/s Allied Distillers	AR	0	4	0
Tullich Burn	d/s Tullich Hatchery	AR	0	2	1
Abhainn Ideidh	Langass Hatchery	AR	0	1	0
Auchtertyre Burn	d/s STW	EG	0	4	0
Auchtertyre Burn	u/s STW	EG	1	2	0
Abhain Ceann An Ora	Ardhasaig Quarry	GF	0	1	0
Glen	u/s Tip	GF	4	1	0
Burn	d/s Fanagmore Dip	GF	0	2	0
Mudale	d/s Alnaharra	GF	0	2	0
Geisgeil Burn	u/s Fish Farm	GF	1	4	0
Rosskeen Burn	d/s Road Bridge	MW	0	3	0
Stoneyfield Ditch	d/s WTS	MW	1	3	0
Glen Burn	u/s Tolsta WTW	MW	1	0	0

Table 3 Statistics of the 1997 audit results for SEPA North

Analyst/Group	n	Mean gains	Standard error	No samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (l+g+o)	Standard error
Aberdeen	30	2.50	0.42	10	33.33	8	2.63	0.42
DH	8	3.25	0.90	3	37.50	8	3.25	0.90
JP	7	0.86	0.34	0	0	2	1.43	0.53
LC	8	3.75	0.77	6	75.00	7	3.75	0.77
MAD	7	1.86	0.88	1	14.29	7	1.86	0.88
Dingwall	14	2.21	0.33	5	35.71	4	2.86	0.38
AR	4	2.25	0.63	1	25.00	4	2.50	0.65
EG	2	3.00	1.00	1	50.00	4	3.50	0.50
GF	5	2.00	0.55	1	20.00	4	3.00	0.84
MW	3	2.00	1.00	2	66.67	3	2.67	0.88
SEPA North	44	2.41	0.31	15	34.09	8	2.70	0.31
Whole of SEPA	102	1.57	0.18	19	18.63	8	1.86	0.19

Table 4 Net effects of the audit on BMWP score and number of scoring taxa

Analyst/Group	n	Mean net effect on BMWP score	% samples underestimated by score >13	Maximum underestimate of BMWP score	Mean net effect on no. of taxa	% of samples underestimated by >2 taxa	Maximum underestimate of no. of taxa
Aberdeen	30	16.83	36.67	57	2.47	33.33	8
DH	8	22.38	37.50	55	3.25	37.50	8
JP	7	4.57	14.29	15	0.71	0	2
LC	8	24.00	75.00	50	3.75	75.00	7
MAD	7	14.57	14.29	57	1.86	14.29	7
Dingwall	14	12.71	57.14	30	1.64	28.57	4
AR	4	15.75	75.00	25	2.25	25.00	4
EG	2	19.50	50.00	30	2.50	50.00	4
GF	5	9.20	40.00	27	1.00	20.00	3
MW	3	10.00	66.67	18	1.33	33.33	3
SEPA North	44	15.52	43.18	57	2.20	31.82	8
Whole of SEPA	102	9.85	29.41	57	1.41	17.65	8

Table 5 The families missed by SEPA North Region's analysts in the 1997 audit

Family	n	% of SEPA North's missed families
Hydrophilidae (incl. Hydraenidae)	6	5.88
Limnephilidae	6	5.88
Hydroptilidae	5	4.90
Lepidostomatidae	5	4.90
Nemouridae	5	4.90
Sphaeriidae	5	4.90
Taeniopterygidae	5	4.90
Elmidae	4	3.92
Leuctridae	4	3.92
Sericostomatidae	4	3.92
Simuliidae	4	3.92
Chloroperlidae	3	2.94
Dytiscidae (incl. Noteridae)	3	2.94
Glossiphoniidae	3	2.94
Heptageniidae	3	2.94
Leptoceridae	3	2.94
Perlodidae	3	2.94
Baetidae	2	1.96
Erpobdellidae	2	1.96
Hydropsychidae	2	1.96
Leptophlebiidae	2	1.96
Lymnaeidae	2	1.96
Polycentropodidae	2	1.96
Psychomyiidae (incl. Ecnomidae)	2	1.96
Rhyacophilidae (incl. Glossosomatidae)	2	1.96
Tipulidae	2	1.96
Ancylidae (incl. Acroloxidae)	1	0.98
Caenidae	1	0.98
Dendrocoelidae	1	0.98
Ephemerellidae	1	0.98
Gammaridae (incl. Crangonyctidae)	1	0.98
Gerridae	1	0.98
Goeridae	1	0.98
Haliplidae	1	0.98
Hydrobiidae (incl. Bithyniidae)	1	0.98
Odontoceridae	1	0.98
Planariidae (incl. Dugesiidae)	1	0.98
Planorbidae	1	0.98
Scirtidae	1	0.98
TOTAL	102	100

Table 6 The species missed by SEPA North Region's analysts in the 1997 audit

Species	n	% of SEPA East's missed species
<i>Lepidostoma hirtum</i> (Fabricius)	5	4.59
<i>Pisidium</i> sp.	4	3.67
<i>Elmis aenea</i> (Muller)	4	3.67
<i>Sericostoma personatum</i> (Spence)	4	3.67
<i>Limnephilidae</i> indet	4	3.67
<i>Hydraena gracilis</i> Germar	4	3.67
<i>Isoperla grammatica</i> (Poda)	3	2.75
<i>Taeniopteryx nebulosa</i> (L.)	3	2.75
<i>Chloroperla torrentium</i> (Pictet)	3	2.75
<i>Glossiphonia complanata</i> (L.)	3	2.75
<i>Hydroptila</i> sp.	3	2.75
<i>Amphinemura sulcicollis</i> (Stephens)	3	2.75
<i>Leuctra hippopus</i> (Kempny)	2	1.83
<i>Leuctra</i> sp.	2	1.83
<i>Ithytrichia</i> sp.	2	1.83
<i>Hydropsyche siltalai</i> Dohler	2	1.83
<i>Erpobdella octoculata</i> (L.)	2	1.83
<i>Athripsodes</i> sp.	2	1.83
<i>Agabus</i> sp.	2	1.83
<i>Brachyptera risi</i> (Morton)	2	1.83
<i>Hydrophilidae</i> indet	2	1.83
<i>Lymnaea peregra</i> (Muller)	2	1.83
<i>Simulium</i> (<i>Simulium</i>) <i>ornatum</i> group	2	1.83
<i>Nemoura cambrica</i> group	2	1.83
<i>Psychomyia pusilla</i> (Fabricius)	2	1.83
<i>Rhithrogena</i> sp.	2	1.83
<i>Rhyacophila dorsalis</i> (Curtis)	2	1.83
<i>Dicranota</i> sp.	1	0.92
<i>Dendrocoelum lacteum</i> (Muller)	1	0.92
<i>Crenobia alpina</i> (Dana)	1	0.92
<i>Crangonyx pseudogracilis</i> Bousfield	1	0.92
<i>Caenis rivulorum</i> Eaton	1	0.92
<i>Baetis</i> sp.	1	0.92
<i>Ecdyonurus</i> sp.	1	0.92
<i>Baetis rhodani</i> (Pictet)	1	0.92
<i>Anisus vortex</i> (L.)	1	0.92
<i>Ancylus fluviatilis</i> Muller	1	0.92
<i>Anabolia nervosa</i> (Curtis)	1	0.92
<i>Simulium</i> (<i>Nevermannia</i>) <i>cryophilum</i> group	1	0.92
<i>Simulium</i> (<i>Simulium</i>) <i>argyreatum</i> group	1	0.92
<i>Sphaeriidae</i> indet	1	0.92
<i>Tipula</i> sp.	1	0.92
<i>Limnius volckmari</i> (Panzer)	1	0.92

Table 6 continued

Species	n	% of SEPA East's missed species
Nemoura avicularis Morton	1	0.92
Athripsodes aterrimus (Stephens)	1	0.92
Potamopyrgus jenkinsi (Smith)	1	0.92
Limnephilus lunatus Curtis	1	0.92
Lype sp.	1	0.92
Leptophlebiidae indet	1	0.92
Odontocerum albicorne (Scopoli)	1	0.92
Oreodytes sanmarkii (Sahlberg)	1	0.92
Oxyethira sp.	1	0.92
Paraleptophlebia submarginata (Stephens)	1	0.92
Ephemerella ignita (Poda)	1	0.92
Helobdella stagnalis (L.)	1	0.92
Haliphus lineatocollis (Marshall)	1	0.92
Goera pilosa (Fabricius)	1	0.92
Polycentropodidae indet	1	0.92
Gerris (Gerris) lacustris (L.)	1	0.92
Polycentropus flavomaculatus (Pictet)	1	0.92
Helophorus (Helophorus) obscurus Mulsant	1	0.92
Molophilus sp.	1	0.92
Elodes sp.	1	0.92
TOTAL	109	100

Table 7 The families missed by all SEPA's analysts in the 1997 audit

Family	n	% of missed families for SEPA audits
Hydrophilidae (incl. Hydraenidae)	13	8.44
Lepidostomatidae	8	5.19
Nemouridae	8	5.19
Limnephilidae	7	4.55
Sericostomatidae	7	4.55
Sphaeriidae	7	4.55
Hydroptilidae	6	3.90
Leptoceridae	6	3.90
Elmidae	5	3.25
Heptageniidae	5	3.25
Simuliidae	5	3.25
Taeniopterygidae	5	3.25
Ancylidae (incl. Acroloxidae)	4	2.60
Glossiphoniidae	4	2.60
Leptophlebiidae	4	2.60
Leuctridae	4	2.60
Rhyacophilidae (incl. Glossosomatidae)	4	2.60
Chloroperlidae	3	1.95
Dytiscidae (incl. Noteridae)	3	1.95
Ephemerellidae	3	1.95
Perlodidae	3	1.95
Polycentropodidae	3	1.95
Psychomyiidae (incl. Ecnomidae)	3	1.95
Baetidae	2	1.30
Caenidae	2	1.30
Erpobdellidae	2	1.30
Gammaridae (incl. Crangonyctidae)	2	1.30
Goeridae	2	1.30
Haliplidae	2	1.30
Hydrobiidae (incl. Bithyniidae)	2	1.30
Hydropsychidae	2	1.30
Lymnaeidae	2	1.30
Odontoceridae	2	1.30
Planorbidae	2	1.30
Tipulidae	2	1.30
Beraeidae	1	0.65
Chironomidae	1	0.65
Dendrocoelidae	1	0.65
Gerridae	1	0.65
Oligochaeta	1	0.65
Physidae	1	0.65
Planariidae (incl. Dugesiiidae)	1	0.65
Scirtidae	1	0.65

Table 7 continued

Family	n	% of missed families for SEPA audits
Sialidae	1	0.65
Valvatidae	1	0.65
TOTAL	154	100

Table 8 The species missed by all SEPA's analysts in the 1997 audit

Species	n	% of missed species for SEPA audits
Hydraena gracilis Germar	10	6.02
Lepidostoma hirtum (Fabricius)	8	4.82
Sericostoma personatum (Spence)	7	4.22
Pisidium sp.	6	3.61
Hydroptila sp.	4	2.41
Amphinemura sulcicollis (Stephens)	4	2.41
Ancylus fluviatilis Muller	4	2.41
Elmis aenea (Muller)	4	2.41
Limnephilidae indet	4	2.41
Chloroperla torrentium (Pictet)	3	1.81
Ephemerella ignita (Poda)	3	1.81
Glossiphonia complanata (L.)	3	1.81
Hydrophilidae indet	3	1.81
Isoperla grammatica (Poda)	3	1.81
Leptophlebiidae indet	3	1.81
Simulium (Simulium) ornatum group	3	1.81
Taeniopteryx nebulosa (L.)	3	1.81
Rhithrogena sp.	3	1.81
Brachyptera risi (Morton)	2	1.20
Limnius volckmari (Panzer)	2	1.20
Helobdella stagnalis (L.)	2	1.20
Leuctra sp.	2	1.20
Lymnaea peregra (Muller)	2	1.20
Ithytrichia sp.	2	1.20
Caenis rivulorum Eaton	2	1.20
Agabus sp.	2	1.20
Hydropsyche siltalai Dohler	2	1.20
Goera pilosa (Fabricius)	2	1.20
Ecdyonurus sp.	2	1.20
Erpobdella octoculata (L.)	2	1.20
Rhyacophila dorsalis (Curtis)	2	1.20
Athripsodes albifrons (L.)	2	1.20
Lype sp.	2	1.20
Leuctra hippopus (Kempny)	2	1.20
Odontocerum albicorne (Scopoli)	2	1.20
Nemoura cambrica group	2	1.20
Psychomyia pusilla (Fabricius)	2	1.20
Polycentropodidae indet	2	1.20
Athripsodes sp.	2	1.20
Potamopyrgus jenkinsi (Smith)	2	1.20
Drusus annulatus/Ecclisopteryx guttulata	1	0.60
Anabolia nervosa (Curtis)	1	0.60
Agapetus sp.	1	0.60

Table 8 continued

Species	n	% of missed species for SEPA audits
Dicranota sp.	1	0.60
Dendrocoelum lacteum (Muller)	1	0.60
Crenobia alpina (Dana)	1	0.60
Tipula sp.	1	0.60
Crangonyx pseudogracilis Bousfield	1	0.60
Ceraclea dissimilis (Stephens)	1	0.60
Tinodes waeneri (L.)	1	0.60
Anisus vortex (L.)	1	0.60
Beraea maurus (Curtis)	1	0.60
Athripsodes aterrimus (Stephens)	1	0.60
Athripsodes cinereus (Curtis)	1	0.60
Bathyomphalus contortus (L.)	1	0.60
Baetis sp.	1	0.60
Baetis rhodani (Pictet)	1	0.60
Tanytarsini	1	0.60
Limnephilus lunatus Curtis	1	0.60
Polycentropus flavomaculatus (Pictet)	1	0.60
Physa fontinalis (L.)	1	0.60
Paraleptophlebia submarginata (Stephens)	1	0.60
Oxyethira sp.	1	0.60
Oreodytes sanmarkii (Sahlberg)	1	0.60
Nemoura cinerea (Retzius)	1	0.60
Nemoura avicularis Morton	1	0.60
Naididae	1	0.60
Mystacides azurea (L.)	1	0.60
Haliphus lineatocollis (Marshall)	1	0.60
Lumbricidae	1	0.60
Elodes sp.	1	0.60
Rhyacophila sp.	1	0.60
Valvata piscinalis (Muller)	1	0.60
Sialis lutaria (L.)	1	0.60
Simulium (Nevermannia) cryophilum group	1	0.60
Simulium (Simulium) argyreatum group	1	0.60
Helophorus (Helophorus) obscurus Mulsant	1	0.60
Helophorus (Atracthelophorus) brevipalpis Bedel	1	0.60
Protonemura sp.	1	0.60
Haliphus sp.	1	0.60
Gerris (Gerris) lacustris (L.)	1	0.60
Gammarus pulex (L.)	1	0.60
Sphaeriidae indet	1	0.60
Molophilus sp.	1	0.60
TOTAL	166	100

Table 9 Missed families for all samples in the 1997 audit

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

Table 9 continued

Family	n	% of missed families in 1997 audit
Piscicolidae	9	0.76
Taeniopterygidae	8	0.68
Corixidae	8	0.68
Odontoceridae	8	0.68
Beraeidae	7	0.59
Calopterygidae	7	0.59
Dryopidae	7	0.59
Sialidae	7	0.59
Oligochaeta	7	0.59
Hydrometridae	5	0.42
Chloroperlidae	5	0.42
Ephemeridae	4	0.34
Brachycentridae	4	0.34
Libellulidae	2	0.17
Notonectidae	2	0.17
Molannidae	2	0.17
Unionidae	1	0.08
Phryganeidae	1	0.08
Philopotamidae	1	0.08
Nepidae	1	0.08
Pleidae	1	0.08
Corophiidae	1	0.08
Total	1182	100

Table 10 Missed species for all samples in the 1997 audit

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

Table 10 continued

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

Table 10 continued

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

Table 10 continued

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

Table 10 continued

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

Table 10 continued

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

APPENDIX

Results of individual sample audits

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 14/05/97

WATER-
COURSE: Don

PRIMARY
ANALYST: DH

AQC
ANALYST:

SITE: u/s Inverurie

CODE: A26

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Sphaeriidae	9
Pisidium sp. 1 only	
Hydroptilidae	9
Ithytrichia sp. 1 only	

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 9

ON NO. OF TAXA 2

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

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

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

WATER-COURSE: Leochel Burn

SITE: A980 Bridge

LABORATORY: Aberdeen

PRIMARY ANALYST: DH

CODE: F05

DATE: 27/05/97

AQC ANALYST:

SORT/AQC METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Sphaeriidae	9
Pisidium sp. 1 only	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a)	
Lepidostomatidae	9
Lepidostoma hirtum (Fabricius)	
Leptoceridae	9
Athripsodes sp. (juv)	

SUMMARY OF AUDIT

LOSSES 0

GAINS 4

OMISSIONS: 0

NET EFFECTS:
ON BMWP SCORE 28
ON NO. OF TAXA 4

- 1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial
- 5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked
- 9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 28/05/97

WATER-

PRIMARY

AQC

COURSE: Blackdog Burn

ANALYST: DH

ANALYST:

SITE: d/s Potterton WWTP

CODE: V50

SORT/AQC

METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Nemouridae

9

Amphinemura sulcicollis (Stephens) 1 only

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 7

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 06/08/97

WATER-
COURSE: Green Burn

PRIMARY
ANALYST: DH

AQC
ANALYST:

SITE: u/s FIS

CODE: 94E

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Sphaeriidae	9
Pisidium sp. 1 only	
Taeniopterygidae	9
Taeniopteryx nebulosa (L.) 1 only	

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 13

ON NO. OF TAXA 2

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 04/09/97

WATER-

COURSE: S.Ugie Tributary

PRIMARY

ANALYST: DH

AQC

ANALYST:

SORT/AQC

SITE: d/s Cleansing Depot

CODE: 60D

METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Lymnaeidae 9

Lymnaea peregra (Muller)

Limnephilidae 9

Limnephilidae indet (juv) 1 only

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 10

ON NO. OF TAXA 2

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 17/10/97

WATER-
COURSE: Urie

PRIMARY
ANALYST: DH

AQC
ANALYST:

SITE: Urie Cottage

CODE: J15

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Lymnaeidae	9
Lymnaea peregra (Muller)	
Planorbidae	9
Anisus vortex (L.)	
Glossiphoniidae	9
Glossiphonia complanata (L.)	
Erpobdellidae	9
Erpobdella octoculata (L.) 1 only	
Heptageniidae	9
Ecdyonurus sp. (juv) 1 only	
Psychomyiidae (incl. Ecnomidae)	9
Lype sp.	
Psychomyia pusilla (Fabricius)	
Lepidostomatidae	9
Lepidostoma hirtum (Fabricius) (juv)	
Sericostomatidae	9
Sericostoma personatum (Spence) (juv) 1 only	

SUMMARY OF AUDIT

LOSSES 0

GAINS 8

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 50

ON NO. OF TAXA 8

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 23/10/97

WATER-
COURSE: Leppie Burn

PRIMARY
ANALYST: DH

AQC
ANALYST:

SITE: d/s Fordoun WWTP

CODE: T14

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Heptageniidae	9
Rhithrogena sp. 1 only	
Leuctridae	9
Leuctra sp. (damaged) 1 only	
Perlodidae	9
Isoperla grammatica (Poda) 1 only	
Chloroperlidae	9
Chloroperla torrentium (Pictet)	
Hydropsychidae	9
Hydropsyche siltalai Dohler 1 only	
Sericostomatidae	9
Sericostoma personatum (Spence) 1 only	

SUMMARY OF AUDIT

LOSSES 0 GAINS 6 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 55
ON NO. OF TAXA 6

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

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

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 18/11/97

WATER-
COURSE: Spey

PRIMARY
ANALYST: DH

AQC
ANALYST:

SITE: Arndilly

CODE: A80

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Caenidae

9

Caenis rivulorum Eaton

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 7

ON NO. OF TAXA 1

1 No representative of family in vial

5 Specimen dead at time of sampling

9 Taxon missed in sorting

2 Alternative terrestrial specimen in vial

6 Taxon in vial but not recorded

10 Unexplained error

3 Posterior end only in vial

7 Mis-identification

11 Taxon added in internal AQC

4 Empty shell or case or cast skin in vial

8 Typographical error - wrong box ticked

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 15/04/96

WATER-
COURSE: Allt Ruadh

PRIMARY
ANALYST: JP

AQC
ANALYST:

SITE: u/s Balachroick

CODE: 032

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

Chironomidae *

1

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Planariidae (incl. Dugesiidae)

9

Crenobia alpina (Dana) 1 only

Chironomidae *

1

Diamesinae

Orthocladiinae

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 1

NET EFFECTS:

ON BMWP SCORE 5

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 28/05/97

WATER-
COURSE: Insh Drain

PRIMARY
ANALYST: JP

AQC
ANALYST:

SITE: d/s Insh WWTP

CODE: 16N

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

None

SUMMARY OF AUDIT

LOSSES 0

GAINS 0

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 0

ON NO. OF TAXA 0

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 28/05/97

WATER-
COURSE: Feshie

PRIMARY
ANALYST: JP

AQC
ANALYST:

SITE: Feshie Bridge

CODE: 20M

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

None

SUMMARY OF AUDIT

LOSSES 0 GAINS 0 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 0

ON NO. OF TAXA 0

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 30/05/97

WATER-
COURSE: Knockando Burn

PRIMARY
ANALYST: JP

AQC
ANALYST:

SITE: Confluence

CODE: 50Z

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name

Presumed
cause of error
(see footnotes)

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Simuliidae

9

Simulium (Simulium) argyreatum group 1 only

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 5

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North	LABORATORY: Aberdeen	DATE: 02/06/97
WATER- COURSE: Tyock Burn	PRIMARY ANALYST: JP	AQC ANALYST:
SITE: Playing Fields	CODE: 50J	SORT/AQC METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

Hydrobiidae (incl. Bithyniidae) *	1
Physidae	1

Additional BMWP taxa found in vial

Planariidae (incl. Dugesiidae)	6
Polycelis nigra group	

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Hydrobiidae (incl. Bithyniidae) *	1
Potamopyrgus jenkinsi (Smith) 1 only	
Gerridae	9
Gerris (Gerris) lacustris (L.) 1 only	

SUMMARY OF AUDIT

LOSSES 1 GAINS 2 OMISSIONS: 1

NET EFFECTS:

ON BMWP SCORE 7
ON NO. OF TAXA 1

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North	LABORATORY: Aberdeen	DATE: 21/10/96
WATER- COURSE: Allt na Baranachd	PRIMARY ANALYST: JP	AQC ANALYST:
SITE: u/s Dunachton	CODE: 024	SORT/AQC METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

<u>BMWP taxa not found in vial</u>	
Leuctridae *	1
<u>Additional BMWP taxa found in vial</u>	
None	

SAMPLE

<u>BMWP taxa not found in sample</u> (For samples where vial is broken or absent)	
N/a	
<u>Additional BMWP taxa found in sample</u>	
Leuctridae *	1
Leuctra hippopus (Kempny)	
Leuctra inermis Kempny	
Leuctra moselyi Morton	

SUMMARY OF AUDIT

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

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 28/11/97

WATER-
COURSE: Tyock Burn

PRIMARY
ANALYST: JP

AQC
ANALYST:

SITE: d/s East City Sawmills

CODE: 50G

SORT/AQC

METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Leuctridae 9

Leuctra hippopus (Kempny) 1 only

Simuliidae 9

Simulium (Simulium) ornatum group 1 only

SUMMARY OF AUDIT

LOSSES 0 GAINS 2 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 15

ON NO. OF TAXA 2

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 26/03/97

WATER-

COURSE: South Mondurno Burn

PRIMARY

ANALYST: LC

AQC

ANALYST:

SITE: u/s Murcar SWS

CODE: W59

SORT/AQC

METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Elmidae

9

Elmis aenea (Muller) (a+1)

Limnius volckmari (Panzer) (l)

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 5

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 27/05/97

WATER-
COURSE: Bronie Burn

PRIMARY
ANALYST: LC

AQC
ANALYST:

SITE: u/s Pitmedden

CODE: E10

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Elmidae

9

Elmis aenea (Muller) (I) 1 only

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 5

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 30/05/97

WATER-
COURSE: Crooko Burn

PRIMARY
ANALYST: LC

AQC
ANALYST:

SITE: Artlaw

CODE: S15

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

Hydropsychidae	6
Hydropsyche siltalai Dohler	

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Glossiphoniidae	9
Glossiphonia complanata (L.) 1 only	
Baetidae	9
Baetis sp. (damaged) 1 only	
Ephemerellidae	9
Ephemerella ignita (Poda)	
Leuctridae	9
Leuctra sp. (damaged) 1 only	
Simuliidae	9
Simulium (Nevermannia) cryophilum group (p) 1 only	

SUMMARY OF AUDIT

LOSSES 0

GAINS 6

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 37
ON NO. OF TAXA 6

1 No representative of family in vial

5 Specimen dead at time of sampling

9 Taxon missed in sorting

2 Alternative terrestrial specimen in vial

6 Taxon in vial but not recorded

10 Unexplained error

3 Posterior end only in vial

7 Mis-identification

11 Taxon added in internal AQC

4 Empty shell or case or cast skin in vial

8 Typographical error - wrong box ticked

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 23/10/97

WATER-
COURSE: Clunie Water Tributary

PRIMARY
ANALYST: LC

AQC
ANALYST:

SITE: d/s Reservoir

CODE: 05M

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Baetidae	9
Baetis rhodani (Pictet) 1 only	
Heptageniidae	9
Rhithrogena sp. 1 only	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a)	
Polycentropodidae	9
Polycentropodidae indet (juv) 1 only	
Limnephilidae	9
Limnephilidae indet (juv)	

SUMMARY OF AUDIT

LOSSES 0

GAINS 5

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 33

ON NO. OF TAXA 5

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

WATER-COURSE: Ythan

SITE: Ellon Car Park

LABORATORY: Aberdeen

PRIMARY ANALYST: LC

CODE: A25

DATE: 31/10/97

AQC ANALYST:

SORT/AQC METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

Caenidae	6
Caenis rivulorum Eaton	

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Erpobdellidae	9
Erpobdella octoculata (L.) 1 only	
Leuctridae	9
Leuctra hippopus (Kempny)	

SUMMARY OF AUDIT

LOSSES 0

GAINS 3

OMISSIONS: 0

NET EFFECTS:
ON BMWP SCORE 20
ON NO. OF TAXA 3

- 1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial
- 5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked
- 9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 01/12/97

WATER-
COURSE: Mains Burn

PRIMARY
ANALYST: LC

AQC
ANALYST:

SITE: Allt a'Bhainne

CODE: D05

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Hydrophilidae (incl. Hydraenidae)	9
Helophorus (Helophorus) obscurus Mulsant (a) 1 only	
Elmidae	9
Elmis aenea (Muller) (l)	
Hydropsychidae	9
Hydropsyche siltalai Dohler	
Limnephilidae	9
Limnephilidae indet (juv) 1 only	

SUMMARY OF AUDIT

LOSSES 0 GAINS 4 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 22
ON NO. OF TAXA 4

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 10/12/97

WATER-
COURSE: Invernettie Burn

PRIMARY
ANALYST: LC

AQC
ANALYST:

SITE: d/s Dales

CODE: I10

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Sphaeriidae	9
Sphaeriidae indet (damaged) 1 only	
Leptophlebiidae	9
Leptophlebiidae indet (damaged) 1 only	
Taeniopterygidae	9
Taeniopteryx nebulosa (L.) 1 only	
Nemouridae	9
Amphinemura sulcicollis (Stephens)	
Nemoura cambrica group	
Perlodidae	9
Isoperla grammatica (Poda)	
Hydrophilidae (incl. Hydraenidae)	9
Hydrophilidae indet (I) 1 only	
Elmidae	9
Elmis aenea (Muller) (a+l)	

SUMMARY OF AUDIT

LOSSES 0

GAINS 7

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 50

ON NO. OF TAXA 7

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 12/12/97

WATER-
COURSE: Keithfield Burn

PRIMARY
ANALYST: LC

AQC
ANALYST:

SITE: B9005 Bridge

CODE: P50

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Dendrocoelidae	9
Dendrocoelum lacteum (Muller) 1 only	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a)	
Hydrophilidae indet (l)	
Leptoceridae	9
Athripsodes sp. (juv) 1 only	

SUMMARY OF AUDIT

LOSSES 0 GAINS 3 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 20
ON NO. OF TAXA 3

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

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

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North	LABORATORY: Aberdeen	DATE: 26/03/97
WATER-COURSE: Durris Burn	PRIMARY ANALYST: MAD	AQC ANALYST:
SITE: Durris Cottage	CODE: K20	SORT/AQC METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Gammaridae (incl. Crangonyctidae)	9
Crangonyx pseudogracilis Bousfield 1 only	

SUMMARY OF AUDIT

LOSSES 0	GAINS 1	OMISSIONS: 0	NET EFFECTS:
			ON BMWP SCORE 6
			ON NO. OF TAXA 1

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North
WATER-
COURSE: Brodiach Burn

LABORATORY: Aberdeen
PRIMARY
ANALYST: MAD

DATE: 27/05/97
AQC
ANALYST:
SORT/AQC
METHOD: Not known

SITE: Mill of Brotherfield

CODE: I60

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Rhyacophilidae (incl. Glossosomatidae) 9

Rhyacophila dorsalis (Curtis) (p) 1 only

Simuliidae 9

Simulium (Simulium) ornatum group 1 only

SUMMARY OF AUDIT

LOSSES 0 GAINS 2 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 12

ON NO. OF TAXA 2

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 29/05/97

WATER-
COURSE: Deveron

PRIMARY
ANALYST: MAD

AQC
ANALYST:

SITE: d/s Knockiemill

CODE: A51

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Ancylidae (incl. Acroloxidae)	9
Ancyclus fluviatilis Muller 1 only	
Sphaeriidae	9
Pisidium sp.	
Taeniopterygidae	9
Brachyptera risi (Morton) 1 only	
Chloroperlidae	9
Chloroperla torrentium (Pictet) 1 only	
Psychomyiidae (incl. Ecnomidae)	9
Psychomyia pusilla (Fabricius) 1 only	
Goeridae	9
Goera pilosa (Fabricius) 1 only	
Sericostomatidae	9
Sericostoma personatum (Spence) 1 only	

SUMMARY OF AUDIT

LOSSES 0

GAINS 7

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 57

ON NO. OF TAXA 7

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 01/10/97

WATER-
COURSE: Kirkton Burn

PRIMARY
ANALYST: MAD

AQC
ANALYST:

SITE: d/s Kirkton of Skene

CODE: I06

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

None

SUMMARY OF AUDIT

LOSSES 0

GAINS 0

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 0

ON NO. OF TAXA 0

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 20/11/97

WATER-
COURSE: Isla

PRIMARY
ANALYST: MAD

AQC
ANALYST:

SITE: d/s Strathmill

CODE: C17

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Leptophlebiidae

9

Paraleptophlebia submarginata (Stephens) 1 only

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 10

ON NO. OF TAXA 1

1 No representative of family in vial

5 Specimen dead at time of sampling

9 Taxon missed in sorting

2 Alternative terrestrial specimen in vial

6 Taxon in vial but not recorded

10 Unexplained error

3 Posterior end only in vial

7 Mis-identification

11 Taxon added in internal AQC

4 Empty shell or case or cast skin in vial

8 Typographical error - wrong box ticked

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 20/11/97

WATER-
COURSE: Cairnie Burn

PRIMARY
ANALYST: MAD

AQC
ANALYST:

SITE: Littlemill

CODE: 60M

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Nemouridae

9

Nemoura cambrica group 1 only

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 7

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 10/12/97

WATER-
COURSE: Deveron

PRIMARY
ANALYST: MAD

AQC
ANALYST:

SITE: Marnoch

CODE: A35

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Lepidostomatidae

9

Lepidostoma hirtum (Fabricius) 1 only

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 10

ON NO. OF TAXA 1

1 No representative of family in vial

5 Specimen dead at time of sampling

9 Taxon missed in sorting

2 Alternative terrestrial specimen in vial

6 Taxon in vial but not recorded

10 Unexplained error

3 Posterior end only in vial

7 Mis-identification

11 Taxon added in internal AQC

4 Empty shell or case or cast skin in vial

8 Typographical error - wrong box ticked

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 08/04/97

WATER-
COURSE: Bennadrove

PRIMARY
ANALYST: AR

AQC
ANALYST:

SITE: d/s Tip

CODE:

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Dytiscidae (incl. Noteridae)	9
Agabus sp. (l) 1 only	
Lepidostomatidae	9
Lepidostoma hirtum (Fabricius)	

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 15

ON NO. OF TAXA 2

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 13/05/97

WATER-
COURSE: Burgie Burn

PRIMARY
ANALYST: AR

AQC
ANALYST:

SITE: d/s Allied Distillers

CODE:

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Glossiphoniidae	9
Glossiphonia complanata (L.)	
Helobdella stagnalis (L.)	
Perlodidae	9
Isoperla grammatica (Poda) 1 only	
Limnephilidae	9
Anabolia nervosa (Curtis) 1 only	
Tipulidae	9
Dicranota sp.	
Molophilus sp.	

SUMMARY OF AUDIT

LOSSES 0

GAINS 4

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 25

ON NO. OF TAXA 4

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 29/04/98

WATER-
COURSE: Tullich Burn

PRIMARY
ANALYST: AR

AQC
ANALYST:

SITE: d/s Tullich Hatchery

CODE:

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

Nemouridae * 1

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Nemouridae * 1

Amphinemura sulcicollis (Stephens)

Lepidostomatidae 9

Lepidostoma hirtum (Fabricius) 1 only

Limnephilidae 9

Limnephilus lunatus Curtis 1 only

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 1

NET EFFECTS:

ON BMWP SCORE 17

ON NO. OF TAXA 2

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 18/05/98

WATER-

COURSE: Abhainn Ideidh

PRIMARY

ANALYST: AR

AQC

ANALYST:

SITE: Langass Hatchery

CODE:

SORT/AQC

METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Hydroptilidae

9

Hydroptila sp.

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 6

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 18/04/97

WATER-
COURSE: Auchtertyre Burn

PRIMARY
ANALYST: EG

AQC
ANALYST:

SITE: d/s STW

CODE:

SORT/AQC
METHOD: Preserved

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Dytiscidae (incl. Noteridae)	9
Oreodytes sanmarkii (Sahlberg) (a) 1 only	
Scirtidae	9
Elodes sp. (l) 1 only	
Sericostomatidae	9
Sericostoma personatum (Spence) 1 only	
Odontoceridae	9
Odontocerum albicorne (Scopoli) 1 only	

SUMMARY OF AUDIT

LOSSES 0

GAINS 4

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 30

ON NO. OF TAXA 4

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 19/08/97

WATER-

COURSE: Auchtertyre Burn

PRIMARY

ANALYST: EG

AQC

ANALYST:

SITE: u/s STW

CODE:

SORT/AQC

METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

Veliidae

8

Veliidae is not a BMWP-scoring family and should not have been included as scoring 5 in the BMWP total

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Polycentropodidae

9

Polycentropus flavomaculatus (Pictet) 1 only

Limnephilidae

9

Limnephilidae indet (juv) 1 only

SUMMARY OF AUDIT

LOSSES 1

GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 9

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 10/04/97

WATER-

PRIMARY

AQC

COURSE: Abhain Ceann An Ora

ANALYST: GF

ANALYST:

SITE: Ardhasaig Quarry

CODE:

SORT/AQC

METHOD: Preserved

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Hydroptilidae

9

Oxyethira sp. 1 only

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 6

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 12/04/97

WATER-
COURSE: Glen

PRIMARY
ANALYST: GF

AQC
ANALYST:

SITE: u/s Tip

CODE:

SORT/AQC
METHOD: Preserved

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

Hydrobiidae (incl. Bithyniidae)	4
Lymnaeidae	4
Aeshnidae	7
Tipulidae	7
Rhagio sp?	

Additional BMWP taxa found in vial

Coenagriidae	7
Pyrrhosoma nymphula (Sulzer) (damaged)	

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

None

SUMMARY OF AUDIT

LOSSES 4

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE -13

ON NO. OF TAXA -3

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 05/06/97

WATER-
COURSE: Burn

PRIMARY
ANALYST: GF

AQC
ANALYST:

SITE: d/s Fanagmore Dip

CODE:

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Dytiscidae (incl. Noteridae) 9

Agabus sp. (I) 1 only

Tipulidae 9

Tipula sp.

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 10

ON NO. OF TAXA 2

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

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

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 24/08/97

WATER-
COURSE: Mudale

PRIMARY
ANALYST: GF

AQC
ANALYST:

SITE: d/s Alnaharra

CODE:

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Taeniopterygidae	9
Taeniopteryx nebulosa (L.) 1 only	
Hydroptilidae	9
Hydroptila sp.	

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 16

ON NO. OF TAXA 2

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

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

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North	LABORATORY: Dingwall	DATE: 28/05/98
WATER- COURSE: Geisgeil Burn	PRIMARY ANALYST: GF	AQC ANALYST:
SITE: u/s Fish Farm	CODE:	SORT/AQC METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

Planorbidae	2
-------------	---

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Nemouridae	9
Amphinemura sulcicollis (Stephens)	
Chloroperlidae	9
Chloroperla torrentium (Pictet) 1 only	
Hydroptilidae	9
Hydroptila sp.	
Ithytrichia sp.	
Rhyacophilidae (incl. Glossosomatidae)	9
Rhyacophila dorsalis (Curtis) 1 only	

SUMMARY OF AUDIT

LOSSES 1 GAINS 4 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 27
ON NO. OF TAXA 3

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 30/04/97

WATER-
COURSE: Rosskeen Burn

PRIMARY
ANALYST: MW

AQC
ANALYST:

SITE: d/s Road Bridge

CODE: 4179

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Hydrobiidae (incl. Bithyniidae)	9
Potamopyrgus jenkinsi (Smith) 1 only	
Taeniopterygidae	9
Brachyptera risi (Morton)	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a)	

SUMMARY OF AUDIT

LOSSES 0

GAINS 3

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 18

ON NO. OF TAXA 3

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 26/08/97

WATER-

COURSE: Stoneyfield Ditch

PRIMARY

ANALYST: MW

AQC

ANALYST:

SITE: d/s WTS

CODE:

SORT/AQC

METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

Mesovelidae

7

Velia caprai Tamanini

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

Nemouridae

9

Nemoura avicularis Morton 1 only

Haliplidae

9

Halipus lineatocollis (Marsham) (a) 1 only

Leptoceridae

9

Athripsodes aterrimus (Stephens)

SUMMARY OF AUDIT

LOSSES 1

GAINS 3

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 17

ON NO. OF TAXA 2

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 24/09/97

WATER-
COURSE: Glen Burn

PRIMARY
ANALYST: MW

AQC
ANALYST:

SITE: u/s Tolsta WTW

CODE:

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
-------------	---

VIAL

BMWP taxa not found in vial

Tipulidae

7

Wiedemannia group (Empididae)

Additional BMWP taxa found in vial

None

SAMPLE

BMWP taxa not found in sample (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found in sample

None

SUMMARY OF AUDIT

LOSSES 1

GAINS 0

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE -5

ON NO. OF TAXA -1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

RL/T04071r7/13

**Centre for
Ecology &
Hydrology**

Institute of Freshwater Ecology
Institute of Hydrology
Institute of Terrestrial Ecology
Institute of Virology & Environmental Microbiology

Natural Environment Research Council