

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

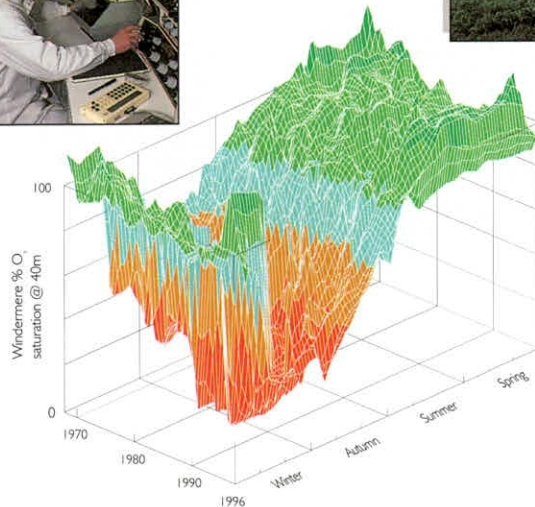
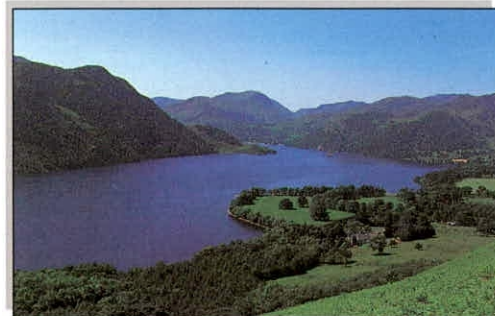
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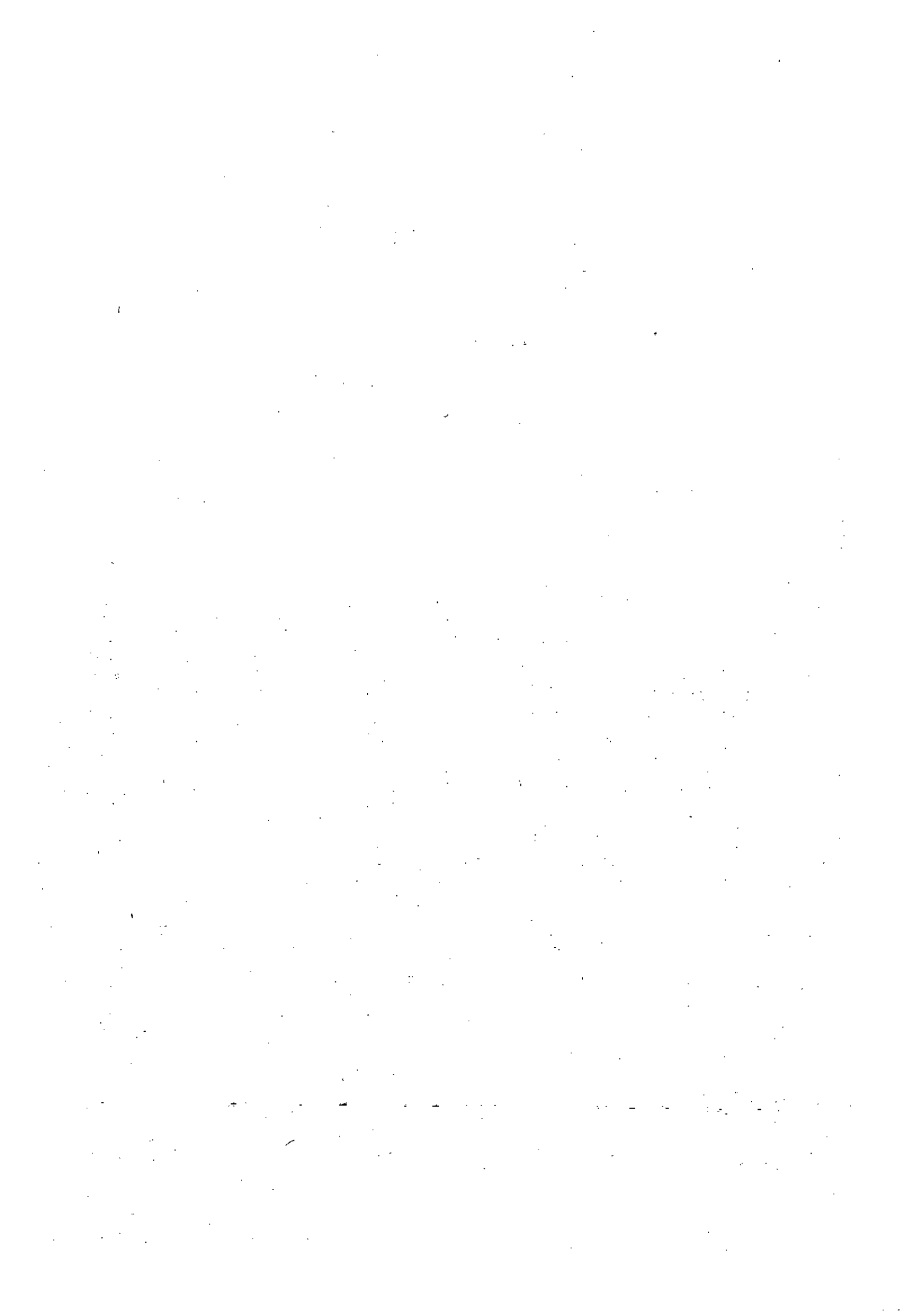
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Report To:
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Scottish Environment Protection Agency, East Region
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1. INTRODUCTION

In 1998 the sampling of aquatic macro-invertebrates for the biological assessment of river quality was carried out throughout the United Kingdom. This task was undertaken by the Environment Agency (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 40 samples analysed by staff employed in the three laboratories of SEPA East Region.

2. SAMPLE SELECTION

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

3. SAMPLE PROCESSING

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

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

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

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

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

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

4. REPORTING

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

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

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

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

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

5. RESULTS

The results of the audit for the three SEPA East laboratories are summarised in Tables 1 to 3. Table 4 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 5 presents data for SEPA East 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 6 and 7 list, at family and species level respectively, the taxa missed in sorting by SEPA East's analysts in the 1998 audit. Tables 8 and 9 list missed taxa at family and species level for all SEPA analysts and Tables 10 and 11 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 12 samples audited for the Galashiels Laboratory of SEPA East

River	Site	Analyst	Losses	Gains	Omissions
Gala Water	Stow	DC	0	0	0
Tweed	Juniporbank	DC	1	0	0
Lambden Burn	Foot	DC	0	2	0
Lyne Water	Foot	DC	0	0	0
Borthwick Water	Foot	DC	0	0	0
Borthwick Water	Foot	DC	0	0	0
Ale Water	Foot	JWC	0	0	0
Whiteadder Water	u/s Charnside Mill intake	JWC	0	0	0
Leet	Coldstream G.S.	JWC	0	0	2
Tweed	Norham	JWC	0	0	0
Tweed	Mertown	JWC	0	0	0
Langton Burn	Foot	JWC	0	1	1

Table 2 The 20 samples audited for the Perth Laboratory of SEPA East

River	Site	Analyst	Losses	Gains	Omissions
Hatton Burn	Thomsford Bridge	BC	0	2	0
Black Devon	Black Devon Bridge	BC	0	0	0
Dronachy Burn	u/s Tiel Burn	BC	0	4	1
Keil Burn	A915 Bridge	BC	0	1	0
Moonzie Burn	Seggiehill Road	BC	0	1	0
Kinaldy Burn	u/s Kenly confluence	BC	0	1	0
Bluther Burn	Newmills	BC	0	0	0
Lyon	Stronuich	BC	0	2	0
Vinny Water	u/s Lethan STW	BC	0	1	0
Glamis Burn	d/s Glamis STW	BC	0	2	0
Forth	Cobleland	BC	0	0	0
Monachyle Burn	Road Bridge	BC	0	1	0
Muckle Burn	B8033 Bridge	BC	0	1	3
Gairney Burn	d/s Powmill	BC	1	6	0
Dochart	Killin	BC	0	0	0
Tay	Pitnacree	BC	0	0	0
Water of May	d/s Ardargie	BC	1	1	0
Earn	Crieff Bridge	BC	0	0	0
Duncrub Burn	u/s Dunning	BC	0	0	0
Assinger Burn	u/s Glenalmond School	RG	0	1	0

Table 3 The 8 samples audited for the Riccarton Laboratory of SEPA East

River	Site	Analyst	Losses	Gains	Omissions
Water of Leith	Currie	NB	0	0	0
Tyne	d/s Ormiston - Loanfoot	NB	0	0	0
Humbie Water	Humbie Mill	NB	0	0	0
North Esk	u/s Auchendinny	NB	0	0	0
Brox Burn	Milrig	SdP	0	0	0
Breich Water	West Badallan	SdP	0	1	0
Auchenbowie Burn	u/s Milnholm Hatchery	SdP	0	2	0
Gogar Burn	Dalmahoy Church	SdP	0	0	0

Table 4 Statistics of the 1998 audit results for SEPA East

Analyst/Group	n	Mean gains	Standard error	No samples >2 gains	% samples >2 gains	Highest no. gains	Mean errors (l+g+o)	Standard error
Galashiels	12	0.25	0.18	0	0	2	0.58	0.26
DC	6	0.33	0.33	0	0	2	0.50	0.34
JWC	6	0.17	0.17	0	0	1	0.67	0.42
Perth	20	1.20	0.34	2	10.00	6	1.50	0.42
BC	19	1.21	0.36	2	10.53	6	1.53	0.44
RG	1	1.00	0	0	0	1	1.00	0
Riccarton	8	0.38	0.26	0	0	2	0.38	0.26
NB	4	0	0	0	0	0	0	0
SdP	4	0.75	0.48	0	0	2	0.75	0.48
SEPA East	40	0.75	0.20	2	5.00	6	1.00	0.24
Whole of SEPA	105	1.09	0.16	8	7.62	11	1.35	0.17

Table 5 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
Galashiels	12	0.50	0	8	0.17	0	2
DC	6	0.50	0	8	0.17	0	2
JWC	6	0.50	0	3	0.17	0	1
Perth	20	6.10	10.00	33	1.10	10.00	5
BC	19	6.37	10.53	33	1.11	10.53	5
RG	1	1.00	0	1	1.00	0	1
Riccarton	8	2.75	12.50	16	0.38	0	2
NB	4	0	0	0	0	0	0
SdP	4	5.50	25.00	16	0.75	0	2
SEPA East	40	3.75	7.50	33	0.68	5.00	5
Whole of SEPA	105	6.60	15.24	71	0.96	6.67	11

Table 6 The families missed by SEPA East Region's analysts in the 1998 audit

Family	n	% of SEPA East's missed families
Hydrophilidae (incl. Hydraenidae)	3	10.34
Lymnaeidae	3	10.34
Leptophlebiidae	2	6.90
Nemouridae	2	6.90
Planorbidae	2	6.90
Polycentropodidae	2	6.90
Simuliidae	2	6.90
Sphaeriidae	2	6.90
Tipulidae	2	6.90
Ancylidae (incl. Acroloxidae)	1	3.45
Dytiscidae (incl. Noteridae)	1	3.45
Heptageniidae	1	3.45
Hydrobiidae (incl. Bithyniidae)	1	3.45
Hydroptilidae	1	3.45
Lepidostomatidae	1	3.45
Leuctridae	1	3.45
Oligochaeta	1	3.45
Planariidae (incl. Dugesiidae)	1	3.45
Total	29	100

Table 7 The species missed by SEPA East Region's analysts in the 1998 audit

Species	n	% of SEPA East's missed species
Hydraena gracilis Germar	3	10.00
Pisidium sp.	2	6.67
Lymnaea peregra (Muller)	2	6.67
Prosimulium hirtipes/latimucro	1	3.33
Amphinemura standfussi Ris	1	3.33
Simulium (Simulium) noelleri Friederichs	1	3.33
Potamopyrgus jenkinsi (Smith)	1	3.33
Polycentropus flavomaculatus (Pictet)	1	3.33
Polycelis sp.	1	3.33
Plectrocnemia conspersa (Curtis)	1	3.33
Lymnaea truncatula (Muller)	1	3.33
Leuctra sp.	1	3.33
Leptophlebiidae indet	1	3.33
Armiger crista (L.)	1	3.33
Ilybius sp.	1	3.33
Amphinemura sulcicollis (Stephens)	1	3.33
Ancylus fluviatilis Muller	1	3.33
Simulium (Simulium) ornatum group	1	3.33
Antocha vitripennis (Meigen)	1	3.33
Crunoecia irrorata (Curtis)	1	3.33
Dicranota sp.	1	3.33
Ecdyonurus sp.	1	3.33
Enchytraeidae	1	3.33
Gyraulus albus (Muller)	1	3.33
Habrophlebia fusca (Curtis)	1	3.33
Hydroptila sp.	1	3.33
Total	30	100

Table 8 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. Dugesidae)	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
Haliplidae	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 9 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
Gyraululus 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 9 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 10 Missed families for all samples in the 1998 audit

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

Table 10 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
Ephemeraidae	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 11 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
Pisicicola 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 11 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 octoculata</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> (Marsham)	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 11 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
Orthoclaadiinae	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 11 continued

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

Table 11 continued

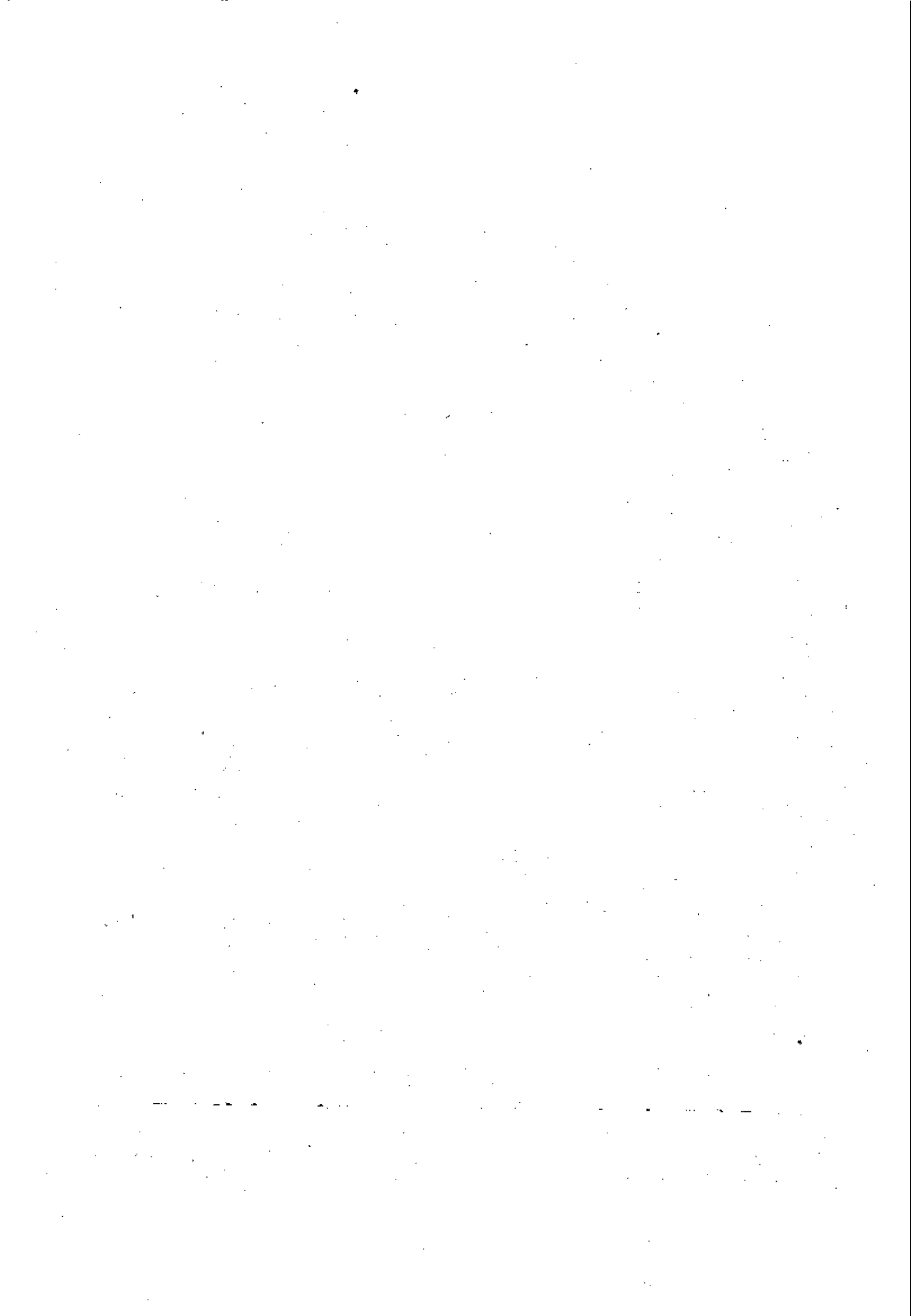
Species	n	% of missed species in 1998 audit
<i>Agabus guttatus</i> (Paykull)	1	0.09
<i>Adicella reducta</i> (Mclachlan)	1	0.09
<i>Prosimulium hirtipes/latimucro</i>	1	0.09
<i>Potamophylax cingulatus</i> (Stephens)	1	0.09
<i>Baetis</i> sp.	1	0.09
<i>Sialis fuliginosa</i> Pictet	1	0.09
<i>Sialis lutaria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

Table 11 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 GALASHIELS LABORATORY

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East
WATER-
COURSE: Gala Water

LABORATORY: Galashiels
PRIMARY
ANALYST: JWC

DATE: 11/11/98
AQC
ANALYST: DC
SORT/AQC
METHOD: Preserved/Preserved

SITE: Stow

CODE: 40/10/15

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 East

LABORATORY: Galashiels

DATE: 27/05/98

WATER-
COURSE: Tweed

PRIMARY
ANALYST: JWC

AQC
ANALYST: DC

SITE: Juniporbank

CODE: 35/10/34

SORT/AQC
METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

Planariidae (incl. Dugesiidae)

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

None

SUMMARY OF AUDIT

LOSSES 1 GAINS 0

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE -5

ON NO. OF TAXA -1

1 No representative of family in vial

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 East
WATER-
COURSE: Lambden Burn
SITE: Foot

LABORATORY: Galashiels
PRIMARY
ANALYST: JWC
CODE: 37/10/1

DATE: 06/08/98
AQC
ANALYST: DC
SORT/AQC
METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

Planariidae (incl. Dugesiidae)	9
Polycelis sp. 1 only	
Sphaeriidae	9
Pisidium sp. 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 East
WATER-
COURSE: Lyne Water
SITE: Foot

LABORATORY: Galashiels
PRIMARY
ANALYST: JWC
CODE: 46/10/1

DATE: 16/07/98
AQC
ANALYST: DC
SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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 East

LABORATORY: Galashiels

DATE: 27/05/98

WATER-
COURSE: Borthwick Water

PRIMARY
ANALYST: JWC

AQC
ANALYST: DC

SITE: Foot

CODE: 41/67/1

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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 East

LABORATORY: Galashiels

DATE: 17/11/98

WATER-
COURSE: Borthwick Water

PRIMARY
ANALYST: JWC

AQC
ANALYST: DC

SITE: Foot

CODE: 41/67/1

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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 East

LABORATORY: Galashiels

DATE: 27/05/98

WATER-
COURSE: Ale Water

PRIMARY
ANALYST: DC

AQC
ANALYST: JWC

SITE: Foot

CODE: 41/40/1

SORT/AQC
METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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 East

LABORATORY: Galashiels

DATE: 13/08/98

WATER-
COURSE: Whiteadder Water

PRIMARY
ANALYST: DC

AQC
ANALYST: JWC

SITE: w/s Charnside Mill intake

CODE: 33/10/16

SORT/AQC
METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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 East

LABORATORY: Galashiels

DATE: 21/04/98

WATER-
COURSE: Leet

PRIMARY
ANALYST: DC

AQC
ANALYST: JWC

SITE: Coldstream G.S.

CODE: 36/10/1

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

Planariidae (incl. Dugesiidae) * 1

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) * 1

Polycelis nigra group

Baetidae * 1

Baetis rhodani (Pictet)

SUMMARY OF AUDIT

LOSSES 0 GAINS 0

OMISSIONS: 2

NET EFFECTS:

ON BMWP SCORE 0

ON NO. OF TAXA 0

1 No representative of family in vial

5 Specimen dead at time of sampling

9 Taxon missed in sorting

2 Alternative terrestrial specimen in vial

6 Taxon in vial but not recorded

10 Unexplained error

3 Posterior end only in vial

7 Mis-identification

11 Taxon added in internal AQC

4 Empty shell or case or cast skin in vial

8 Typographical error - wrong box ticked

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East

LABORATORY: Galashiels

DATE: 22/09/98

WATER-
COURSE: Tweed

PRIMARY
ANALYST: DC

AQC
ANALYST: JWC

SITE: Norham

CODE: 35/10/1

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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

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 East

LABORATORY: Galashiels

DATE: 10/12/98

WATER-
COURSE: Tweed

PRIMARY
ANALYST: DC

AQC
ANALYST: JWC

SITE: Mertown

CODE: 35/10/19

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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 East

LABORATORY: Galashiels

DATE: 17/09/98

WATER-
COURSE: Langton Burn

PRIMARY
ANALYST: DC

AQC
ANALYST: JWC

SITE: Foot

CODE: 34/20/1

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

Planorbidae * 7

Additional BMWP taxa found in vial

Valvatidae 7
 Valvata cristata Muller

SAMPLE

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

N/a

Additional BMWP taxa found in sample

Planorbidae * 1
 Armiger crista (L.) 1 only

SUMMARY OF AUDIT

LOSSES 0 GAINS 1 OMISSIONS: 1

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)



AUDIT RESULTS FOR PERTH LABORATORY

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East
WATER-
COURSE: Hatton Burn
SITE: Thomsford Bridge

LABORATORY: Perth
PRIMARY
ANALYST: IL
CODE: 1/130/3.8

DATE: 14/07/98
AQC
ANALYST: BC
SORT/AQC
METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

Lymnaeidae	9
Lymnaea peregra (Muller) 1 only	
Sphaeriidae	9
Pisidium sp. 1 only	

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 East

LABORATORY: Perth

DATE: 21/05/98

WATER-
COURSE: Black Devon

PRIMARY
ANALYST: IL

AQC
ANALYST: BC

SITE: Black Devon Bridge

CODE: 4/10/15.4

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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

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 East

LABORATORY: Perth

DATE: 18/06/98

WATER-COURSE: Dronachy Burn

PRIMARY ANALYST: IL

AQC ANALYST: BC

SITE: u/s Tiel Burn

CODE: 3/40/1.7

SORT/AQC METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

Leuctridae * 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

Lymnaeidae 9

Lymnaea peregra (Muller) 1 only

Leptophlebiidae 9

Leptophlebiidae indet (damaged) 1 only

Leuctridae * 1

Leuctra fusca (L.)

Hydrophilidae (incl. Hydraenidae) 9

Hydraena gracilis Germar (a) 1 only

Simuliidae 9

Simulium (Simulium) noelleri Friederichs (p)

Simulium (Simulium) ornatum group (p)

SUMMARY OF AUDIT

LOSSES 0

GAINS 4

OMISSIONS: 1

NET EFFECTS:

ON BMWP SCORE 23

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 East

LABORATORY: Perth

DATE: 09/10/98

WATER-COURSE: Keil Burn

PRIMARY ANALYST: IL

AQC ANALYST: BC

SITE: A915 Bridge

CODE: 1/120/1

SORT/AQC METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

Hydrophilidae (incl. Hydraenidae)

9

Hydraena gracilis Germar (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

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 East

LABORATORY: Perth

DATE: 29/06/98

WATER-
COURSE: Moonzie Burn

PRIMARY
ANALYST: JL

AQC
ANALYST: BC

SITE: Seggiehill Road

CODE: 56/30/6

SORT/AQC
METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

Heptageniidae

9

Ecdyonurus sp. 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 East

LABORATORY: Perth

DATE: 07/10/98

WATER-COURSE: Kinaldy Burn

PRIMARY ANALYST: JL

AQC ANALYST: BC

SITE: u/s Kenly confluence

CODE: 55/60/5

SORT/AQC METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

Dytiscidae (incl. Noteridae)

9

Ilybius sp. (I) 1 only

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 5

ON NO. OF TAXA 1

1 No representative of family in vial

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 East

LABORATORY: Perth

DATE: 04/05/98

WATER-
COURSE: Bluther Burn

PRIMARY
ANALYST: JL

AQC
ANALYST: BC

SITE: Newmills

CODE: 3/280/0.3

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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

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 East

LABORATORY: Perth

DATE: 16/11/98

WATER-
COURSE: Lyon

PRIMARY
ANALYST: JL

AQC
ANALYST: BC

SITE: Stronuich

CODE: 63/10/1.5

SORT/AQC

METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

Nemouridae	9
Amphinemura sulcicollis (Stephens) 1 only	
Tipulidae	9
Antocha vitripennis (Meigen) 1 only	

SUMMARY OF AUDIT

LOSSES 0

GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 12

ON NO. OF TAXA 2

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East
WATER-
COURSE: Vinny Water
SITE: u/s Lethan STW

LABORATORY: Perth
PRIMARY
ANALYST: JR
CODE: 52/70/4

DATE: 07/10/98
AQC
ANALYST: BC
SORT/AQC
METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

Planorbidae

Armiger crista (L.) 1 only

9

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 East

LABORATORY: Perth

DATE: 14/10/98

WATER-
COURSE: Glamis Burn

PRIMARY
ANALYST: JR

AQC
ANALYST: BC

SITE: d/s Glamis STW

CODE: 59/150/5.2

SORT/AQC
METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

Lymnaeidae	9
Lymnaea truncatula (Muller) 1 only	
Polycentropodidae	9
Plectrocnemia conspersa (Curtis) 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 East

LABORATORY: Perth

DATE: 19/11/98

WATER-
COURSE: Forth

PRIMARY
ANALYST: KB

AQC
ANALYST: BC

SITE: Cobleland

CODE: 10/10/51.2

SORT/AQC

METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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 East

LABORATORY: Perth

DATE: 13/05/98

WATER-
COURSE: Monachyle Burn

PRIMARY
ANALYST: KB

AQC
ANALYST: BC

SITE: Road Bridge

CODE: 9/440/49.8

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

Tipulidae

9

Dicranota sp. 1 only

SUMMARY OF AUDIT

LOSSES 0 GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 5

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East	LABORATORY: Perth	DATE: 23/06/98
WATER-COURSE: Muckle Burn	PRIMARY ANALYST: KB	AQC ANALYST: BC
SITE: B8033 Bridge	CODE: 8/100/20.6	SORT/AQC METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

Oligochaeta *	1
Baetidae *	1
Heptageniidae *	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

Oligochaeta *	1
Lumbricidae	
Baetidae *	1
Baetis rhodani (Pictet)	
Baetis scambus group	
Heptageniidae *	1
Ecdyonurus sp.	
Polycentropodidae	9
Polycentropus flavomaculatus (Pictet)	

SUMMARY OF AUDIT

LOSSES 0	GAINS 1	OMISSIONS: 3	NET EFFECTS:
			ON BMWP SCORE 7
			ON NO. OF TAXA 1

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East	LABORATORY: Perth	DATE: 28/04/98
WATER- COURSE: Gairney Burn	PRIMARY ANALYST: KB	AQC ANALYST: BC
SITE: d/s Powmill	CODE: 6/150/26.3	SORT/AQC METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

Planariidae (incl. Dugesiidae)	1
"Assumed to have been present" noted on data sheet	

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

Hydrobiidae (incl. Bithyniidae)	9
Potamopyrgus jenkinsi (Smith) 1 only	
Planorbidae	9
Gyraulus albus (Muller) 1 only	
Leptophlebiidae	9
Habrophlebia fusca (Curtis) 1 only	
Nemouridae	12
Amphinemura standfussi Ris	
Leuctridae	9
Leuctra sp. (juv) 1 only	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a) 1 only	

SUMMARY OF AUDIT

LOSSES 1	GAINS 6	OMISSIONS: 0
NET EFFECTS:		
ON BMWP SCORE 33		
ON NO. OF TAXA 5		

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 East

LABORATORY: Perth

DATE: 30/10/98

WATER-
COURSE: Dochart

PRIMARY
ANALYST: RG

AQC
ANALYST: BC

SITE: Killin

CODE: 57/3/2

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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

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 East

LABORATORY: Perth

DATE: 21/04/98

WATER-
COURSE: Tay

PRIMARY
ANALYST: RG

AQC
ANALYST: BC

SITE: Pitnacree

CODE: 57/3/6

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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 East

LABORATORY: Perth

DATE: 24/04/98

WATER-COURSE: Water of May

PRIMARY ANALYST: RG

AQC ANALYST: BC

SITE: d/s Ardargie

CODE: 64/65/3.1

SORT/AQC METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

Lymnaeidae

7

Succineidae 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

Simuliidae

9

Prosimulium hirtipes/latimucro (p) 1 only

SUMMARY OF AUDIT

LOSSES 1 GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 2

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 East

LABORATORY: Perth

DATE: 17/06/98

WATER-
COURSE: Earn

PRIMARY
ANALYST: RG

AQC
ANALYST: BC

SITE: Crieff Bridge

CODE: 64/10/5

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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 East

LABORATORY: Perth

DATE: 24/04/98

WATER-
COURSE: Duncrub Burn

PRIMARY
ANALYST: RG

AQC
ANALYST: BC

SITE: u/s Dunning

CODE: 64/140/3

SORT/AQC
METHOD: Live/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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 East

LABORATORY: Perth

DATE: 25/02/99

WATER-
COURSE: Assinger Burn

PRIMARY
ANALYST: JR

AQC
ANALYST: RG

SITE: u/s Glenalmond School

CODE:

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

Oligochaeta

Enchytraeidae 1 only

9

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 1

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

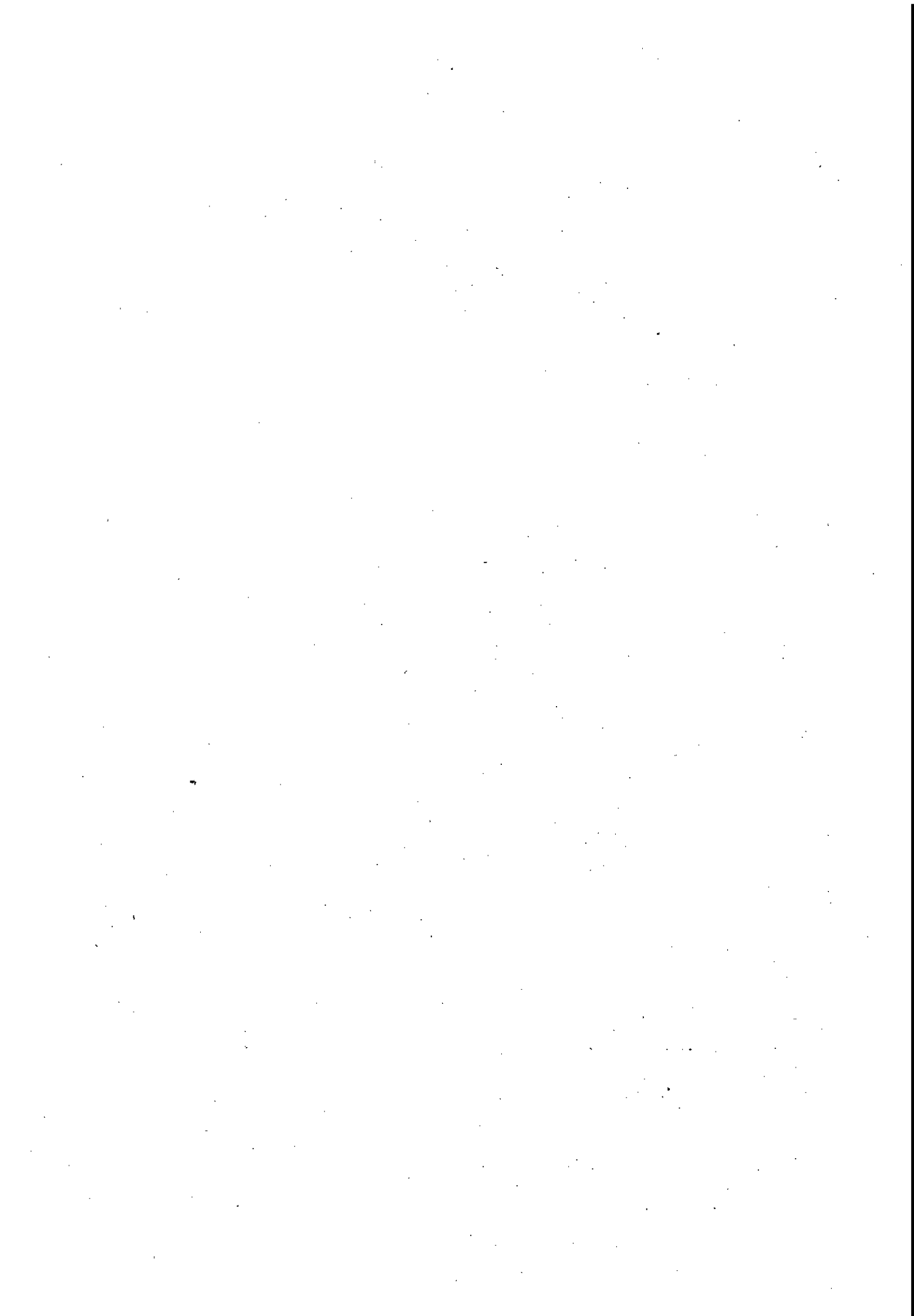
9 Taxon missed in sorting

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)



AUDIT RESULTS FOR RICCARTON LABORATORY

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East

LABORATORY: Riccarton

DATE: 16/06/98

WATER-COURSE: Water of Leith

PRIMARY ANALYST:

AQC ANALYST: NB

SITE: Currie

CODE: 18/10/19.55

SORT/AQC METHOD: Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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 East

LABORATORY: Riccarton

DATE: 26/08/98

WATER-COURSE: Tyne

PRIMARY ANALYST:

AQC ANALYST: NB

SITE: d/s Ormiston - Loanfoot

CODE: 22/10/30.46

SORT/AQC METHOD: Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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

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 East

LABORATORY: Riccarton

DATE: 02/11/98

WATER-
COURSE: Humbie Water

PRIMARY
ANALYST: SdP

AQC
ANALYST: NB

SITE: Humbie Mill

CODE: 22/270/35.08

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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

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 East

LABORATORY: Riccarton

DATE: 04/05/98

WATER-
COURSE: North Esk

PRIMARY
ANALYST: SdP

AQC
ANALYST: NB

SITE: u/s Auchendinny

CODE: 20/50/26.07

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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 East

LABORATORY: Riccarton

DATE: 11/05/98

WATER-
COURSE: Brox Burn

PRIMARY
ANALYST:

AQC
ANALYST: SdP

SITE: Milrig

CODE: 16/70/10.95

SORT/AQC
METHOD: Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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 East

LABORATORY: Riccarton

DATE: 17/06/98

WATER-
COURSE: Breich Water

PRIMARY
ANALYST:

AQC
ANALYST: SdP

SITE: West Badallan

CODE: 16/270/42.54

SORT/AQC
METHOD: Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

Hydroptilidae

9

Hydroptila sp. 1 only

SUMMARY OF AUDIT

LOSSES 0

GAINS 1

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 6

ON NO. OF TAXA 1

1 No representative of family in vial

2 Alternative terrestrial specimen in vial

3 Posterior end only in vial

4 Empty shell or case or cast skin in vial

5 Specimen dead at time of sampling

6 Taxon in vial but not recorded

7 Mis-identification

8 Typographical error - wrong box ticked

9 Taxon missed in sorting

10 Unexplained error

11 Taxon added in internal AQC

12 Recorded taxon that was rejected by AQC analyst

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East

LABORATORY: Riccarton

DATE: 11/08/98

WATER-COURSE: Auchenbowie Burn

PRIMARY ANALYST:

AQC ANALYST: SdP

SITE: u/s Milnholm Hatchery

CODE: 12/160/27.01

SORT/AQC METHOD: Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Data sheet includes "indet caddis" (= Hydropsyche sp. pupa)

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

Ancylus fluviatilis Muller

Lepidostomatidae 9

Crunoecia irrorata (Curtis) 1 only

SUMMARY OF AUDIT

LOSSES 0 GAINS 2

OMISSIONS: 0

NET EFFECTS:

ON BMWP SCORE 16

ON NO. OF TAXA 2

1 No representative of family in vial

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 East

LABORATORY: Riccarton

DATE: 01/05/98

WATER-
COURSE: Gogar Burn

PRIMARY
ANALYST: NB

AQC
ANALYST: SdP

SITE: Dalmahoy Church

CODE: 16/20/17.09

SORT/AQC
METHOD: Preserved/Preserved

RESULTS OF AUDIT

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

VIAL

BMWP taxa not found in vial

None

Additional BMWP taxa found in vial

None

SAMPLE

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

N/a

Additional BMWP taxa found in sample

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

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)

