Institute of Freshwater Ecology

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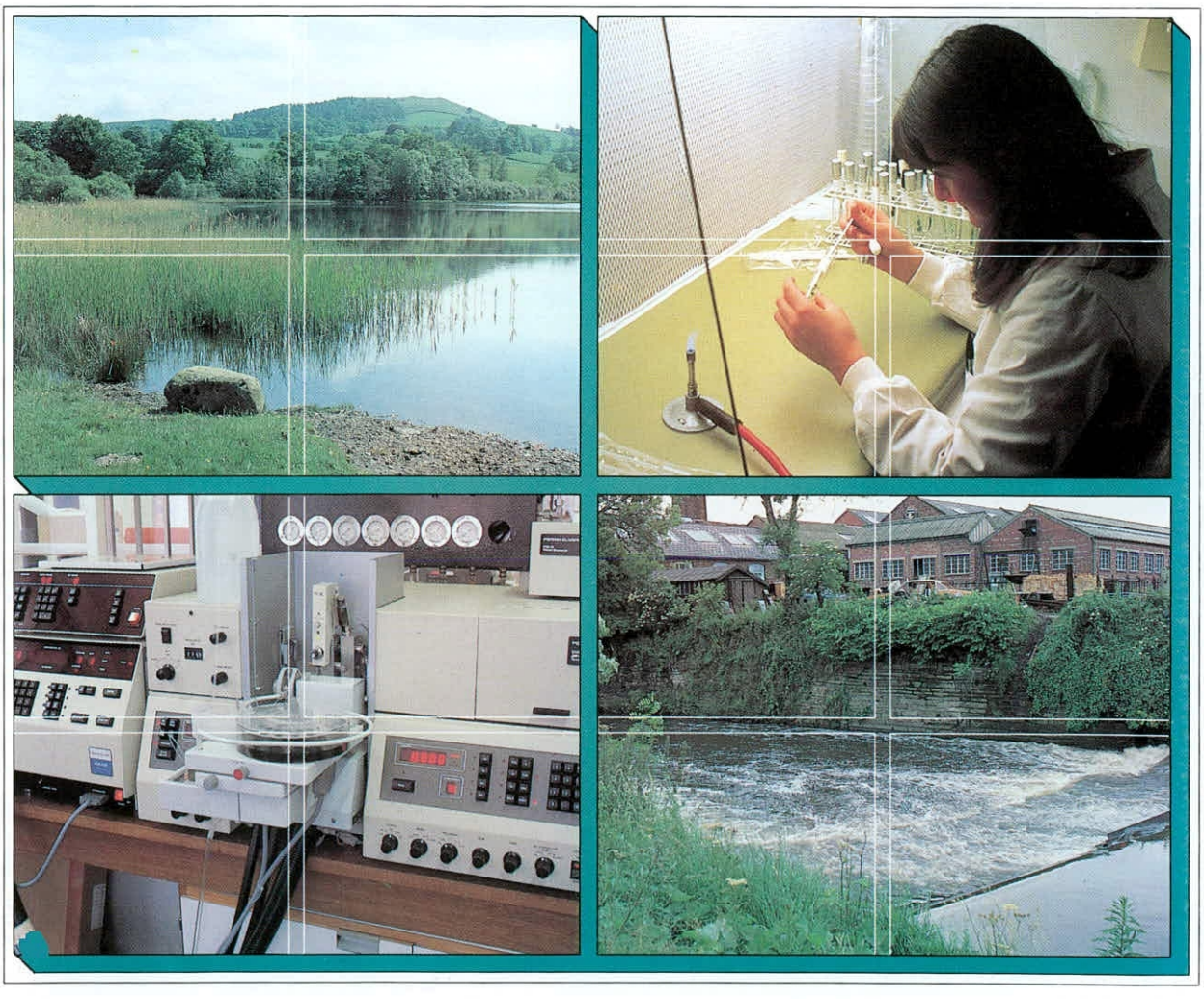

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1. INTRODUCTION

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

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

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

This report presents the results of the audit of 38 samples analysed by staff employed by 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. Table 6 lists, at family level, the taxa missed in sorting by SEPA East's analysts in the 1997 audit. Table 7 lists the species most frequently missed by SEPA East's biologists, as found by the 1997 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 1997 audit for the whole of the United Kingdom.

6. ACKNOWLEDGEMENTS

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

Table 1 The 8 samples audited for the Galashiels Laboratory of SEPA East

River	Site	Analyst	Losses	Gains	Omissions
Yarrow Water	Philiphaugh GS	DC	0	2	0
Teviot Water	B711 Bridge	DC	0	0	0
Whiteadder Water	Ford above Preston	DC	0	0	0
Whiteadder Water	Chesterfield Ford	DC	0	0	0
Yarrow Water	Philiphaugh GS	JWC	0	0	0
Tweed	Old Tweed Bridge	JWC	0	0	0
Teviot Water	B711 Bridge	JWC	0	0	0
Eden Water	Foot	JWC	0	0	0

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

River	Site	Analyst	Losses	Gains	Omissions
Black Water	Strone	BC	0	2	0
Glenny Burn	Portend	BC	0	2	0
Vinny Water	d/s Craichie STW	BC	0	0	0
Monikie Burn	A922 Bridge	BC	0	0	0
Devon	Tullibody Bridge	BC	0	2	0
Duncrub Burn	B9141 Bridge	BC	0	0	0
Allan Water	d/s Ashfield	BC	0	2	0
Pow Burn	Carnbo	JL	0	3	0
Allan Water	Dunblane	JL	0	0	0
South Esk	u/s Brechin STW	JL	0	1	0
North Esk	d/s Edzell STW	JL	1	4	1
Back Burn	Milnathort	JL	0	1	0
South Queich	Kinross Bridge	JL	1	4	0
Eden	Ramornie Bridge	JR	2	1	3
Ordie Burn	Old Road Bridge	JR	0	0	2
Leven	u/s Lothrie Burn	JR	0	0	2
St Monance Burn	A917 Bridge	KB	0	0	0
Kilrenny Burn	A917 Bridge	KB	2	0	0
Ceres Burn	d/s Ceres STW	RG	0	0	0
Leven	Cabbagehall Bridge	RG	0	1	0

Table 3 The 10 samples audited for the Riccarton Laboratory of SEPA East

River	Site	Analyst	Losses	Gains	Omissions
Keith Water	Keith Bridge	NB	0	0	0
Bavelaw Burn	d/s Mill Balerno	NB	0	1	0
North Esk	Roslin	NB	0	2	1
Tyne	Pencaitland	NB	0	1	0
Almond	Cowhill	SdP	0	0	0
Breich Water	Easter Breich	SdP	0	1	0
Carron	Denny Industrial Estate	SdP	0	2	0
Avon	Wallace's Cave	SdP	0	0	0
Almond	Blackburn	SdP	0	2	0
North Esk	u/s Auchendinny	SdP	0	0	0

Table 4 Statistics of the 1997 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	**8**	**0.25**	**0.25**	**0**	**0**	**2**	**0.25**	**0.25**
DC	4	0.50	0.50	0	0	2	0.50	0.50
JWC	4	0	0	0	0	0	0	0
Perth	**20**	**1.15**	**0.30**	**3**	**15.00**	**4**	**1.85**	**0.42**
BC	7	1.14	0.40	0	0	2	1.14	0.40
JL	6	2.17	0.70	3	50.00	4	2.67	0.99
JR	3	0.33	0.33	0	0	1	3.33	1.33
KB	2	0	0	0	0	0	1.00	1.00
RG	2	0.50	0.50	0	0	1	0.50	0.50
Riccarton	**10**	**0.90**	**0.28**	**0**	**0**	**2**	**1.00**	**0.33**
NB	4	1.00	0.41	0	0	2	1.25	0.63
SdP	6	0.83	0.40	0	0	2	0.83	0.40
SEPA East	**38**	**0.89**	**0.19**	**3**	**7.89**	**4**	**1.29**	**0.26**
Whole of SEPA	**102**	**1.57**	**0.18**	**19**	**18.63**	**8**	**1.86**	**0.19**

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 underestimat of no. of taxa
Galashiels	**8**	**1.88**	**12.50**	**15**	**0.25**	0	**2**
DC	4	3.75	25.00	15	0.50	0	2
JWC	4	0	0	0	0	0	0
Perth	**20**	**6.25**	**25.00**	**25**	**0.85**	**15.00**	**3**
BC	7	9.43	42.86	20	1.14	0	2
JL	6	11.67	33.33	25	1.83	50.00	3
JR	3	-2.00	0	0	-0.33	0	0
KB	2	-4.00	0	0	-1.00	0	0
RG	2	1.50	0	3	0.50	0	1
Riccarton	**10**	**6.60**	**20.00**	**20**	**0.90**	0	**2**
NB	4	6.75	25.00	17	1.00	0	2
SdP	6	6.50	16.67	20	0.83	0	2
SEPA East	**38**	**5.42**	**21.05**	**25**	**0.74**	**7.89**	**3**
Whole of SEPA	**102**	9.85	**29.41**	57	**1.41**	**17.65**	**8**

Table 6 The families missed by SEPA East Region's analysts in the 1997 audit

Family	n	% of SEPA East's missed families
Hydrophilidae (incl. Hydraenidae)	5	14.71
Ancylidae (incl. Acroloxidae)	2	5.88
Ephemerellidae	2	5.88
Lepidostomatidae	2	5.88
Leptoceridae	2	5.88
Leptophlebiidae	2	5.88
Sericostomatidae	2	5.88
Sphaeriidae	2	5.88
Beraeidae	1	2.94
Caenidae	1	2.94
Glossiphoniidae	1	2.94
Goeridae	1	2.94
Haliplidae	1	2.94
Heptageniidae	1	2.94
Hydrobiidae (incl. Bithyniidae)	1	2.94
Hydroptilidae	1	2.94
Limnephilidae	1	2.94
Nemouridae	1	2.94
Odontoceridae	1	2.94
Physidae	1	2.94
Sialidae	1	2.94
Simuliidae	1	2.94
Valvatidae	1	2.94
TOTAL	**34**	**100**

Table 7 The species missed by SEPA East Region's analysts in the 1997 audit

Species	n	% of SEPA East's missed species
Hydraena gracilis Germar	5	14.29
Ancylus fluviatilis Muller	2	5.71
Sericostoma personatum (Spence)	2	5.71
Pisidium sp.	2	5.71
Ephemerella ignita (Poda)	2	5.71
Leptophlebiidae indet	2	5.71
Lepidostoma hirtum (Fabricius)	2	5.71
Sialis lutaria (L.)	1	2.86
Amphinemura sulcicollis (Stephens)	1	2.86
Valvata piscinalis (Muller)	1	2.86
Simulium (Simulium) ornatum group	1	2.86
Potamopyrgus jenkinsi (Smith)	1	2.86
Physa fontinalis (L.)	1	2.86
Odontocerum albicorne (Scopoli)	1	2.86
Hydroptila sp.	1	2.86
Helophorus (Atracthelophorus) brevipalpis Bedel	1	2.86
Helobdella stagnalis (L.)	1	2.86
Haliplus sp.	1	2.86
Goera pilosa (Fabricius)	1	2.86
Ecdyonurus sp.	1	2.86
Drusus annulatus/Ecclisopteryx guttulata	1	2.86
Caenis rivulorum Eaton	1	2.86
Athripsodes albifrons (L.)	1	2.86
Beraea maurus (Curtis)	1	2.86
Athripsodes cinereus (Curtis)	1	2.86
TOTAL	**35**	**100**

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

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

Table 8 continued

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

Table 9 The species missed by all SEPA's analysts in the 1997 audit

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

Table 9 continued

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

Table 10 Missed families for all samples in the 1997 audit

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

Table 10 continued

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

Table 11 Missed species for all samples in the 1997 audit

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

Table 11 continued

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

Table 11 continued

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

Table 11 continued

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

Table 11 continued

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

Table 11 continued

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

APPENDIX

Results of individual sample audits

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East | **LABORATORY:** Galashiels | **DATE:** 23/09/97

WATER-COURSE: Yarrow Water | **PRIMARY ANALYST:** JWC | **AQC ANALYST:** DC

SITE: Philiphaugh GS | **CODE:** 44/10/1 | **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	
Lepidostomatidae	12
Lepidostoma hirtum (Fabricius) 1 only	
Simuliidae	9
Simulium (Simulium) ornatum group 1 only	

SUMMARY OF AUDIT

LOSSES 0 **GAINS** 2 **OMISSIONS:** 0

NET EFFECTS:

ON BMWP SCORE 15

ON NO. OF TAXA 2

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East | **LABORATORY:** Galashiels | **DATE:** 13/11/97

WATER-COURSE: Teviot Water | **PRIMARY ANALYST:** JWC | **AQC ANALYST:** DC

SITE: B711 Bridge | **CODE:** 41/10/27 | **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:** 01/10/97

WATER-COURSE: Whiteadder Water | **PRIMARY ANALYST:** JWC | **AQC ANALYST:** DC

SITE: Ford above Preston | **CODE:** 33/10/19 | **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:** 27/05/97

WATER-COURSE: Whiteadder Water | **PRIMARY ANALYST:** JWC | **AQC ANALYST:** DC

SITE: Chesterfield Ford | **CODE:** 33/10/3 | **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
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:** 14/07/97

WATER-COURSE: Yarrow Water | **PRIMARY ANALYST:** DC | **AQC ANALYST:** JWC

SITE: Philiphaugh GS | **CODE:** 44/10/1 | **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
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:** 13/08/97

WATER-COURSE: Tweed | **PRIMARY ANALYST:** DC | **AQC ANALYST:** JWC

SITE: Old Tweed Bridge | **CODE:** 35/10/30 | **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:** 19/08/97

WATER-COURSE: Teviot Water | **PRIMARY ANALYST:** DC | **AQC ANALYST:** JWC

SITE: B711 Bridge | **CODE:** 41/10/27 | **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:** 22/09/97

WATER-COURSE: Eden Water | **PRIMARY ANALYST:** DC | **AQC ANALYST:** JWC

SITE: Foot | **CODE:** 38/10/1 | **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
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:** 18/08/97

WATER-COURSE: Black Water | **PRIMARY ANALYST:** RG | **AQC ANALYST:** BC

SITE: Strone | **CODE:** 60/45/6 | **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	
Ancylidae (incl. Acroloxidae)	9
Ancylus fluviatilis Muller	
Sericostomatidae	9
Sericostoma personatum (Spence)	

SUMMARY OF AUDIT

LOSSES 0 **GAINS** 2 **OMISSIONS:** 0

NET EFFECTS:

ON BMWP SCORE 16

ON NO. OF TAXA 2

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East | **LABORATORY:** Perth | **DATE:** 25/08/97

WATER-COURSE: Glenny Burn | **PRIMARY ANALYST:** KB | **AQC ANALYST:** BC

SITE: Portend | **CODE:** 10/220/36.32 | **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	
Leptophlebiidae	9
Leptophlebiidae indet (juv) 1 only	
Odontoceridae	9
Odontocerum albicorne (Scopoli) 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 East | **LABORATORY:** Perth | **DATE:** 07/10/97

WATER-COURSE: Vinny Water | **PRIMARY ANALYST:** JR | **AQC ANALYST:** BC

SITE: d/s Craichie STW | **CODE:** 52/70/2.2 | **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

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:** 23/10/97

WATER-COURSE: Monikie Burn | **PRIMARY ANALYST:** JR | **AQC ANALYST:** BC

SITE: A922 Bridge | **CODE:** 53/70/6 | **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

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:** 10/09/97

WATER-COURSE: Devon | **PRIMARY ANALYST:** KB | **AQC ANALYST:** BC

SITE: Tullibody Bridge | **CODE:** 6/10/4.7 | **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	
Physidae	9
Physa fontinalis (L.) 1 only	
Ephemerellidae	9
Ephemerella ignita (Poda) 1 only	

SUMMARY OF AUDIT

LOSSES 0 **GAINS** 2 **OMISSIONS:** 0

NET EFFECTS:

ON BMWP SCORE 13

ON NO. OF TAXA 2

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East | **LABORATORY:** Perth | **DATE:** 22/09/97

WATER-COURSE: Duncrub Burn | **PRIMARY ANALYST:** RG | **AQC ANALYST:** BC

SITE: B9141 Bridge | **CODE:** 64/140/2 | **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

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:** 23/10/97

WATER-COURSE: Allan Water | **PRIMARY ANALYST:** KB | **AQC ANALYST:** BC

SITE: d/s Ashfield | **CODE:** 8/10/10 | **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	
Caenidae	12
Caenis rivulorum Eaton	
Leptoceridae	12
Athripsodes albifrons (L.)	

SUMMARY OF AUDIT

LOSSES 0 **GAINS** 2 **OMISSIONS:** 0

NET EFFECTS:

ON BMWP SCORE 17

ON NO. OF TAXA 2

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East | **LABORATORY:** Perth | **DATE:** 22/07/97

WATER-COURSE: Pow Burn | **PRIMARY ANALYST:** | **AQC ANALYST:** JL

SITE: Carnbo | **CODE:** 2/340/40-01 | **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	
Sphaeriidae	9
Pisidium sp. 1 only	
Haliplidae	9
Haliplus sp. (l) 1 only	
Sialidae	9
Sialis lutaria (L.) 1 only	

SUMMARY OF AUDIT

LOSSES 0 **GAINS** 3 **OMISSIONS:** 0 **NET EFFECTS:**

ON BMWP SCORE 12
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 East | **LABORATORY:** Perth | **DATE:** 26/05/97

WATER-COURSE: Allan Water | **PRIMARY ANALYST:** | **AQC ANALYST:** JL

SITE: Dunblane | **CODE:** 8/10/6.3 | **SORT/AQC METHOD:** Not known/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:** 27/05/97

WATER-COURSE: South Esk | **PRIMARY ANALYST:** | **AQC ANALYST:** JL

SITE: u/s Brechin STW | **CODE:** 51/10/15.9 | **SORT/AQC METHOD:** Not known/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

Goeridae	9
Goera pilosa (Fabricius) 1 only	

SUMMARY OF AUDIT

LOSSES 0 **GAINS** 1 **OMISSIONS:** 0

NET EFFECTS:

ON BMWP SCORE 10

ON NO. OF TAXA 1

1 No representative of family in vial
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:** 16/07/97

WATER-COURSE: North Esk | **PRIMARY ANALYST:** | **AQC ANALYST:** JL

SITE: d/s Edzell STW | **CODE:** 50/10/10.1 | **SORT/AQC METHOD:** Not known/Preserved

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
VIAL	
BMWP taxa not found in vial	
Perlodidae	1
Lepidostomatidae *	1
Additional BMWP taxa found in vial	
None	
SAMPLE	
BMWP taxa not found in sample (For samples where vial is broken or absent)	
N/a	
Additional BMWP taxa found in sample	
Ancylidae (incl. Acroloxidae)	9
Ancylus fluviatilis Muller	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a)	
Lepidostomatidae *	1
Lepidostoma hirtum (Fabricius) (p) 1 only	
Limnephilidae	12
Drusus annulatus/Ecclisopteryx guttulata (juv) 1 only	
Leptoceridae	9
Athripsodes cinereus (Curtis) 1 only	

SUMMARY OF AUDIT

LOSSES 1 **GAINS** 4 **OMISSIONS:** 1

NET EFFECTS:

ON BMWP SCORE 18
ON NO. OF TAXA 3

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East | **LABORATORY:** Perth | **DATE:** 22/07/97

WATER-COURSE: Back Burn | **PRIMARY ANALYST:** | **AQC ANALYST:** JL

SITE: Milnathort | **CODE:** 2/410/33.2 | **SORT/AQC METHOD:** Not known/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
Helophorus (Atracthelophorus) brevipalpis Bedel (a)	
Hydraena gracilis Germar (a)	

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:** 24/09/97

WATER-COURSE: South Queich | **PRIMARY ANALYST:** IL | **AQC ANALYST:** JL

SITE: Kinross Bridge | **CODE:** 2/310/31.9 | **SORT/AQC METHOD:** Live/Preserved

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
VIAL	
BMWP taxa not found in vial	
Planorbidae	2
Additional BMWP taxa found in vial	
None	
SAMPLE	
BMWP taxa not found in sample (For samples where vial is broken or absent)	
N/a	
Additional BMWP taxa found in sample	
Hydrobiidae (incl. Bithyniidae)	9
Potamopyrgus jenkinsi (Smith)	
Leptophlebiidae	9
Leptophlebiidae indet (juv) 1 only	
Hydrophilidae (incl. Hydraenidae)	9
Hydraena gracilis Germar (a) 1 only	
Lepidostomatidae	9
Lepidostoma hirtum (Fabricius) 1 only	

SUMMARY OF AUDIT

LOSSES 1 **GAINS** 4 **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 East | **LABORATORY:** Perth | **DATE:** 10/07/97

WATER-COURSE: Eden | **PRIMARY ANALYST:** | **AQC ANALYST:** JR

SITE: Ramornie Bridge | **CODE:** 56/10/6 | **SORT/AQC METHOD:** Not known/Preserved

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
VIAL	
BMWP taxa not found in vial	
Ancylidae (incl. Acroloxidae) *	1
Piscicolidae	1
Dytiscidae (incl. Noteridae) *	1
Elmidae	1
Limnephilidae *	4
Additional BMWP taxa found in vial	
None	
SAMPLE	
BMWP taxa not found in sample (For samples where vial is broken or absent)	
N/a	
Additional BMWP taxa found in sample	
Ancylidae (incl. Acroloxidae) *	1
Ancylus fluviatilis Muller 1 only	
Sphaeriidae	9
Pisidium sp. 1 only	
Dytiscidae (incl. Noteridae) *	1
Oreodytes sanmarkii (Sahlberg) (a+l)	
Limnephilidae *	4
Drusus annulatus (Stephens)	

SUMMARY OF AUDIT

LOSSES 2 **GAINS** 1 **OMISSIONS:** 3

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:** Perth | **DATE:** 29/07/97

WATER-COURSE: Ordie Burn | **PRIMARY ANALYST:** | **AQC ANALYST:** JR

SITE: Old Road Bridge | **CODE:** 57/56/3 | **SORT/AQC METHOD:** Preserved

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
VIAL	
BMWP taxa not found in vial	
Dytiscidae (incl. Noteridae) *	1
Tipulidae *	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	
Dytiscidae (incl. Noteridae) *	1
Oreodytes sanmarkii (Sahlberg) (a)	
Tipulidae *	1
Tipula (Yamatotipula) montium group	

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
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:** 29/07/97

WATER-COURSE: Leven | **PRIMARY ANALYST:** | **AQC ANALYST:** JR

SITE: u/s Lothrie Burn | **CODE:** 2/10/15-6 | **SORT/AQC METHOD:** Preserved

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
VIAL	
BMWP taxa not found in vial	
Hydrobiidae (incl. Bithyniidae) *	4
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	
Hydrobiidae (incl. Bithyniidae) *	4
Potamopyrgus jenkinsi (Smith)	
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
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: 25/06/97

WATER-COURSE: St Monance Burn

PRIMARY ANALYST:

AQC ANALYST: KB

SITE: A917 Bridge

CODE: 1/60/0.5

SORT/AQC METHOD: Not known/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:** 25/06/97

WATER-COURSE: Kilrenny Burn | **PRIMARY ANALYST:** | **AQC ANALYST:** KB

SITE: A917 Bridge | **CODE:** 1/20/0.65 | **SORT/AQC METHOD:** Preserved

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
VIAL	
BMWP taxa not found in vial	
Planariidae (incl. Dugesiidae)	7
Oligochaeta fragment	
Hydrobiidae (incl. Bithyniidae)	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 2 **GAINS** 0 **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 | **LABORATORY:** Perth | **DATE:** 19/06/97

WATER-COURSE: Ceres Burn | **PRIMARY ANALYST:** | **AQC ANALYST:** RG

SITE: d/s Ceres STW | **CODE:** 56/60/3.4 | **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:** Perth | **DATE:** 03/06/97

WATER-COURSE: Leven | **PRIMARY ANALYST:** | **AQC ANALYST:** RG

SITE: Cabbagehall Bridge | **CODE:** 2/10/17.8 | **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	
Valvatidae	9
Valvata piscinalis (Muller) 1 only	

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:** Riccarton | **DATE:** 22/04/97

WATER-COURSE: Keith Water | **PRIMARY ANALYST:** SdP | **AQC ANALYST:** NB

SITE: Keith Bridge | **CODE:** 22/300/34.4 | **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
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:** 07/11/97

WATER-COURSE: Bavelaw Burn | **PRIMARY ANALYST:** SdP | **AQC ANALYST:** NB

SITE: d/s Mill Balerno | **CODE:** 18/50/22.15 | **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)	

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:** Riccarton | **DATE:** 18/04/97

WATER-COURSE: North Esk | **PRIMARY ANALYST:** SdP | **AQC ANALYST:** NB

SITE: Roslin | **CODE:** 20/50/22.45 | **SORT/AQC METHOD:** Preserved/Preserved

RESULTS OF AUDIT

Family name	Presumed cause of error (see footnotes)
VIAL	
BMWP taxa not found in vial	
Sphaeriidae *	4
Additional BMWP taxa found in vial	
None	
SAMPLE	
BMWP taxa not found in sample (For samples where vial is broken or absent)	
N/a	
Additional BMWP taxa found in sample	
Sphaeriidae *	4
Pisidium sp. 1 only	
Nemouridae	9
Amphinemura sulcicollis (Stephens) 1 only	
Sericostomatidae	9
Sericostoma personatum (Spence) 1 only	

SUMMARY OF AUDIT

LOSSES 0 **GAINS** 2 **OMISSIONS:** 1

NET EFFECTS:

ON BMWP SCORE 17

ON NO. OF TAXA 2

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East | **LABORATORY:** Riccarton | **DATE:** 22/04/97

WATER-COURSE: Tyne | **PRIMARY ANALYST:** SdP | **AQC ANALYST:** NB

SITE: Pencaitland | **CODE:** 22/10/28.66 | **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:** Riccarton | **DATE:** 10/04/97

WATER-COURSE: Almond | **PRIMARY ANALYST:** NB | **AQC ANALYST:** SdP

SITE: Cowhill | **CODE:** 16/10/37.85 | **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:** 10/04/97

WATER-COURSE: Breich Water | **PRIMARY ANALYST:** NB | **AQC ANALYST:** SdP

SITE: Easter Breich | **CODE:** 16/270/28.68 | **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

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:** Riccarton | **DATE:** 23/04/97

WATER-COURSE: Carron | **PRIMARY ANALYST:** NB | **AQC ANALYST:** SdP

SITE: Denny Industrial Estate | **CODE:** 12/10/19.6 | **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	
Ephemerellidae	9
Ephemerella ignita (Poda)	
Beraeidae	9
Beraea maurus (Curtis) 1 only	

SUMMARY OF AUDIT

LOSSES 0 **GAINS** 2 **OMISSIONS:** 0

NET EFFECTS:

ON BMWP SCORE 20

ON NO. OF TAXA 2

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East | **LABORATORY:** Riccarton | **DATE:** 07/10/97

WATER-COURSE: Avon | **PRIMARY ANALYST:** NB | **AQC ANALYST:** SdP

SITE: Wallace's Cave | **CODE:** 14/10/20.84 | **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:** 13/10/97

WATER-COURSE: Almond | **PRIMARY ANALYST:** NB | **AQC ANALYST:** SdP

SITE: Blackburn | **CODE:** 16/10/31.61 | **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	
Glossiphoniidae	9
Helobdella stagnalis (L.) 1 only	
Hydroptilidae	9
Hydroptila sp. (p) 1 only	

SUMMARY OF AUDIT

LOSSES 0 **GAINS** 2 **OMISSIONS:** 0

NET EFFECTS:

ON BMWP SCORE 9

ON NO. OF TAXA 2

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

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

EXTERNAL AUDIT OF BIOLOGICAL SAMPLES

REGION: SEPA East | **LABORATORY:** Riccarton | **DATE:** 18/04/97

WATER-COURSE: North Esk | **PRIMARY ANALYST:** NB | **AQC ANALYST:** SdP

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)

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