

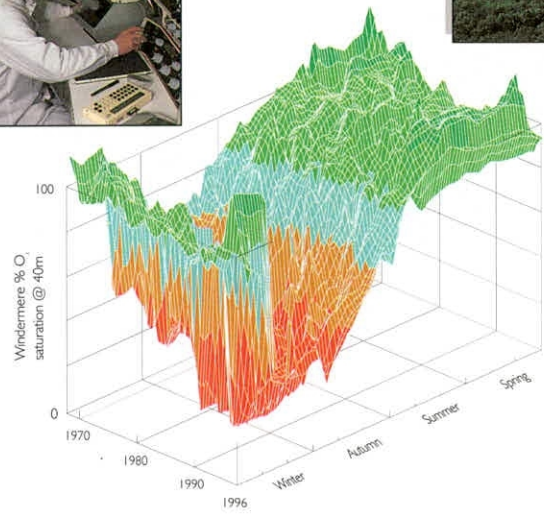
An Audit of Performance in the Analysis of Biological Samples in 1998 SEPA North Region

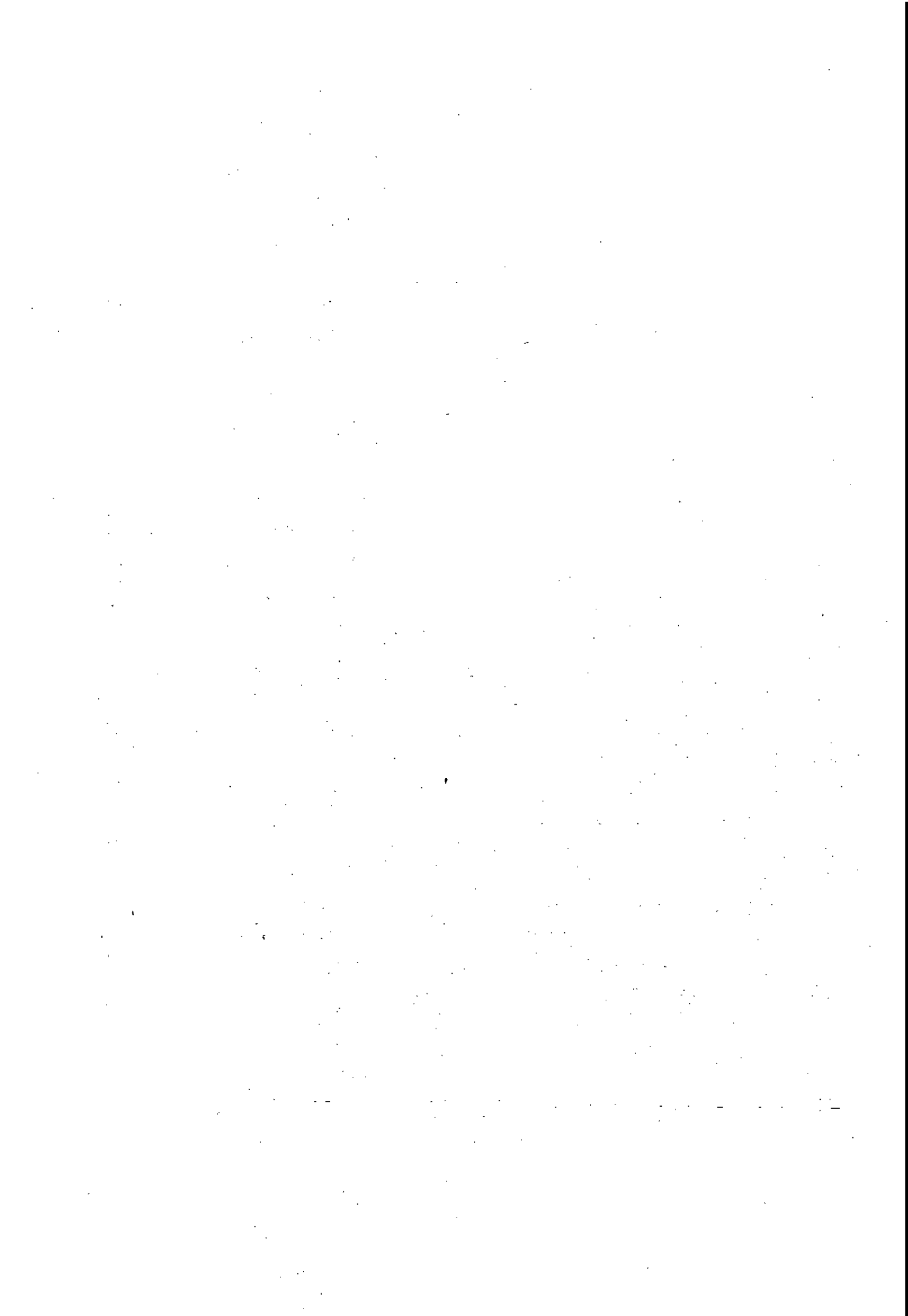
R J M Gunn, CBiol
R Wiggers, Ing

J H Blackburn, BSc
J Davy-Bowker, MSc

J M Winder, PhD
J F Wright, PhD

Report To: Scottish Environment Protection Agency, North Region
IFE Report Ref. No: RL/T04071R7/22







**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 1998 SEPA North Region

**R J M Gunn, J H Blackburn, J M Winder, R Wiggers, J Davy-Bowker
and J F Wright**

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

R.J.M. Gunn
June 1999
Scottish Environment Protection Agency, North Region
RL/T04071R7/22

**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 1998 the sampling of aquatic macro-invertebrates for the biological assessment of river quality was carried out throughout the United Kingdom. This task was undertaken by the Environment Agency (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. For each site the taxa present were recorded on a standard data sheet. Although attempts had been made to standardise sample processing and recording techniques, these did vary somewhat from region to region.

In view of the number of staff involved and the variability of sample processing techniques, it was recognised that a quality assurance exercise was necessary to minimise and quantify errors. Each laboratory appointed at least one experienced analyst to act as an internal analytical quality control (AQC) inspector. 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 and 1997. 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 29 samples analysed by staff employed in the two laboratories of SEPA North Region. It does not include the results of the audit of a further two samples from the Dingwall Laboratory that were analysed to species level.

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 West 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 West 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. Tables 5 and 6 list, at family and species level respectively, the taxa missed in sorting by SEPA West's analysts in the 1998 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 1998 audit for the whole of the United Kingdom.

6. ACKNOWLEDGEMENTS

Grateful thanks to John Murray-Bligh of the Environment Agency's Thames Region, who provided an invaluable assistance in the development of the audit methodology and who has been a reliable source of helpful advice throughout.

Table 1 The 21 samples audited for the Aberdeen Laboratory of SEPA North

River	Site	Analyst	Losses	Gains	Omissions
Glas Allt	Glas Allt Shiel	CN	0	0	0
Deveron	Coniecleugh	CN	1	1	0
Invernettie Burn	d/s Dales	CN	0	4	0
Gadie Burn	d/s Archaeolink	CN	0	1	0
Keithfield Burn	B9005 Bridge	JK	0	2	0
Far Burn	Dyce Pumping Station	JL	0	1	0
Water of Buchat	Bridge of Buchat	JL	0	2	0
Don	Riverview	JL	0	1	2
Little Water	B9005 Bridge	JL	0	8	1
Quoich Water	d/s Linn of Quoich	JL	0	11	0
Aberlour Burn	d/s Glenallachie	JP	0	0	0
Black Burn	u/s Burnside	JP	0	0	0
South Ugie	d/s Stuartfield	LC	0	2	0
Youlie Burn	d/s Tarves	LC	0	1	0
Auchreddie Burn	B9028 Bridge	LC	0	2	0
Glas Allt	Glas Allt Shiel	MAD	0	1	0
Isla	d/s Keith WWTP	MAD	0	1	0
Culter Burn	Peterculter	MAD	0	2	1
Cowie Burn	Leith Hall	MAD	0	1	0
Dee	Milltimber	MAD	0	2	0
Dee	Potarch	MAD	0	2	0

Table 2 The 4 samples audited for the Dingwall Laboratory of SEPA North

River	Site	Analyst	Losses	Gains	Omissions
Nevis	Caravan Park	AR	1	3	0
Abhainn Glinne Dubh	u/s Stornoway WTP	AR	0	0	0
Rhiconich Burn	d/s LFS	GF	1	1	0
Gillock Burn	Gillock	GF	0	2	0

Table 3 Statistics of the 1998 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	21	2.14	0.58	3	14.29	11	2.38	0.60
CN	4	1.50	0.87	1	25.00	4	1.75	0.85
JK	1	2.00	0	0	0	2	2.00	0
JL	5	4.60	2.06	2	40.00	11	5.20	2.01
JP	2	0	0	0	0	0	0	0
LC	3	1.67	0.33	0	0	2	1.67	0.33
MAD	6	1.50	0.22	0	0	2	1.67	0.33
Dingwall	4	1.50	0.65	1	25.00	3	2.00	0.82
AR	2	1.50	1.50	1	50.00	3	2.00	2.00
GF	2	1.50	0.50	0	0	2	2.00	0
SEPA North	25	2.04	0.49	4	16.00	11	2.32	0.52
Whole of SEPA	105	1.09	0.16	8	7.62	11	1.35	0.17

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	21	15.67	38.10	71	2.10	14.29	11
CN	4	12.75	25.00	36	1.25	25.00	4
JK	1	20.00	100.00	20	2.00	0	2
JL	5	31.60	60.00	71	4.60	40.00	11
JP	2	0	0	0	0	0	0
LC	3	8.67	33.33	15	1.67	0	2
MAD	6	12.33	33.33	20	1.50	0	2
Dingwall	4	6.00	25.00	18	1.00	0	2
AR	2	9.00	50.00	18	1.00	0	2
GF	2	3.00	0	6	1.00	0	2
SEPA North	25	14.12	36.00	71	1.92	12.00	11
Whole of SEPA	105	6.60	15.24	71	0.96	6.67	11

Table 5 The families missed by SEPA North Region's analysts in the 1998 audit

Family	n	% of SEPA North's missed families
Ephemerellidae	4	7.84
Hydrophilidae (incl. Hydraenidae)	3	5.88
Lymnaeidae	3	5.88
Nemouridae	3	5.88
Planariidae (incl. Dugesiidae)	3	5.88
Rhyacophilidae (incl. Glossosomatidae)	3	5.88
Taeniopterygidae	3	5.88
Ancylidae (incl. Acroloxidae)	2	3.92
Brachycentridae	2	3.92
Chloroperlidae	2	3.92
Elmidae	2	3.92
Lepidostomatidae	2	3.92
Leuctridae	2	3.92
Simuliidae	2	3.92
Caenidae	1	1.96
Goeridae	1	1.96
Haliplidae	1	1.96
Hydropsychidae	1	1.96
Hydroptilidae	1	1.96
Leptoceridae	1	1.96
Leptophlebiidae	1	1.96
Limnephilidae	1	1.96
Odontoceridae	1	1.96
Oligochaeta	1	1.96
Perlidae	1	1.96
Physidae	1	1.96
Polycentropodidae	1	1.96
Siphonuridae	1	1.96
Sphaeriidae	1	1.96
Total	51	100

Table 6 The species missed by SEPA North Region's analysts in the 1998 audit

Species	n	% of SEPA North's missed species
<i>Ephemerella ignita</i> (Poda)	4	7.14
<i>Lymnaea peregra</i> (Muller)	3	5.36
<i>Agapetus</i> sp.	2	3.57
<i>Crenobia alpina</i> (Dana)	2	3.57
<i>Chloroperla torrentium</i> (Pictet)	2	3.57
<i>Elmis aenea</i> (Muller)	2	3.57
<i>Protonemura meyeri</i> (Pictet)	2	3.57
<i>Ancylus fluviatilis</i> Muller	2	3.57
<i>Brachycentrus subnubilus</i> Curtis	2	3.57
<i>Lepidostoma hirtum</i> (Fabricius)	2	3.57
<i>Hydraena riparia</i> Kugelann	1	1.79
<i>Hydraena gracilis</i> Germar	1	1.79
<i>Haliphus</i> sp.	1	1.79
<i>Hydrobius fuscipes</i> (L.)	1	1.79
<i>Hydropsyche pellucidula</i> (Curtis)	1	1.79
<i>Dinocras cephalotes</i> (Curtis)	1	1.79
<i>Caenis rivulorum</i> Eaton	1	1.79
<i>Brachyptera</i> sp.	1	1.79
<i>Brachyptera risi</i> (Morton)	1	1.79
<i>Aplexa hypnorum</i> (L.)	1	1.79
<i>Anacaena globulus</i> (Paykull)	1	1.79
<i>Athripsodes cinereus</i> (Curtis)	1	1.79
<i>Polycentropus</i> sp.	1	1.79
<i>Hydroptila</i> sp.	1	1.79
<i>Laccobius (Macrolaccobius) bipunctatus</i> (Fabricius)	1	1.79
<i>Taeniopteryx nebulosa</i> (L.)	1	1.79
<i>Siphonurus lacustris</i> Eaton	1	1.79
<i>Simulium (Wilhelmia) sp.</i>	1	1.79
<i>Simulium (Simulium) argyreatum</i> group	1	1.79
<i>Silo</i> sp.	1	1.79
<i>Rhyacophila</i> sp.	1	1.79
<i>Protonemura</i> sp.	1	1.79
<i>Polycelis felina</i> (Dalyell)	1	1.79
<i>Pisidium</i> sp.	1	1.79
<i>Paraleptophlebia</i> sp.	1	1.79
<i>Odontocerum albicorne</i> (Scopoli)	1	1.79
Naididae	1	1.79
<i>Lymnaea truncatula</i> (Muller)	1	1.79
<i>Limnius volckmari</i> (Panzer)	1	1.79
Limnephilidae indet	1	1.79
<i>Leuctra inermis</i> Kempny	1	1.79

Table 6 continued

Species	n	% of SEPA North's missed species
Leuctra fusca (L.)	1	1.79
Rhyacophila dorsalis (Curtis)	1	1.79
Total	56	100

Table 7 The families missed by all SEPA's analysts in the 1998 audit

Family	n	% of missed families for SEPA audits
Hydrophilidae (incl. Hydraenidae)	10	9.17
Lymnaeidae	6	5.50
Nemouridae	6	5.50
Chloroperlidae	5	4.59
Planariidae (incl. Dugesiiidae)	5	4.59
Rhyacophilidae (incl. Glossosomatidae)	5	4.59
Simuliidae	5	4.59
Caenidae	4	3.67
Ephemerellidae	4	3.67
Leptoceridae	4	3.67
Taeniopterygidae	4	3.67
Ancylidae (incl. Acroloxidae)	3	2.75
Elmidae	3	2.75
Lepidostomatidae	3	2.75
Leptophlebiidae	3	2.75
Leuctridae	3	2.75
Planorbidae	3	2.75
Polycentropodidae	3	2.75
Sphaeriidae	3	2.75
Brachycentridae	2	1.83
Dytiscidae (incl. Noteridae)	2	1.83
Hydropsychidae	2	1.83
Hydroptilidae	2	1.83
Limnephilidae	2	1.83
Oligochaeta	2	1.83
Psychomyiidae (incl. Ecnomidae)	2	1.83
Tipulidae	2	1.83
Baetidae	1	0.92
Dendrocoelidae	1	0.92
Gammaridae (incl. Crangonyctidae)	1	0.92
Goeridae	1	0.92
Halplidae	1	0.92
Heptageniidae	1	0.92
Hydrobiidae (incl. Bithyniidae)	1	0.92
Odontoceridae	1	0.92
Perlidae	1	0.92
Physidae	1	0.92
Siphonuridae	1	0.92
Total	109	100

Table 8 The species missed by all SEPA's analysts in the 1998 audit

Species	n	% of missed species for SEPA audits
Hydraena gracilis Germar	7	5.88
Chloroperla torrentium (Pictet)	5	4.20
Lymnaea peregra (Muller)	5	4.20
Agapetus sp.	4	3.36
Ephemerella ignita (Poda)	4	3.36
Caenis rivulorum Eaton	4	3.36
Elmis aenea (Muller)	3	2.52
Ancylus fluviatilis Muller	3	2.52
Pisidium sp.	3	2.52
Brachycentrus subnubilus Curtis	2	1.68
Limnephilidae indet	2	1.68
Crenobia alpina (Dana)	2	1.68
Lepidostoma hirtum (Fabricius)	2	1.68
Hydroptila sp.	2	1.68
Brachyptera risi (Morton)	2	1.68
Lymnaea truncatula (Muller)	2	1.68
Simulium (Simulium) ornatum group	2	1.68
Amphinemura sulcicollis (Stephens)	2	1.68
Athripsodes cinereus (Curtis)	2	1.68
Athripsodes aterrimus (Stephens)	2	1.68
Protonemura meyeri (Pictet)	2	1.68
Psychomyia pusilla (Fabricius)	2	1.68
Rhyacophila sp.	2	1.68
Dicranota sp.	1	0.84
Gammarus pulex (L.)	1	0.84
Amphinemura standfussi Ris	1	0.84
Ecdyonurus sp.	1	0.84
Dinocras cephalotes (Curtis)	1	0.84
Gyraulus albus (Muller)	1	0.84
Enchytraeidae	1	0.84
Dendrocoelum lacteum (Muller)	1	0.84
Crunoecia irrorata (Curtis)	1	0.84
Chloroperla tripunctata (Scopoli)	1	0.84
Crangonyx pseudogracilis Bousfield	1	0.84
Antocha vitripennis (Meigen)	1	0.84
Habrophlebia fusca (Curtis)	1	0.84
Hydropsyche siltalai Dohler	1	0.84
Brachyptera sp.	1	0.84
Bathyomphalus contortus (L.)	1	0.84
Baetis rhodani (Pictet)	1	0.84
Athripsodes bilineatus (L.)	1	0.84

Table 8 continued

Species	n	% of missed species for SEPA audits
Armiger crista (L.)	1	0.84
Aplexa hypnorum (L.)	1	0.84
Anacaena globulus (Paykull)	1	0.84
Protonemura sp.	1	0.84
Hydrobius fuscipes (L.)	1	0.84
Polycelis nigra group	1	0.84
Polycelis sp.	1	0.84
Polycentropus flavomaculatus (Pictet)	1	0.84
Polycentropus sp.	1	0.84
Plectrocnemia conspersa (Curtis)	1	0.84
Prosimulium hirtipes/latimucro	1	0.84
Paraleptophlebia sp.	1	0.84
Rhyacophila dorsalis (Curtis)	1	0.84
Silo sp.	1	0.84
Simulium (Simulium) argyreatum group	1	0.84
Simulium (Simulium) noelleri Friederichs	1	0.84
Simulium (Wilhelmia) sp.	1	0.84
Siphonurus lacustris Eaton	1	0.84
Potamopyrgus jenkinsi (Smith)	1	0.84
Leuctra fusca (L.)	1	0.84
Helophorus (Atracthelophorus) brevipalpis Bedel	1	0.84
Hydraena riparia Kugelann	1	0.84
Hydropsyche pellucidula (Curtis)	1	0.84
Taeniopteryx nebulosa (L.)	1	0.84
Ilybius sp.	1	0.84
Polycelis felina (Dalyell)	1	0.84
Leptophlebiidae indet	1	0.84
Haliphus sp.	1	0.84
Leuctra inermis Kempny	1	0.84
Leuctra sp.	1	0.84
Limnius volckmari (Panzer)	1	0.84
Naididae	1	0.84
Odontocerum albicorne (Scopoli)	1	0.84
Oreodytes sp.	1	0.84
Laccobius (Macrolaccobius) bipunctatus (Fabricius)	1	0.84
Total	119	100

Table 9 Missed families for all samples in the 1998 audit

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

Table 9 continued

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

Table 10 Missed species for all samples in the 1998 audit

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

Table 10 continued

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

Table 10 continued

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

Table 10 continued

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

Table 10 continued

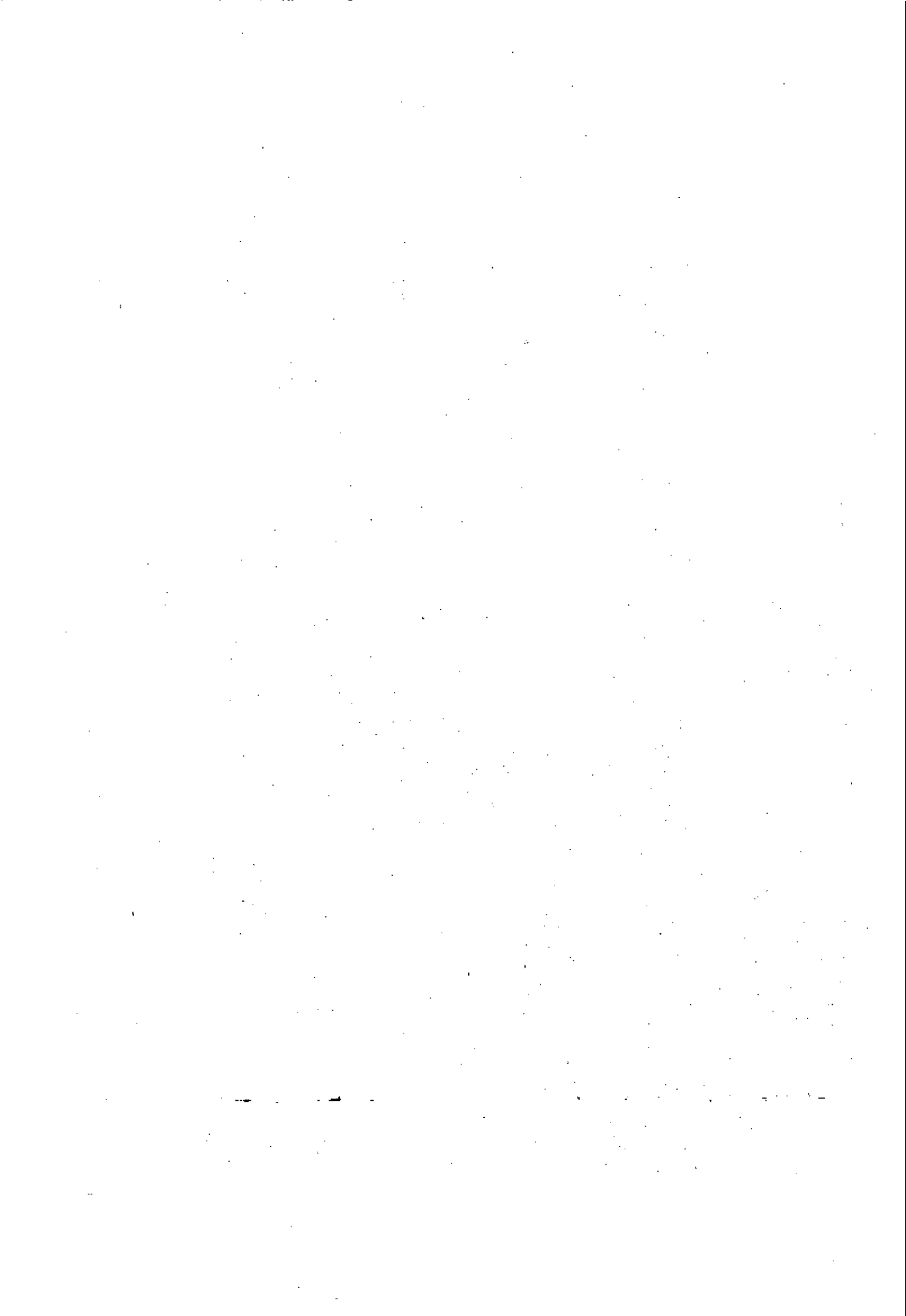
Species	n	% of missed species in 1998 audit
Agabus guttatus (Paykull)	1	0.09
Adicella reducta (Mclachlan)	1	0.09
Prosimulium hirtipes/latimicro	1	0.09
Potamophylax cingulatus (Stephens)	1	0.09
Baetis sp.	1	0.09
Sialis fuliginosa Pictet	1	0.09
Sialis lutaria (L.)	1	0.09
Silo nigricornis (Pictet)	1	0.09
Trocheta subviridis Dutrochet	1	0.09
Amphinemura standfussi Ris	1	0.09
Anobolia nervosa (Curtis)	1	0.09
Tanytarsini	1	0.09
Taeniopteryx nebulosa (L.)	1	0.09
Sympetrum sp.	1	0.09
Siphonurus lacustris Eaton	1	0.09
Simulium (Nevermannia) cryophilum group	1	0.09
Potamonectes sp.	1	0.09
Aplexa hypnorum (L.)	1	0.09
Simulium sp.	1	0.09
Simulium (Simulium) reptans (L.)	1	0.09
Amphinemura sp.	1	0.09
Simulium (Simulium) argyreatum group	1	0.09
Anacaena globulus (Paykull)	1	0.09
Simulium (Nevermannia) lundstromi (Enderlein)	1	0.09
Ceraclea nigronevosa (Retzius)	1	0.09
Hydrobius fuscipes (L.)	1	0.09
Leuctra inermis Kempny	1	0.09
Enallagma cyathigerum (Charpentier)	1	0.09
Enchytraeidae	1	0.09
Ephemera danica Muller	1	0.09
Esolus parallelepipedus (Muller)	1	0.09
Hydrophilidae indet	1	0.09
Physa fontinalis (L.)	1	0.09
Hydrocyphon deflexicollis (Muller)	1	0.09
Diamesinae	1	0.09
Glossiphoniidae indet	1	0.09
Glossosoma sp.	1	0.09
Glyphotaelius pellucidus (Retzius)	1	0.09
Gyrinidae indet	1	0.09
Gyrinus sp.	1	0.09

Table 10 continued

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

APPENDIX

Results of individual sample audits



AUDIT RESULTS FOR ABERDEEN LABORATORY

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 20/10/97

WATER-
COURSE: Glas Allt

PRIMARY
ANALYST: CN

AQC
ANALYST:

SITE: Glas Allt Shiel

CODE: 092

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: 15/05/98

WATER-
COURSE: Deveron

PRIMARY
ANALYST: CN

AQC
ANALYST:

SITE: Coniccleugh

CODE: A20

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

Dytiscidae (incl. Noteridae)

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

Brachycentridae

9

Brachycentrus subnubilus Curtis (p)

SUMMARY OF AUDIT

LOSSES 1

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 5

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
WATER-COURSE: Invernettie Burn
SITE: d/s Dales

LABORATORY: Aberdeen
PRIMARY ANALYST: CN
CODE: I10

DATE: 14/08/98
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

Ancyliidae (incl. Acroloxidae)	9
Ancyclus fluviatilis Muller	
Siphonuridae	9
Siphonurus lacustris Eaton 1 only	
Ephemerellidae	9
Ephemerella ignita (Poda)	
Leuctridae	9
Leuctra fusca (L.)	

SUMMARY OF AUDIT

LOSSES 0 GAINS 4 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 36
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: 08/09/98

WATER-
COURSE: Gadie Burn

PRIMARY
ANALYST: CN

AQC
ANALYST:

SITE: d/s Archaeolink

CODE: L89

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

Perlidae

9

Dinocras cephalotes (Curtis) 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

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: 19/05/98

WATER-
COURSE: Keithfield Burn

PRIMARY
ANALYST: JK

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

Odontoceridae	9
Odontocerum albicorne (Scopoli) 1 only	
Leptoceridae	9
Athripsodes cinereus (Curtis) 1 only	

SUMMARY OF AUDIT

LOSSES 0 GAINS 2 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 20

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: 05/11/98

WATER-
COURSE: Far Burn

PRIMARY
ANALYST: JL

AQC
ANALYST:

SITE: Dyce Pumping Station

CODE: 93X

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

Limnephilidae

9

Limnephilidae indet (juv) 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: 08/09/98

WATER-COURSE: Water of Buchat

PRIMARY ANALYST: JL

AQC ANALYST:

SITE: Bridge of Buchat

CODE: E05

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 1 only	
Rhyacophilidae (incl. Glossosomatidae)	9
Agapetus sp. (p)	

SUMMARY OF AUDIT

LOSSES 0 GAINS 2 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 14
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: 16/12/98

WATER-
COURSE: Don

PRIMARY
ANALYST: JL

AQC
ANALYST:

SITE: Riverview

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

Tipulidae *	1
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

Ancylidae (incl. Acroloxidae)	9
Ancyclus fluviatilis Muller	
Tipulidae *	1
Dicranota sp.	
Chironomidae *	1
Chironomini	
Prodiamesinae	

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 2

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: Aberdeen	DATE: 25/11/98
WATER-COURSE: Little Water	PRIMARY ANALYST: JL	AQC ANALYST:
SITE: B9005 Bridge	CODE: C05	SORT/AQC METHOD: Not known

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

Chironomidae * 4

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

Polycelis felina (Dalyell)

Lymnaeidae 9

Lymnaea peregra (Muller) 1 only

Leptophlebiidae 9

Paraleptophlebia sp. (damaged) 1 only

Ephemereididae 9

Ephemerella ignita (Poda) 1 only

Nemouridae 9

Protonemura meyeri (Pictet) 1 only

Leuctridae 9

Leuctra inermis Kempny 1 only

Chloroperlidae 9

Chloroperla torrentium (Pictet) 1 only

Simuliidae 9

Simulium (Wilhelmia) sp.

Chironomidae * 4

Orthocladinae 1 only

SUMMARY OF AUDIT

LOSSES 0	GAINS 8	OMISSIONS: 1	NET EFFECTS:
			ON BMWP SCORE 60
			ON NO. OF TAXA 8

- | | | |
|--|--|--|
| 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: Quoich Water

LABORATORY: Aberdeen
PRIMARY
ANALYST: JL

DATE: 20/07/98
AQC
ANALYST:
SORT/AQC
METHOD: Not known

SITE: d/s Linn of Quoich

CODE: 079

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

SUMMARY OF AUDIT

LOSSES 0 GAINS 11 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 71

ON NO. OF TAXA 11

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: 20/07/98
WATER- COURSE: Quoich Water	PRIMARY ANALYST: JL	AQC ANALYST:
SITE: d/s Linn of Quoich	CODE: 079	SORT/AQC METHOD: Not known

Additional BMWP taxa found in sample

Planariidae (incl. Dugesiiidae)	9
Crenobia alpina (Dana)	
Oligochaeta	9
Naididae	
Ephemerellidae	9
Ephemerella ignita (Poda)	
Nemouridae	9
Protonemura sp. (juv) 1 only	
Elmidae	9
Elmis aenea (Muller) (l)	
Limnius volckmari (Panzer) (a)	
Hydroptilidae	9
Hydroptila sp. 1 only	
Polycentropodidae	9
Polycentropus sp. (juv) 1 only	
Hydropsychidae	9
Hydropsyche pellucidula (Curtis) (l+p)	
Brachycentridae	9
Brachycentrus subnubilus Curtis	
Lepidostomatidae	9
Lepidostoma hirtum (Fabricius) 1 only	
Simuliidae	9
Simulium (Simulium) argyreatum group	

SUMMARY OF AUDIT

LOSSES 0 GAINS 11 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 71
ON NO. OF TAXA 11

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: 28/05/98

WATER-
COURSE: Aberlour Burn

PRIMARY
ANALYST: JP

AQC
ANALYST:

SITE: d/s Glenallachie

CODE: 70N

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: 20/05/98

WATER-
COURSE: Black Burn

PRIMARY
ANALYST: JP

AQC
ANALYST:

SITE: u/s Burnside

CODE: 30E

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: 08/10/98

WATER-
COURSE: South Ugie

PRIMARY
ANALYST: LC

AQC
ANALYST:

SITE: d/s Stuartfield

CODE: G75

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	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena riparia Kugelann (a) 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: 20/05/98

WATER-COURSE: Youlie Burn

PRIMARY ANALYST: LC

AQC ANALYST:

SITE: d/s Tarves

CODE: G10

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 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

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: 10/12/98

WATER-

PRIMARY

AQC

COURSE: Auchreddie Burn

ANALYST: LC

ANALYST:

SITE: B9028 Bridge

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

Lymnaeidae

9

Lymnaea peregra (Muller)

Lymnaea truncatula (Muller)

Sphaeriidae

9

Pisidium sp.

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 6

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: 21/07/97

WATER-
COURSE: Glas Allt

PRIMARY
ANALYST: MAD

AQC
ANALYST:

SITE: Glas Allt Shiel

CODE: 092

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

Rhyacophilidae (incl. Glossosomatidae)

9

Rhyacophila dorsalis (Curtis) 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: 29/04/98

WATER-
COURSE: Isla

PRIMARY
ANALYST: MAD

AQC
ANALYST:

SITE: d/s Keith WWTP

CODE: C45

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

Brachyptera risi (Morton)

9

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

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: 05/12/98

WATER-COURSE: Culter Burn

PRIMARY ANALYST: MAD

AQC ANALYST:

SITE: Peterculter

CODE: 115

SORT/AQC METHOD: Not known

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

Capniidae * 3

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

Capniidae * 3

Capnia bifrons (Newman)

Lepidostomatidae 9

Lepidostoma hirtum (Fabricius) 1 only

Goeridae 9

Silo sp. 1 only

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 1

NET EFFECTS:

ON BMWP SCORE 20

ON NO. OF TAXA 2

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: 20/11/98

WATER-COURSE: Cowie Burn

PRIMARY ANALYST: MAD

AQC ANALYST:

SITE: Leith Hall

CODE: 10T

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

Chloroperlidae

9

Chloroperla torrentium (Pictet)

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

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: 03/11/98

WATER-
COURSE: Dee

PRIMARY
ANALYST: MAD

AQC
ANALYST:

SITE: Milltimber

CODE: A40

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

Haliplidae	9
Halipus sp. (l) 1 only	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a) 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: 21/05/98

WATER-
COURSE: Dee

PRIMARY
ANALYST: MAD

AQC
ANALYST:

SITE: Potarch

CODE: A25

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

EphemereIIDae	9
EphemereIIa ignita (Poda) 1 only	
Rhyacophilidae (incl. Glossosomatidae)	9
Agapetus sp.	
Rhyacophila sp. (juv)	

SUMMARY OF AUDIT

LOSSES 0 GAINS 2 OMISSIONS: 0

NET EFFECTS:

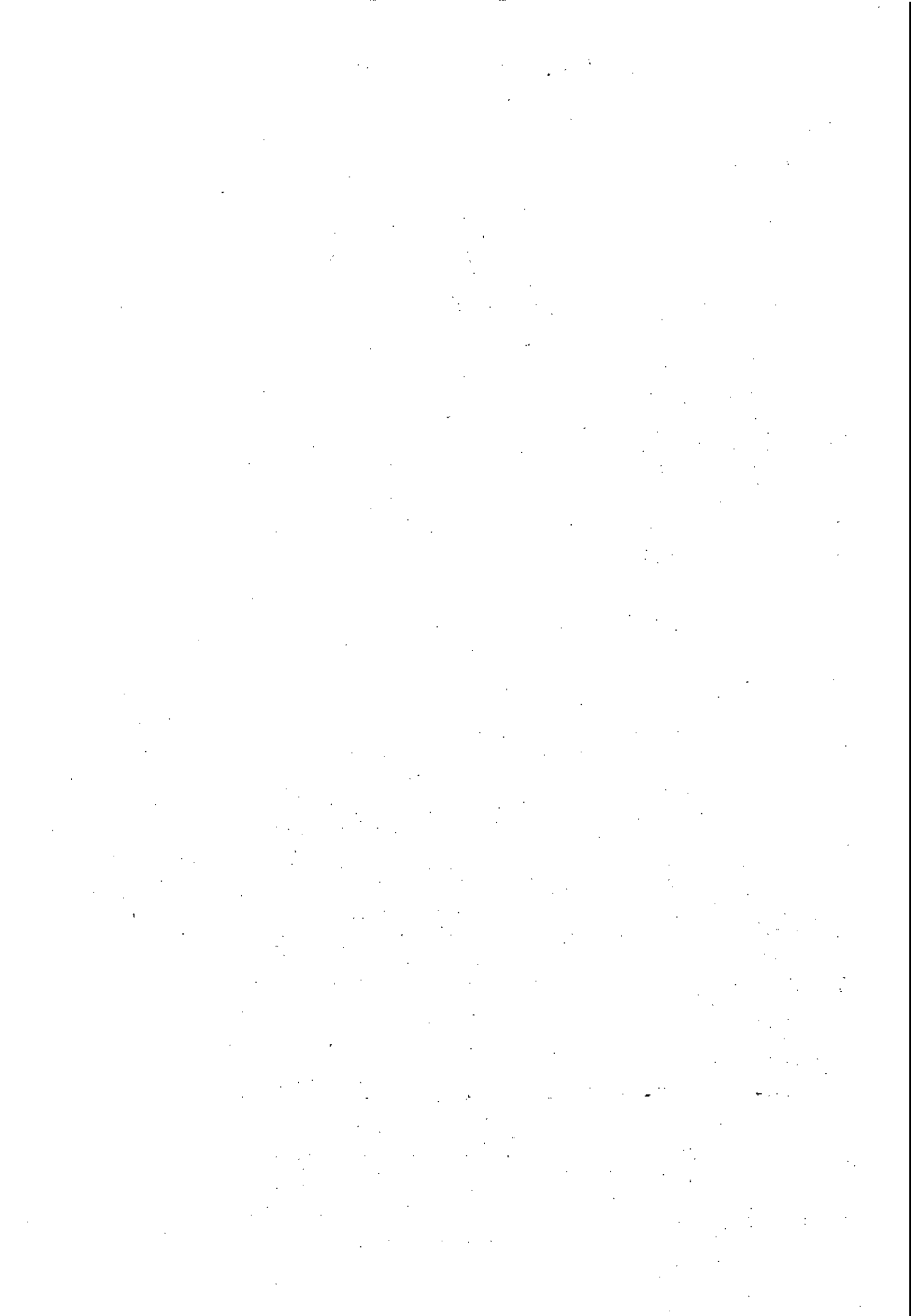
ON BMWP SCORE 17
ON NO. OF TAXA 2

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)



AUDIT RESULTS FOR DINGWALL LABORATORY

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Dingwall

DATE: 02/12/98

WATER-
COURSE: Nevis

PRIMARY
ANALYST: AR

AQC
ANALYST:

SITE: Caravan Park

CODE:

SORT/AQC
METHOD: Not known

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

Baetidae

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

Taeniopterygidae

9

Brachyptera sp. (juv) 1 only

Nemouridae

9

Protonemura meyeri (Pictet)

SUMMARY OF AUDIT

LOSSES 1

GAINS 3

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 18

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: 06/10/98

WATER-

PRIMARY

AQC

COURSE: Abhainn Glinne Dubh

ANALYST: AR

ANALYST:

SITE: u/s Stornoway WTP

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

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
WATER-
COURSE: Rhiconich Burn
SITE: d/s LFS

LABORATORY: Dingwall
PRIMARY
ANALYST: GF
CODE:

DATE: 28/05/98
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

Mesovelidae

7

Veliidae nymph in vial

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

Anacaena globulus (Paykull) (a)

Hydrobius fuscipes (L.) (a)

Laccobius (Macrolaccobius) bipunctatus (Fabricius) (a)

SUMMARY OF AUDIT

LOSSES 1 GAINS 1

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
WATER-
COURSE: Gillock Burn
SITE: Gillock

LABORATORY: Dingwall
PRIMARY
ANALYST: GF
CODE:

DATE: 22/09/98
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

Physidae	9
Aplexa hypnorum (L.) 1 only	
Lymnaeidae	9
Lymnaea peregra (Muller)	

SUMMARY OF AUDIT

LOSSES 0 GAINS 2 OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 6
ON NO. OF TAXA 2

- | | | |
|--|--|--|
| 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)

