



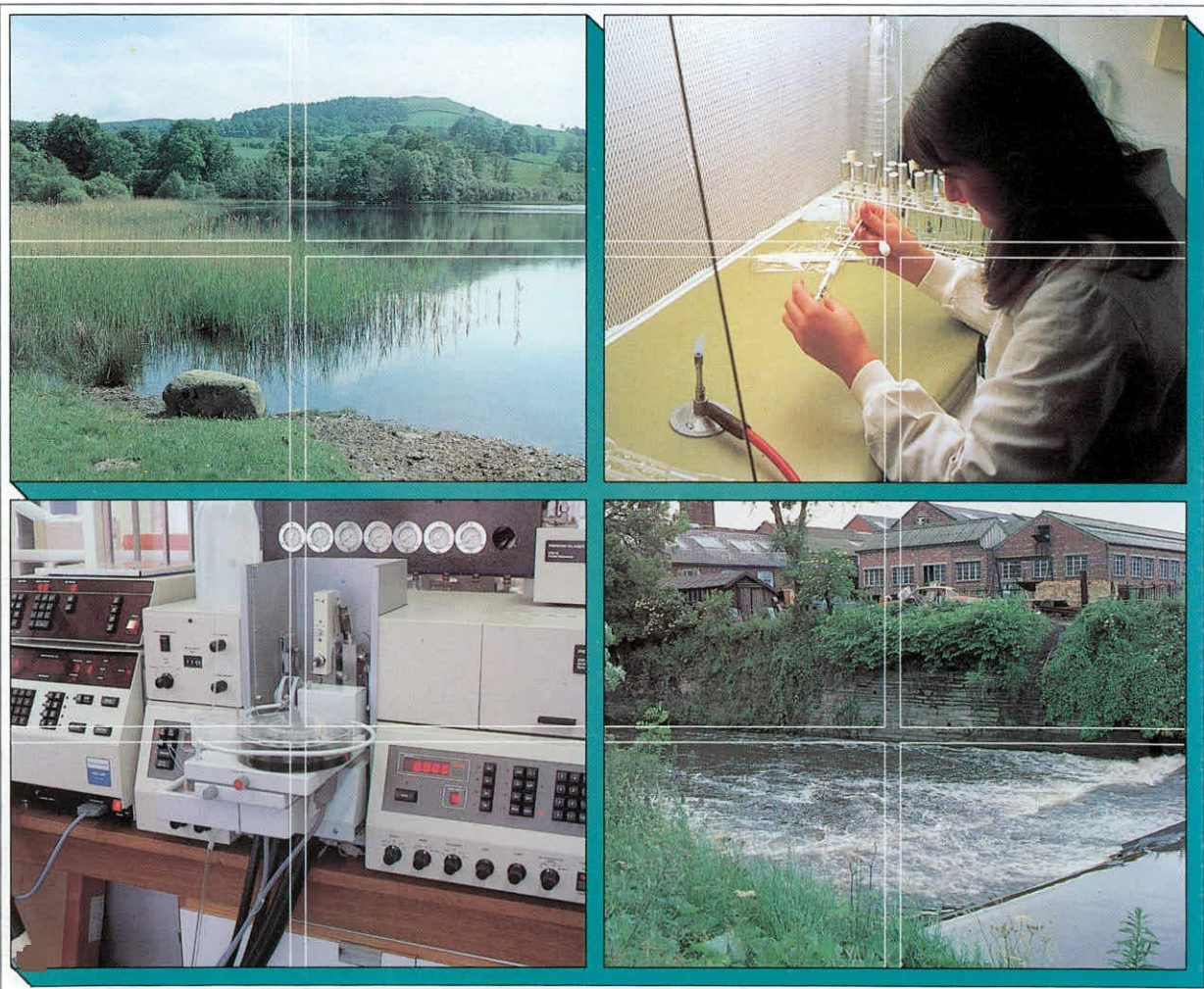
# **An audit of performance in the analysis of biological samples in 1996 SEPA North Region**

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Report To:

Scottish Environment Protection Agency, North Region







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Report Date:

August 1997

Report To:

Scottish Environment Protection Agency, North Region

IFE Report Ref. No:

RL/T04071R7/07

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Ecology &  
Hydrology**

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## **1. INTRODUCTION**

In 1996 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. 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 rather than the primary analyst.

This report presents the results of the audit of 39 samples analysed by SEPA North staff.

## **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 centered 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 1996 audit. Table 6 lists the species missed by SEPA North's biologists, as found by the 1996 audit. Tables 7 and 8 list missed taxa at family and species level for all SEPA analysts and Tables 10 and 11 give similar listings for the entire 1996 audit for the whole of the UK.

## **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 33 samples audited for the Aberdeen Laboratory of SEPA North

River	Site	Analyst	Losses	Gains	Omissions
SPRING					
North Ugie Tributary	u/s New Leeds	DH	1	1	0
Allt Coire Cas	u/s WWTP	DH	0	3	0
Don	Montgarrie Bridge	DH	0	6	0
Gassey Burn	u/s Brodies S/O	DH	0	0	0
Fiddich	Balvenie Ford	JP	0	1	0
Cowie Burn	Leith Hall	LC	0	1	0
Davidstone Burn	Bridge of Howdoup	LC	0	1	0
Don	Grandholm	LC	0	2	0
Burnroot Burn	u/s Burnroot	LC	0	4	0
Black Burn	u/s Clinterty WWTP	LC	0	2	0
Don	Grandholm	MAD	0	1	0
Dour	u/s New Aberdour	MAD	0	7	0
S.Ugie Tributary	d/s Cleansing Depot	MAD	0	0	0
SUMMER					
Keithfield Burn	B9005 Bridge	DH	0	3	0
Dee	Potarch	DH	0	0	0
Allt Mor	Coronation Bridge	JP	0	2	0
Roths Burn	Glenrothes Distillery	JP	0	4	0
Blackdog Burn	u/s Potterton WWTP	MAD	0	2	0
Tarty Burn	Mill of Tarty	TO	0	3	0
Pinkie Burn	B979 Bridge	TO	0	2	0
Dee	d/s Aboyne	TO	0	1	0
AUTUMN					
Far Burn	u/s Airport	DH	0	0	0
Distillery Burn	Meadows confluence	DH	0	2	0
Allt Choire Chaoil	u/s Charnachuinn	JP	0	4	0
Isla	Milton Tower	JP	0	0	0
Davidstone Burn	Bridge of Howdoup	JP	0	0	0
Ebrie Burn	B9005 Bridge	LC	0	1	0
Bucks Burn	d/s Bankhead SWS	LC	0	1	0
W Tullos Burn	d/s W Tullos Estate	LC	0	3	0
Gairn	Bridge of Gairn	LC	0	10	0
Cowie	Stonehaven	MAD	0	2	0
Spey	d/s Dailuaine Distillery	MAD	0	7	0
Aberlour Burn	d/s Aberlour	MAD	0	5	0

Table 2 The 6 samples audited for the Dingwall Laboratory of SEPA North

River	Site	Analyst	Losses	Gains	Omissions
<b>SPRING</b>					
Nairn	u/s Bridge of Faillite Smolts	AR	0	4	0
Bruiach Burn	u/s Kiltarlity STW	AR	0	5	0
Kilmarie	d/s Strathaird Hatchery	EG	0	1	0
Moidart	u/s Fish Hatchery	EG	1	2	0
Polla	u/s Fish Farm	GF	1	4	0
<b>SUMMER</b>					
Wick	Watten	GF	0	2	0

Table 3 Statistics of the 1996 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
<b>Aberdeen</b>	<b>33</b>	<b>2.45</b>	<b>0.41</b>	<b>12</b>	<b>36.36</b>	<b>10</b>	<b>2.48</b>	<b>0.41</b>
DH	8	1.88	0.74	3	37.50	6	2.00	0.73
JP	6	1.83	0.75	2	33.33	4	1.83	0.75
LC	9	2.78	0.97	3	33.33	10	2.78	0.97
MAD	7	3.43	1.09	3	42.86	7	3.43	1.09
TO	3	2.00	0.58	1	33.33	3	2.00	0.58
<b>Dingwall</b>	<b>6</b>	<b>3.00</b>	<b>0.63</b>	<b>3</b>	<b>50.00</b>	<b>5</b>	<b>3.33</b>	<b>0.67</b>
AR	2	4.50	0.50	2	100.00	5	4.50	0.50
EG	2	1.50	0.50	0	0.00	2	2.00	1.00
GF	2	3.00	1.00	1	50.00	4	3.50	1.50
<b>SEPA North</b>	<b>39</b>	<b>2.54</b>	<b>0.36</b>	<b>15</b>	<b>38.46</b>	<b>10</b>	<b>2.62</b>	<b>0.36</b>

Table 4 Net effects of the Audit on BMWP score and number of scoring taxa for SEPA North

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 samples	Maximum underestimate of no. of taxa
<b>Aberdeen</b>	<b>33</b>	<b>16.76</b>	<b>45.45</b>	<b>61</b>	<b>2.42</b>	<b>36.36</b>	<b>10</b>
DH	8	10.75	37.50	32	1.75	37.50	6
JP	6	14.33	50.00	32	1.83	33.33	4
LC	9	17.22	33.33	61	2.78	33.33	10
MAD	7	24.71	57.14	52	3.43	42.86	7
TO	3	17.67	66.67	23	2.00	33.33	3
<b>Dingwall</b>	<b>6</b>	<b>17.50</b>	<b>66.67</b>	<b>33</b>	<b>2.67</b>	<b>50.00</b>	<b>5</b>
AR	2	25.00	100.00	33	4.50	100.00	5
EG	2	10.00	0.00	10	1.00	0.00	1
GF	2	17.50	100.00	20	2.50	50.00	3
<b>SEPA North</b>	<b>39</b>	<b>16.87</b>	<b>48.72</b>	<b>61.00</b>	<b>2.46</b>	<b>38.46</b>	<b>10.00</b>

Table 5            The families missed by SEPA North Region's analysts

Family	n	% of SEPA North Region's missed taxa in audit
Caenidae	6	6.32
Hydrophilidae (incl. Hydraenidae)	6	6.32
Goeridae	5	5.26
Simuliidae	5	5.26
Chloroperlidae	4	4.21
Dytiscidae (incl. Noteridae)	4	4.21
Elmidae	4	4.21
Hydroptilidae	4	4.21
Planariidae (incl. Dugesiidae)	4	4.21
Ephemerellidae	3	3.16
Lepidostomatidae	3	3.16
Leptoceridae	3	3.16
Leuctridae	3	3.16
Polycentropodidae	3	3.16
Psychomyiidae (incl. Ecnomidae)	3	3.16
Rhyacophilidae (incl. Glossosomatidae)	3	3.16
Ancylidae (incl. Acroloxidae)	2	2.11
Chironomidae	2	2.11
Glossiphoniidae	2	2.11
Gyrinidae	2	2.11
Limnephilidae	2	2.11
Lymnaeidae	2	2.11
Nemouridae	2	2.11
Oligochaeta	2	2.11
Scirtidae	2	2.11
Sericostomatidae	2	2.11
Sphaeriidae	2	2.11
Capniidae	1	1.05
Heptageniidae	1	1.05
Hydrobiidae (incl. Bithyniidae)	1	1.05
Hydropsychidae	1	1.05
Leptophlebiidae	1	1.05
Odontoceridae	1	1.05
Perlodidae	1	1.05
Sialidae	1	1.05
Siphonuridae	1	1.05
Taeniopterygidae	1	1.05
<b>TOTAL</b>	<b>95</b>	<b>100.00</b>

Table 6 The species missed by SEPA North Region's analysts

Species	n	% of SEPA North Region's missed taxa in AQC Audit
Hydraena gracilis Germar	6	5.88
Caenis rivulorum Eaton	6	5.88
Oreodytes sanmarkii (Sahlberg)	4	3.92
Elmis aenea (Muller)	4	3.92
Chloroperla torrentium (Pictet)	4	3.92
Silo pallipes (Fabricius)	4	3.92
Hydroptila sp.	4	3.92
Ephemerella ignita (Poda)	3	2.94
Elodes sp.	2	1.96
Enchytraeidae	2	1.96
Orthocladinae	2	1.96
Leuctra fusca (L.)	2	1.96
Orectochilus villosus (Muller)	2	1.96
Ancylos fluviatilis Muller	2	1.96
Rhyacophila dorsalis (Curtis)	2	1.96
Simulium argyreatum/variegatum	2	1.96
Polycelis felina (Dalyell)	2	1.96
Simulium (Simulium) ornatum group	2	1.96
Lepidostoma hirtum (Fabricius)	2	1.96
Sericostoma personatum (Spence)	2	1.96
Pisidium sp.	2	1.96
Psychomyia pusilla (Fabricius)	2	1.96
Athripsodes albifrons/bilineatus	1	0.98
Ecdyonurus sp.	1	0.98
Ecclisopteryx guttulata (Pictet)	1	0.98
Crunoecia irrorata (Curtis)	1	0.98
Crenobia alpina/Phagocata vitta	1	0.98
Capnia sp.	1	0.98
Sialis sp.	1	0.98
Brachyptera risi (Morton)	1	0.98
Athripsodes bilineatus (L.)	1	0.98
Silo sp.	1	0.98
Amphinemura sulcicollis (Stephens)	1	0.98
Agapetus sp.	1	0.98
Simulium (Nevermannia) vernum Macquart	1	0.98
Simulium (Simulium) argyreatum Meigen	1	0.98
Simulium sp.	1	0.98
Tinodes waeneri (L.)	1	0.98
Athripsodes commutatus (Rostock)	1	0.98
Polycelis sp.	1	0.98
Ameletus inopinatus Eaton	1	0.98
Prosimulium hirtipes/tomosvaryi	1	0.98
Perlodes microcephala (Pictet)	1	0.98
Plectrocnemia conspersa (Curtis)	1	0.98
Odontocerum albicorne (Scopoli)	1	0.98
Nemoura cambrica/erratica	1	0.98
Lymnaea sp.	1	0.98
Lymnaea peregra (Muller)	1	0.98
Limnius volckmari (Panzer)	1	0.98

Table 6 continued

Species	n	% of SEPA North Region's missed taxa in AQC Audit
<i>Limnebius truncatellus</i> (Thunberg)	1	0.98
<i>Glossiphonia complanata</i> (L.)	1	0.98
<i>Polycentropus flavomaculatus</i> (Pictet)	1	0.98
<i>Polycentropus flavomaculatus/kingi</i>	1	0.98
<i>Hydropsyche siltalai</i> Dohler	1	0.98
<i>Potamophylax cingulatus/latipennis</i>	1	0.98
<i>Helobdella stagnalis</i> (L.)	1	0.98
<i>Potamopyrgus jenkinsi</i> (Smith)	1	0.98
<i>Habrophlebia fusca</i> (Curtis)	1	0.98
<i>Paraleptophlebia</i> sp.	1	0.98
<i>Glossosoma</i> sp.	1	0.98
<i>Leuctra inermis</i> Kempny	1	0.98
<b>TOTAL</b>	<b>102</b>	<b>100.00</b>

Table 7. The families missed by SEPA's analysts in the 1996 audit

Family	n	% of missed taxa for SEPA audits
Hydrophilidae (incl. Hydraenidae)	10	5.85
Caenidae	9	5.26
Lymnaeidae	8	4.68
Planariidae (incl. Dugesiidae)	8	4.68
Psychomyiidae (incl. Ecnomidae)	8	4.68
Simuliidae	8	4.68
Hydroptilidae	7	4.09
Lepidostomatidae	7	4.09
Nemouridae	7	4.09
Sphaeriidae	7	4.09
Elmidae	6	3.51
Sericostomatidae	6	3.51
Goeridae	5	2.92
Rhyacophilidae (incl. Glossosomatidae)	5	2.92
Chloroperlidae	4	2.34
Dytiscidae (incl. Noteridae)	4	2.34
Ephemerellidae	4	2.34
Leptoceridae	4	2.34
Oligochaeta	4	2.34
Ancylidae (incl. Acroloxidae)	3	1.75
Chironomidae	3	1.75
Glossiphoniidae	3	1.75
Gyrinidae	3	1.75
Hydrobiidae (incl. Bithyniidae)	3	1.75
Leptophlebiidae	3	1.75
Leuctridae	3	1.75
Limnephilidae	3	1.75
Polycentropodidae	3	1.75
Heptageniidae	2	1.17
Odontoceridae	2	1.17
Planorbidae	2	1.17
Scirtidae	2	1.17
Taeniopterygidae	2	1.17
Tipulidae	2	1.17
Asellidae	1	0.58
Brachycentridae	1	0.58
Capniidae	1	0.58
Dendrocoelidae	1	0.58
Haliplidae	1	0.58
Hydropsychidae	1	0.58
Perlidae	1	0.58
Perlodidae	1	0.58
Sialidae	1	0.58
Siphonuridae	1	0.58
Valvatidae	1	0.58
<b>TOTAL</b>	<b>171</b>	<b>100.00</b>

Table 8. The species missed by SEPA's analysts in the 1996 audit

Species Description	n	% of missed species for SEPA audits
Hydraena gracilis Germar	9	5.00
Caenis rivulorum Eaton	9	5.00
Hydroptila sp.	7	3.89
Pisidium sp.	7	3.89
Elmis aenea (Muller)	6	3.33
Sericostoma personatum (Spence)	6	3.33
Lepidostoma hirtum (Fabricius)	5	2.78
Lymnaea peregra (Muller)	5	2.78
Ephemerella ignita (Poda)	4	2.22
Oreodytes sanmarkii (Sahlberg)	4	2.22
Psychomyia pusilla (Fabricius)	4	2.22
Silo pallipes (Fabricius)	4	2.22
Chloroperla torrentium (Pictet)	4	2.22
Potamopyrgus jenkinsi (Smith)	3	1.67
Dugesia polychroa/lugubris	3	1.67
Orectochilus villosus (Muller)	3	1.67
Polycelis felina (Dalyell)	3	1.67
Rhyacophila dorsalis (Curtis)	3	1.67
Tinodes waeneri (L.)	3	1.67
Ancylus fluviatilis Muller	3	1.67
Simulium (Simulium) ornatum group	3	1.67
Odontocerum albicorne (Scopoli)	2	1.11
Habrophlebia fusca (Curtis)	2	1.11
Leuctra fusca (L.)	2	1.11
Gyraulus albus (Muller)	2	1.11
Limnebius truncatellus (Thunberg)	2	1.11
Lymnaea sp.	2	1.11
Simulium argyreatum/variegatum	2	1.11
Nemoura cambrica/erratica	2	1.11
Elodes sp.	2	1.11
Orthoclaadiinae	2	1.11
Brachyptera risi (Morton)	2	1.11
Simulium (Nevermannia) cryophilum group	2	1.11
Athripsodes bilineatus (L.)	2	1.11
Enchytraeidae	2	1.11
Crunoecia irrorata (Curtis)	2	1.11
Ecdyonurus sp.	2	1.11
Glossiphonia complanata (L.)	1	0.56
Haliphus lineatocollis (Marshall)	1	0.56
Ameletus inopinatus Eaton	1	0.56
Capnia sp.	1	0.56
Amphinemura sulcicollis (Stephens)	1	0.56
Athripsodes commutatus (Rostock)	1	0.56
Crenobia alpina/Phagocata vitta	1	0.56
Glossiphonia heteroclita (L.)	1	0.56
Dendrocoelum lacteum (Muller)	1	0.56
Athripsodes albifrons/bilineatus	1	0.56
Lumbricidae	1	0.56
Dicranota sp.	1	0.56
Brachycentrus subnubilus Curtis	1	0.56

Table 8 continued

Species Description	n	% of missed species for SEPA
<i>Helobdella stagnalis</i> (L.)	1	0.56
<i>Antocha vitripennis</i> (Meigen)	1	0.56
<i>Eccloisopteryx guttulata</i> (Pictet)	1	0.56
<i>Asellus aquaticus</i> (L.)	1	0.56
<i>Glossosoma</i> sp.	1	0.56
<i>Rhyacophila</i> sp.	1	0.56
<i>Polycentropus flavomaculatus/kingi</i>	1	0.56
<i>Limnephilidae</i> indet	1	0.56
<i>Prosimulium hirtipes/tomosvaryi</i>	1	0.56
<i>Protonemura meyeri</i> (Pictet)	1	0.56
<i>Helophorus</i> ( <i>Atracthelophorus</i> ) <i>brevipalpis</i> Bedel	1	0.56
<i>Psychomyiidae</i> indet	1	0.56
<i>Polycentropus flavomaculatus</i> (Pictet)	1	0.56
<i>Sialis</i> sp.	1	0.56
<i>Silo</i> sp.	1	0.56
<i>Simulium</i> ( <i>Nevermannia</i> ) <i>vernum</i> Macquart	1	0.56
<i>Simulium</i> ( <i>Simulium</i> ) <i>argyreatum</i> Meigen	1	0.56
<i>Simulium</i> sp.	1	0.56
<i>Tanytarsini</i>	1	0.56
<i>Tubificidae</i>	1	0.56
<i>Protonemura</i> sp.	1	0.56
<i>Lymnaea stagnalis</i> (L.)	1	0.56
<i>Helophorus</i> ( <i>Meghelophorus</i> ) <i>aequalis</i> Thomson	1	0.56
<i>Hydropsyche siltalai</i> Dohler	1	0.56
<i>Leuctra inermis</i> Kempny	1	0.56
<i>Agapetus</i> sp.	1	0.56
<i>Potamophylax cingulatus/latipennis</i>	1	0.56
<i>Valvata piscinalis</i> (Muller)	1	0.56
<i>Polycelis</i> sp.	1	0.56
<i>Nemoura</i> sp.	1	0.56
<i>Nemurella picteti</i> Klapalek	1	0.56
<i>Paraleptophlebia</i> sp.	1	0.56
<i>Paraleptophlebia submarginata</i> (Stephens)	1	0.56
<i>Perla bipunctata</i> Pictet	1	0.56
<i>Perlodes microcephala</i> (Pictet)	1	0.56
<i>Plectrocnemia conspersa</i> (Curtis)	1	0.56
<i>Limnius volckmari</i> (Panzer)	1	0.56
<b>TOTAL</b>	<b>180</b>	<b>100.00</b>



Table 9 Missed families for all samples in the 1996 audit

Family	n	% of missed taxa in 1996 audit
Hydroptilidae	78	5.41
Elmidae	74	5.13
Hydrophilidae (incl. Hydraenidae)	73	5.06
Hydrobiidae (incl. Bithyniidae)	59	4.09
Simuliidae	57	3.95
Planariidae (incl. Dugesiidae)	49	3.40
Psychomyiidae (incl. Ecnomidae)	49	3.40
Caenidae	43	2.98
Tipulidae	41	2.84
Leptoceridae	41	2.84
Sphaeriidae	40	2.77
Halplidae	36	2.50
Lymnaeidae	36	2.50
Planorbidae	35	2.43
Valvatidae	32	2.22
Goeridae	32	2.22
Hydropsychidae	31	2.15
Polycentropodidae	30	2.08
Ancylidae (incl. Acroloxidae)	29	2.01
Glossiphoniidae	29	2.01
Asellidae	29	2.01
Rhyacophilidae (incl. Glossosomatidae)	28	1.94
Physidae	26	1.80
Lepidostomatidae	26	1.80
Limnephilidae	26	1.80
Baetidae	26	1.80
Dytiscidae (incl. Noteridae)	25	1.73
Dendrocoelidae	24	1.66
Sericostomatidae	24	1.66
Nemouridae	22	1.53
Leptophlebiidae	22	1.53
Erpobdellidae	18	1.25
Scirtidae	17	1.18
Coenagriidae	16	1.11
Chloroperlidae	16	1.11
Leuctridae	16	1.11
Ephemerellidae	15	1.04
Heptageniidae	14	0.97
Gyrinidae	14	0.97
Chironomidae	14	0.97
Brachycentridae	11	0.76
Odontoceridae	10	0.69
Perlodidae	10	0.69
Oligochaeta	10	0.69
Taeniopterygidae	10	0.69
Piscicolidae	9	0.62
Sialidae	8	0.55
Calopterygidae	6	0.42
Beraeidae	5	0.35
Corophiidae	5	0.35

Table 9 continued

Family	n	% of missed taxa in 1996 audit
Corixidae	5	0.35
Hydrometridae	4	0.28
Ephemeridae	4	0.28
Gammaridae (incl. Crangonyctidae)	4	0.28
Notonectidae	3	0.21
Molannidae	3	0.21
Dryopidae	3	0.21
Hirudinidae	2	0.14
Phryganeidae	2	0.14
Aphelocheiridae	2	0.14
Perlidae	2	0.14
Unionidae	2	0.14
Philopotamidae	2	0.14
Nepidae	2	0.14
Capniidae	1	0.07
Cordulegasteridae	1	0.07
Gerridae	1	0.07
Gomphidae	1	0.07
Neritidae	1	0.07
Siphonuridae	1	0.07
<b>TOTAL</b>	<b>1442</b>	<b>100.00</b>

Table 10 Missed species for all samples in the 1996 audit

Species	n	% of missed species in 1996 audit
Potamopyrgus jenkinsi (Smith)	58	3.84
Hydroptila sp.	58	3.84
Elmis aenea (Muller)	51	3.38
Hydraena gracilis Germar	38	2.52
Simulium (Simulium) ornatum group	33	2.19
Pisidium sp.	32	2.12
Ancyclus fluviatilis Muller	28	1.86
Dendrocoelum lacteum (Muller)	24	1.59
Sericostoma personatum (Spence)	24	1.59
Haliphus sp.	24	1.59
Tinodes waeneri (L.)	24	1.59
Caenis rivulorum Eaton	24	1.59
Asellus aquaticus (L.)	23	1.52
Lepidostoma hirtum (Fabricius)	22	1.46
Valvata piscinalis (Muller)	21	1.39
Lymnaea peregra (Muller)	19	1.26
Polycelis nigra/tenuis	19	1.26
Oulimnius sp.	18	1.19
Caenis luctuosa/macrura	17	1.13
Gyraulus albus (Muller)	17	1.13
Dicranota sp.	16	1.06
Elodes sp.	16	1.06
Chloroperla torrentium (Pictet)	16	1.06
Ephemerella ignita (Poda)	15	0.99
Helobdella stagnalis (L.)	15	0.99
Valvata cristata Muller	14	0.93
Psychomyia pusilla (Fabricius)	14	0.93
Orectochilus villosus (Muller)	13	0.86
Rhyacophila dorsalis (Curtis)	13	0.86
Mystacides azurea (L.)	13	0.86
Hydropsyche siltalai Dohler	13	0.86
Baetis rhodani (Pictet)	13	0.86
Helophorus (Atracthelophorus) brevipalpis Bedel	13	0.86
Orthocladiinae	12	0.80
Leuctra fusca (L.)	12	0.80
Polycentropus flavomaculatus (Pictet)	12	0.80
Physa fontinalis (L.)	12	0.80
Simulium (Eusimulium) aureum group	12	0.80
Hydropsyche sp.	12	0.80
Lymnaea sp.	11	0.73
Polycelis felina (Dalyell)	11	0.73
Brachycentrus subnubilus Curtis	11	0.73
Silo pallipes (Fabricius)	11	0.73
Ithytrichia sp.	11	0.73
Ecdyonurus sp.	10	0.66
Ischnura elegans (Van der Linden)	10	0.66
Glossiphonia complanata (L.)	10	0.66
Odontocerum albicorne (Scopoli)	10	0.66
Pilaria (Pilaria) sp.	10	0.66
Habrophlebia fusca (Curtis)	10	0.66

Table 10 continued

Species	n	% of missed species in 1996 audit
Silo sp.	10	0.66
Piscicola geometra (L.)	9	0.60
Agapetus sp.	9	0.60
Oreodytes sanmarkii (Sahlberg)	9	0.60
Lype sp.	8	0.53
Athripsodes bilineatus (L.)	8	0.53
Limnephilidae indet	8	0.53
Oxyethira sp.	8	0.53
Armiger crista (L.)	8	0.53
Erpobdellidae indet	8	0.53
Oulimnius tuberculatus (Muller)	7	0.46
Paraleptophlebia submarginata (Stephens)	7	0.46
Physa sp.	7	0.46
Physa acuta/heterostropha	7	0.46
Erpobdella octoculata (L.)	7	0.46
Goera pilosa (Fabricius)	7	0.46
Limnius volckmari (Panzer)	7	0.46
Sphaeriidae indet	7	0.46
Nemoura avicularis Morton	6	0.40
Asellus meridianus Racovitza	6	0.40
Isoperla grammatica (Poda)	6	0.40
Coenagriidae indet	6	0.40
Dugesia tigrina (Girard)	6	0.40
Tubificidae	6	0.40
Plectrocnemia conspersa (Curtis)	6	0.40
Baetis vernus Curtis	5	0.33
Taeniopteryx nebulosa (L.)	5	0.33
Athripsodes sp.	5	0.33
Protonemura meyeri (Pictet)	5	0.33
Bathymophalus contortus (L.)	5	0.33
Tipula (Yamatotipula) montium group	5	0.33
Brachyptera risi (Morton)	5	0.33
Athripsodes aterrimus (Stephens)	5	0.33
Plectrocnemia sp.	5	0.33
Anisus vortex (L.)	5	0.33
Dugesia lugubris/polychroa	4	0.27
Planariidae indet	4	0.27
Sialis fuliginosa Pictet	4	0.27
Simulium (Boophthora) erythrocephalum (deGeer)	4	0.27
Ephemera sp.	4	0.27
Crunoecia irrorata (Curtis)	4	0.27
Haliphus lineatocollis (Marshall)	4	0.27
Hydraena riparia Kugelann	4	0.27
Glossosoma sp.	4	0.27
Leuctra inermis Kempny	4	0.27
Hydropsyche angustipennis (Curtis)	4	0.27
Perlodes microcephala (Pictet)	4	0.27
Nemurella picteti Klapalek	4	0.27
Tanytarsini	4	0.27
Glossiphonia heteroclita (L.)	4	0.27

Table 10 continued

Species	n	% of missed species in 1996 audit
<i>Haliphus fluviatilis</i> Aube	4	0.27
<i>Gammarus pulex</i> (L.)	4	0.27
<i>Agraylea multipunctata</i> Curtis	4	0.27
<i>Agabus</i> sp./ <i>Ilybius</i> sp.	4	0.27
<i>Adicella reducta</i> (McLachlan)	3	0.20
<i>Halesus digitatus/radiatus</i>	3	0.20
<i>Simulium</i> (Nevermannia) <i>cryophilum</i> group	3	0.20
<i>Antocha vitripennis</i> (Meigen)	3	0.20
<i>Heptagenia sulphurea</i> (Muller)	3	0.20
<i>Hydrometra</i> sp.	3	0.20
<i>Simulium</i> (Nevermannia) <i>angustitarse</i> group	3	0.20
<i>Molanna angustata</i> Curtis	3	0.20
<i>Platambus maculatus</i> (L.)	3	0.20
<i>Beraea maurus</i> (Curtis)	3	0.20
<i>Calopteryx</i> sp.	3	0.20
<i>Polycentropus</i> sp.	3	0.20
<i>Calopteryx splendens</i> (Harris)	3	0.20
<i>Notonecta</i> sp.	3	0.20
Chironomini	3	0.20
<i>Limnebius truncatellus</i> (Thunberg)	3	0.20
<i>Corophium curvispinum</i> Sars	3	0.20
<i>Paraleptophlebia</i> sp.	3	0.20
<i>Protonemura</i> sp.	3	0.20
<i>Athripsodes cinereus</i> (Curtis)	3	0.20
<i>Dugesia polychroa/lugubris</i>	3	0.20
<i>Dryops</i> sp.	3	0.20
<i>Drusus annulatus/Ecclisopteryx guttulata</i>	3	0.20
<i>Cloeon dipterum</i> (L.)	3	0.20
<i>Rhyacophila</i> sp.	3	0.20
<i>Limnephilus</i> sp.	3	0.20
<i>Sialis lutaria</i> (L.)	3	0.20
<i>Ecclisopteryx guttulata</i> (Pictet)	2	0.13
<i>Haemopsis sanguisuga</i> (L.)	2	0.13
<i>Brychius elevatus</i> (Panzer)	2	0.13
<i>Adicella/Triaenodes</i> group	2	0.13
Goeridae indet	2	0.13
<i>Beraeodes minutus</i> (L.)	2	0.13
<i>Caenis horaria</i> (L.)	2	0.13
<i>Agabus</i> sp.	2	0.13
<i>Baetis scambus</i> group	2	0.13
<i>Anacaena globulus</i> (Paykull)	2	0.13
<i>Baetis buceratus</i> Eaton	2	0.13
<i>Aphelocheirus aestivalis</i> (Fabricius)	2	0.13
<i>Corophium multisetosum</i> Stock	2	0.13
<i>Austrolimnophila</i> sp.	2	0.13
Erioptera sp.	2	0.13
<i>Amphinemura sulcicollis</i> (Stephens)	2	0.13
<i>Cyrnus trimaculatus</i> (Curtis)	2	0.13
Enchytraeidae	2	0.13
<i>Anabolia nervosa</i> (Curtis)	2	0.13

Table 10 continued

Species	n	% of missed species in 1996 audit
Glossiphoniidae indet	2	0.13
Lymnaea stagnalis (L.)	2	0.13
Ilybius sp.	2	0.13
Laccobius sp.	2	0.13
Leptophlebiidae indet	2	0.13
Limnephilus extricatus Mclachlan	2	0.13
Limnophila (Eloeophila) sp.	2	0.13
Silo nigricornis (Pictet)	2	0.13
Hydropsyche contubernalis Mclachlan	2	0.13
Pilaria sp.	2	0.13
Lumbriculidae	2	0.13
Lymnaea truncatula (Muller)	2	0.13
Mystacides nigra/longicornis	2	0.13
Nemoura cambrica/erratica	2	0.13
Nemoura sp.	2	0.13
Nepa cinerea L.	2	0.13
Halipidae indet	2	0.13
Potamonectes sp.	2	0.13
Oulimnius major (Rey)	2	0.13
Phryganeidae indet	2	0.13
Sigara (Subsigara) falleni (Fieber)	2	0.13
Simulium argyreatum/variegatum	2	0.13
Sigara (Sigara) dorsalis (Leach)	2	0.13
Hydrophilidae indet	2	0.13
Helophorus flavipes/obscurus	2	0.13
Helophorus sp.	2	0.13
Tanypodinae	2	0.13
Tinodes waeneri (L.), Lype sp.	2	0.13
Hydraena riparia	2	0.13
Simulium (Simulium) reptans (L.)	2	0.13
Trocheta sp.	2	0.13
Hydrobius fuscipes (L.)	2	0.13
Helophorus (Helophorus) flavipes/obscurus	2	0.13
Polycentropus flavomaculatus/kingi	1	0.07
Bithynia tentaculata (L.)	1	0.07
Ameletus inopinatus Eaton	1	0.07
Sphaerium sp.	1	0.07
Baetis scambus/fuscatus	1	0.07
Potamophylax cingulatus/latipennis	1	0.07
Theodoxus fluviatilis (L.)	1	0.07
Prodiamesinae	1	0.07
Athripsodes commutatus (Rostock)	1	0.07
Baetis sp.	1	0.07
Tipula sp.	1	0.07
Potamonectes depressus/elegans	1	0.07
Polycelis sp.	1	0.07
Cercyon sp.	1	0.07
Anodonta sp.	1	0.07
Simulium (Wilhelmia) equinum (L.)	1	0.07
Anacaena limbata (Fabricius)	1	0.07

Table 10 continued

Species	n	% of missed species in 1996 audit
Simulium (Simulium) argyreatum Meigen	1	0.07
Simulium (Nevermannia) verum Macquart	1	0.07
Pseudanodonta complanata (Rossmassler)	1	0.07
Anacaena bipustulata (Marshall)	1	0.07
Prosimulium hirtipes/tomosvaryi	1	0.07
Simulium sp.	1	0.07
Athripsodes albifrons (L.)	1	0.07
Athripsodes albifrons/bilineatus	1	0.07
Sialis sp.	1	0.07
Riolus subviolaceus (Muller)	1	0.07
Rhithrogena sp.	1	0.07
Psychomyiidae indet	1	0.07
Simulium (Wilhelmia) sp.	1	0.07
Hippeutis complanatus (L.)	1	0.07
Lumbricidae	1	0.07
Capnia sp.	1	0.07
Leptophlebia marginata (L.)	1	0.07
Wormaldia occipitalis (Pictet)	1	0.07
Acroloxus lacustris (L.)	1	0.07
Hydrometra stagnorum (L.)	1	0.07
Planorbidae indet	1	0.07
Gerris (Gerris) lacustris (L.)	1	0.07
Drusus annulatus (Stephens)	1	0.07
Heptagenia lateralis (Curtis)	1	0.07
Heptagenia lateralis (Curtis)	1	0.07
Gomphus vulgatissimus (L.)	1	0.07
Helophorus (Meghelophorus) grandis Illiger	1	0.07
Gyraulus albus (Muller)	1	0.07
Gyrinus sp.	1	0.07
Helophorus (Meghelophorus) aequalis Thomson	1	0.07
Helophorus (Helophorus) minutus Fabricius	1	0.07
Halesus radiatus (Curtis)	1	0.07
Hydrocyphon deflexicollis (Muller)	1	0.07
Colymbetinae indet	1	0.07
Pilaria (Neolimnomyia) sp.	1	0.07
Caenis luctuosa group	1	0.07
Philopotamus montanus (Donovan)	1	0.07
Perla bipunctata Pictet	1	0.07
Oreodytes davisii (Curtis)	1	0.07
Hydroporus tessellatus Drapiez	1	0.07
Limnephilidae	1	0.07
Chloroperla tripunctata (Scopoli)	1	0.07
Dinocras cephalotes (Curtis)	1	0.07
Cordulegaster boltonii (Donovan)	1	0.07
Molophilus sp.	1	0.07
Micronecta sp.	1	0.07
Crenobia alpina/Phagocata vitta	1	0.07
Cyrtus flavidus McLachlan	1	0.07
Lymnaea palustris/truncatula	1	0.07
Dicranota (Dicranota) sp.	1	0.07

Table 10 continued

Species	n	% of missed species in 1996 audit
Lymnaea palustris (Muller)	1	0.07
Dina lineata (Muller)	1	0.07
Ceraclea sp.	1	0.07
<b>TOTAL</b>	<b>1509</b>	<b>100.00</b>



## **APPENDIX**

### **Results of individual sample audits**

## EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 16.5.96

WATER-  
COURSE: North Ugie Tributary

PRIMARY  
ANALYST: DH

AQC  
ANALYST:

SITE: u/s New Leeds

CODE: F10

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

Baetidae	7
Leptophlebia marginata (L.)	

#### Additional BMWP taxa found by IFE

Leptophlebiidae	7
Leptophlebia marginata (L.)	

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

None

### SUMMARY OF AUDIT

LOSSES 1

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 6

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: 9.1.97

WATER-

COURSE: Allt Coire Cas

PRIMARY

ANALYST: DH

AQC

ANALYST:

SITE: u/s WWTP

CODE: 25E

SORT/AQC

METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Siphonuridae	9
Ameletus inopinatus Eaton	
Chloroperlidae	9
Chloroperla torrentium (Pictet)	
Simuliidae	9
Simulium argyreatum/variegatum 1 only	

### SUMMARY OF AUDIT

LOSSES 0

GAINS 3

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 25

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: 9.1.97

WATER-

PRIMARY

AQC

COURSE: Don

ANALYST: DH

ANALYST:

SITE: Montgarrie Bridge

CODE: A13

SORT/AQC

METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Planariidae (incl. Dugesidae)	9
Polycelis felina (Dalyell) 1 only	
Glossiphoniidae	9
Helobdella stagnalis (L.) 1 only	
Caenidae	9
Caenis rivulorum Eaton 1 only	
Sericostomatidae	9
Sericostoma personatum (Spence) 1 only	
Simuliidae	9
Simulium argyreatum/variegatum	
Chironomidae	9
Brillia modesta (Meigen), Tvetenia sp.	

### SUMMARY OF AUDIT

LOSSES 0

GAINS 6

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 32

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: 18.3.97

WATER-  
COURSE: Gassey Burn

PRIMARY  
ANALYST: DH

AQC  
ANALYST:

SITE: u/s Brodies S/O

CODE: 75A

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

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: 26.3.97

WATER-  
COURSE: Fiddich

PRIMARY  
ANALYST: JP

AQC  
ANALYST:

SITE: Balvenie Ford

CODE: E70

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

### SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Psychomyiidae (incl. Ecnomidae)

9

Psychomyia pusilla (Fabricius) 1 only

---

### SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 8

ON NO. OF TAXA 1

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

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

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

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

## EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA North

LABORATORY: Aberdeen

DATE: 20.5.96

WATER-  
COURSE: Cowie Burn

PRIMARY  
ANALYST: LC

AQC  
ANALYST:

SITE: Leith Hall

CODE: 10T

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

---

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Rhyacophilidae (incl. Glossosomatidae)

9

Agapetus sp.

---

### 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: 29.5.96

WATER-  
COURSE: Davidstone Burn

PRIMARY  
ANALYST: LC

AQC  
ANALYST:

SITE: Bridge of Howdoup

CODE: 40M

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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Family name	Presumed cause of error (see footnotes)
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### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

None

#### Additional BMWP taxa found by IFE

Ephemereallidae

9

Ephemereella ignita (Poda)

---

### 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: 6.2.97

WATER-

COURSE: Don

PRIMARY

ANALYST: LC

AQC

ANALYST:

SITE: Grandholm

CODE: A55

SORT/AQC

METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Caenidae	9
Caenis rivulorum Eaton 1 only	
Elmidae	9
Elmis aenea (Muller) (I)	
Limnius volckmari (Panzer) (I)	

### 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: 6.3.97

WATER-  
COURSE: Burnroot Burn

PRIMARY  
ANALYST: LC

AQC  
ANALYST:

SITE: u/s Burnroot

CODE: 14M

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Ancyliidae (incl. Acroloxidae)	9
Ancyclus fluviatilis Muller 1 only	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a)	
Limnebius truncatellus (Thunberg) (a)	
Sialidae	9
Sialis sp. (juv) 1 only	
Goeridae	9
Silo pallipes (Fabricius)	

### 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: Aberdeen

DATE: 19.3.97

WATER-  
COURSE: Black Burn

PRIMARY  
ANALYST: LC

AQC  
ANALYST:

SITE: u/s Clinterty WWTP

CODE: 87D

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Leuctridae	9
Leuctra inermis Kempny 1 only	
Capniidae	9
Capnia sp. 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: 17.5.96

WATER-  
COURSE: Don

PRIMARY  
ANALYST: MAD

AQC  
ANALYST:

SITE: Grandholm

CODE: A55

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

---

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

---

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

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: 7.2.97

WATER-  
COURSE: Dour

PRIMARY  
ANALYST: MAD

AQC  
ANALYST:

SITE: u/s New Aberdour

CODE: A13

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
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### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Chloroperlidae	9
Chloroperla torrentium (Pictet)	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a)	
Scirtidae	9
Elodes sp. (l)	
Elmidae	9
Elmis acnea (Muller) (l)	
Rhyacophilidae (incl. Glossosomatidae)	9
Rhyacophila dorsalis (Curtis), Glossosoma sp.	
Lepidostomatidae	9
Crunoecia irrorata (Curtis) 1 only	
Goeridae	9
Silo sp. (juv) 1 only	

### SUMMARY OF AUDIT

LOSSES 0

GAINS 7

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 52

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: 5.3.97

WATER-

COURSE: S.Ugie Tributary

PRIMARY

ANALYST: MAD

AQC

ANALYST:

SITE: d/s Cleansing Depot

CODE: 60D

SORT/AQC

METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

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: 4.7.96

WATER-  
COURSE: Keithfield Burn

PRIMARY  
ANALYST: DH

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 by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Glossiphoniidae	9
Glossiphonia complanata (L.) 1 only	
Caenidae	9
Caenis rivulorum Eaton 1 only	
Dytiscidae (incl. Noteridae)	9
Oreodytes sanmarkii (Sahlberg) (l) 1 only	

### SUMMARY OF AUDIT

LOSSES 0

GAINS 3

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 15

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: 27.8.96

WATER-  
COURSE: Dec

PRIMARY  
ANALYST: DH

AQC  
ANALYST:

SITE: Potarch

CODE: A25

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

---

Family name	Presumed cause of error (see footnotes)
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### VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

### SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

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: 25.6.96

WATER-

PRIMARY

AQC

COURSE: Allt Mor

ANALYST: JP

ANALYST:

SITE: Coronation Bridge

CODE: 251

SORT/AQC

METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Ephemerellidae	9
Ephemerella ignita (Poda) 1 only	
Hydropsychidae	9
Hydropsyche siltalai Dohler 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

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: 10.7.96

WATER-  
COURSE: Rothies Burn

PRIMARY  
ANALYST: JP

AQC  
ANALYST:

SITE: Glenrothes Distillery

CODE: 83K

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Planariidae (incl. Dugesiiidae)	9
Polycelis sp. (damaged) 1 only	
Chloroperlidae	9
Chloroperla torrentium (Pictet) 1 only	
Hydroptilidae	9
Hydroptila sp. (p) 1 only	
Goeridae	9
Silo pallipes (Fabricius) 1 only	

### SUMMARY OF AUDIT

LOSSES 0    GAINS 4    OMISSIONS: 0

#### NET EFFECTS:

ON BMWP SCORE 31

ON NO. OF TAXA 4

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: 10.6.96

WATER-  
COURSE: Blackdog Burn

PRIMARY  
ANALYST: MAD

AQC  
ANALYST:

SITE: u/s Potterton WWTP

CODE: V45

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Leuctridae	9
Leuctra fusca (L.)	
Simuliidae	9
Simulium (Nevermannia) venum Macquart	
Simulium (Simulium) ornatum group	

### 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: 4.6.96

WATER-  
COURSE: Tarty Burn

PRIMARY  
ANALYST: TO

AQC  
ANALYST:

SITE: Mill of Tarty

CODE: I20

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Leptophlebiidae	9
Habrophlebia fusca (Curtis)	
Paraleptophlebia sp.	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a) 1 only	
Psychomyiidae (incl. Ecnomidae)	9
Tinodes waeneri (L.) 1 only	

### SUMMARY OF AUDIT

LOSSES 0

GAINS 3

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 23

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: 10.6.96

WATER-  
COURSE: Pinkie Burn

PRIMARY  
ANALYST: TO

AQC  
ANALYST:

SITE: B979 Bridge

CODE: 90M

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE

(For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Leuctridae	9
Leuctra fusca (L.)	
Chloroperlidae	9
Chloroperla torrentium (Pictet)	

### 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: 27.8.96

WATER-  
COURSE: Dec

PRIMARY  
ANALYST: TO

AQC  
ANALYST:

SITE: d/s Aboyne

CODE: A20

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Perlodidae

9

Perlodes microcephala (Pictet) 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: 4.11.96

WATER-  
COURSE: Far Burn

PRIMARY  
ANALYST: DH

AQC  
ANALYST:

SITE: u/s Airport

CODE: 93D

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

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: 8.11.96

WATER-  
COURSE: Distillery Burn

PRIMARY  
ANALYST: DH

AQC  
ANALYST:

SITE: Meadows confluence

CODE: 75P

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Sphaeriidae	9
Pisidium sp. 1 only	
Elmidae	9
Elmis aenea (Muller) (l) 1 only	

### SUMMARY OF AUDIT

LOSSES 0    GAINS 2    OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 8  
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: 16.10.95

WATER-  
COURSE: Allt Choire Chaoil

PRIMARY  
ANALYST: JP

AQC  
ANALYST:

SITE: u/s Charnachuin

CODE: O29

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Planariidae (incl. Dugesiidae)	9
Crenobia alpina/Phagocata vitta (juv) 1 only	
Taeniopterygidae	9
Brachyptera risi (Morton) 1 only	
Polycentropodidae	9
Polycentropus flavomaculatus/kingi (juv) 1 only	
Odontoceridae	9
Odontocerum albicorne (Scopoli) 1 only	

### SUMMARY OF AUDIT

LOSSES 0

GAINS 4

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 32

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: 8.10.96

WATER-  
COURSE: Isla

PRIMARY  
ANALYST: JP

AQC  
ANALYST:

SITE: Milton Tower

CODE: C20

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

### SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

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: 8.10.96

WATER-

PRIMARY

AQC

COURSE: Davidstone Burn

ANALYST: JP

ANALYST:

SITE: Bridge of Howdoup

CODE: 40M

SORT/AQC

METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE

(For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

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: 2.10.96

WATER-  
COURSE: Ebric Burn

PRIMARY  
ANALYST: LC

AQC  
ANALYST:

SITE: B9005 Bridge

CODE: D50

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

BMWP taxa not found by IFE

None

Additional BMWP taxa found by IFE

None

### SAMPLE

BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

Additional BMWP taxa found by IFE

Sphaeriidae

9

Pisidium sp.

### SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 3

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: 8.11.96

WATER-  
COURSE: Bucks Burn

PRIMARY  
ANALYST: LC

AQC  
ANALYST:

SITE: d/s Bankhead SWS

CODE: 95W

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

---

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

---

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Nemouridae

9

Nemoura cambrica/erratica

---

### 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  
WATER-  
COURSE: W Tullos Burn

LABORATORY: Aberdeen  
PRIMARY  
ANALYST: LC

DATE: 10.12.96  
AQC  
ANALYST:  
SORT/AQC  
METHOD: Not known

SITE: d/s W Tullos Estate

CODE: 90N

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Hydrobiidae (incl. Bithyniidae)	9
Potamopyrgus jenkinsi (Smith) 1 only	
Simuliidae	9
Simulium (Simulium) ornatum group 1 only	
Chironomidae	9
Orthocladinae 1 only	

### SUMMARY OF AUDIT

LOSSES 0    GAINS 3    OMISSIONS: 0

#### NET EFFECTS:

ON BMWP SCORE 10  
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: 31.12.96

WATER-  
COURSE: Gairn

PRIMARY  
ANALYST: LC

AQC  
ANALYST:

SITE: Bridge of Gairn

CODE: C05

SORT/AQC  
METHOD: Not known

## RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

Rhyacophilidae (incl. Glossosomatidae)	6
Rhyacophila dorsalis (Curtis), Agapetus sp.	

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Oligochaeta	9
Enchytraeidae 1 only	
Caenidae	9
Caenis rivulorum Eaton 1 only	
Dytiscidae (incl. Noteridae)	9
Oreodytes sanmarkii (Sahlberg) (a) 1 only	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a)	
Elmidae	9
Elmis aenea (Muller) (l) 1 only	
Hydroptilidae	9
Hydroptila sp.	
Psychomyiidae (incl. Ecnomidae)	9
Psychomyia pusilla (Fabricius) 1 only	
Limnephilidae	9
Potamophylax cingulatus/latipennis	
Leptoceridae	9
Athripsodes commutatus (Rostock)	

## SUMMARY OF AUDIT

LOSSES 0    GAINS 10    OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 61

ON NO. OF TAXA 10

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: 2.9.96

WATER-  
COURSE: Cowie

PRIMARY  
ANALYST: MAD

AQC  
ANALYST:

SITE: Stonehaven

CODE: D10

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

EphemereUidae

6

EphemereUa ignita (Poda)

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Lymnaeidae

9

Lymnaea sp. (juv)

### 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

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: 2.10.96

WATER-  
COURSE: Spey

PRIMARY  
ANALYST: MAD

AQC  
ANALYST:

SITE: d/s Dailuaine Distillery

CODE: A65

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Caenidae	9
Caenis rivulorum Eaton	
Nemouridae	9
Amphinemura sulcicollis (Stephens) 1 only	
Gyrinidae	9
Orectochilus villosus (Muller) (I)	
Dytiscidae (incl. Noteridae)	9
Oreodytes sanmarkii (Sahlberg) (a) 1 only	
Polycentropodidae	9
Polycentropus flavomaculatus (Pictet) 1 only	
Limnephilidae	9
Ecclisopteryx guttulata (Pictet) 1 only	
Sericostomatidae	9
Sericostoma personatum (Spence)	

### SUMMARY OF AUDIT

LOSSES 0

GAINS 7

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 48

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: 4.11.96

WATER-  
COURSE: Aberlour Burn

PRIMARY  
ANALYST: MAD

AQC  
ANALYST:

SITE: d/s Aberlour

CODE: 70T

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Lymnaeidae	9
Lymnaea peregra (Muller) 1 only	
Ephemereidae	9
Ephemera ignita (Poda) 1 only	
Gyrinidae	9
Orectochilus villosus (Muller) (l) 1 only	
Lepidostomatidae	9
Lepidostoma hirtum (Fabricius) 1 only	
Goeridae	9
Silo pallipes (Fabricius)	

### SUMMARY OF AUDIT

LOSSES 0

GAINS 5

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 38

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

LABORATORY: Highland

DATE: 17.4.96

WATER-  
COURSE: Nairn

PRIMARY  
ANALYST: AR3

AQC  
ANALYST:

SITE: u/s Bridge of Faillite Smolts

CODE:

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Ancyliidae (incl. Acroloxidae)	9
Ancyclus fluviatilis Muller 1 only	
Oligochaeta	9
Enchytraeidae 1 only	
Scirtidae	9
Elodes sp. (l) 1 only	
Simuliidae	9
Simulium (Simulium) argyreatum Meigen (p)	
Prosimulium hirtipes/tomosvaryi (damaged)	
Simulium sp. (juv)	

### SUMMARY OF AUDIT

LOSSES 0

GAINS 4

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 17

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: Highland

DATE: 25.4.96

WATER-  
COURSE: Bruiach Burn

PRIMARY  
ANALYST: AR4

AQC  
ANALYST:

SITE: u/s Kiltarlity STW

CODE:

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Dytiscidae (incl. Noteridae)	9
Oreodytes sanmarkii (Sahlberg) (a) 1 only	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a)	
Hydroptilidae	9
Hydroptila sp. 1 only	
Polycentropodidae	9
Plectrocnemia conspersa (Curtis) 1 only	
Goeridae	9
Silo pallipes (Fabricius)	

### 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

LABORATORY: Highland

DATE: 17.4.96

WATER-  
COURSE: Kilmarie

PRIMARY  
ANALYST: EG1

AQC  
ANALYST:

SITE: d/s Strathaird Hatchery

CODE:

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Heptageniidae

9

Ecdyonurus sp.

### 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: Highland

DATE: 17.4.96

WATER-  
COURSE: Moidart

PRIMARY  
ANALYST: EG2

AQC  
ANALYST:

SITE: u/s Fish Hatchery

CODE:

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

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

#### VIAL

##### BMWP taxa not found by IFE

Planariidae (incl. Dugesiidae)	7
Dendrocoelum lacteum (Muller)	

##### Additional BMWP taxa found by IFE

Dendrocoelidae	7
Dendrocoelum lacteum (Muller)	

#### SAMPLE

##### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

##### Additional BMWP taxa found by IFE

Leptoceridae	9
Athripsodes albifrons/bilineatus	

### SUMMARY OF AUDIT

LOSSES 1

GAINS 2

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: Highland

DATE: 22.4.96

WATER-  
COURSE: Polla

PRIMARY  
ANALYST: GF1

AQC  
ANALYST:

SITE: u/s Fish Farm

CODE:

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
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### VIAL

#### BMWP taxa not found by IFE

Psychomyiidae (incl. Ecnomidae)

7

Rhyacophila sp. (juv)

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Planariidae (incl. Dugesiidae)

9

Polycelis felina (Dalyell) 1 only

Caenidae

9

Caenis rivulorum Eaton 1 only

Hydrophilidae (incl. Hydraenidae)

9

Hydraena gracilis Germar (a) 1 only

Hydroptilidae

9

Hydroptila sp. 1 only

### SUMMARY OF AUDIT

LOSSES 1

GAINS 4

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 15

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: Highland

DATE: 7.6.96

WATER-  
COURSE: Wick

PRIMARY  
ANALYST: GF2

AQC  
ANALYST:

SITE: Watten

CODE:

SORT/AQC  
METHOD: Not known

### RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
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### VIAL

#### BMWP taxa not found by IFE

None

#### Additional BMWP taxa found by IFE

None

### SAMPLE

#### BMWP taxa not found by IFE (For samples where vial is broken or absent)

N/a

#### Additional BMWP taxa found by IFE

Lepidostomatidae	9
Lepidostoma hirtum (Fabricius) 1 only	
Leptoceridae	9
Athripsodes bilineatus (L.)	

### 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)



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Hydrology**

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Institute of Terrestrial Ecology  
Institute of Virology & Environmental Microbiology

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