



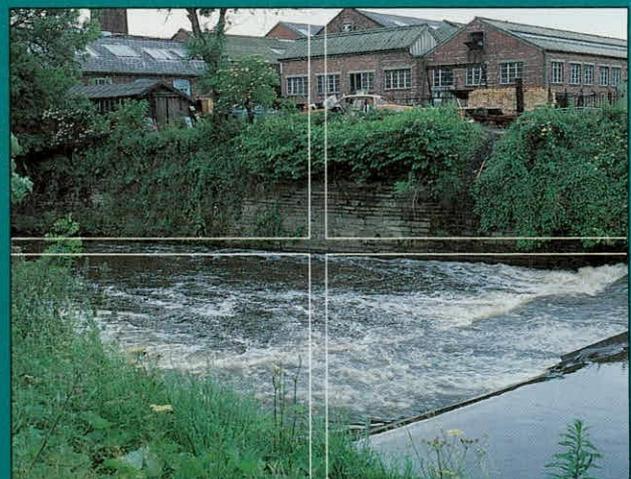
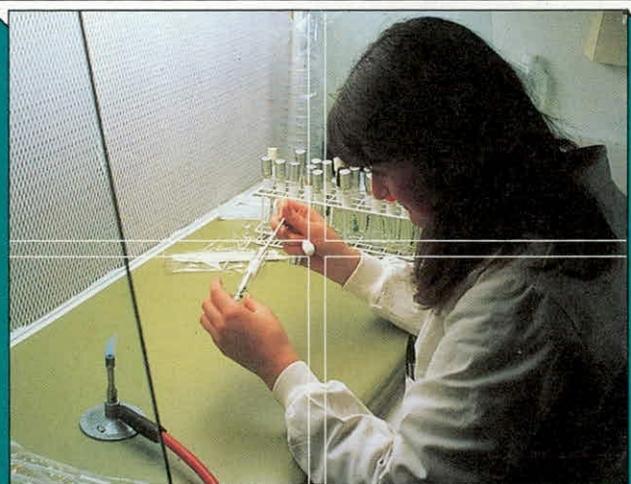
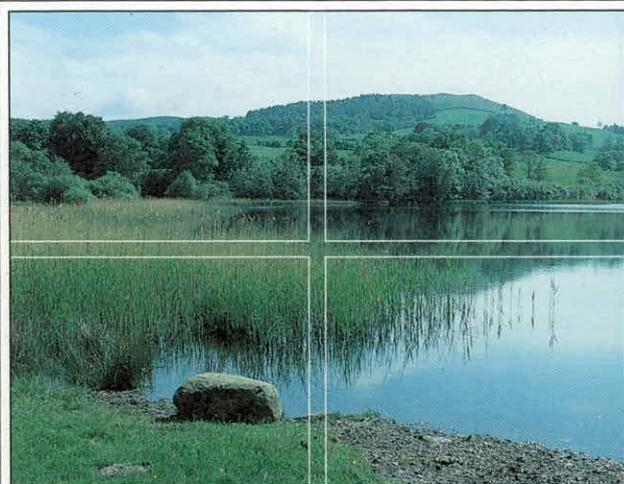
# **Quality audit of biological samples for the 1990 River Quality Survey Clyde River Purification Board**

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**Quality Audit of Biological Samples**  
**for the 1990 River Quality Survey**  
**Clyde River Purification Board**

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Project leader: J.F. Wright  
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## 1. INTRODUCTION

The 1990 River Quality Survey included the sampling of aquatic macro-invertebrates for biological assessment of river quality throughout the United Kingdom. In England and Wales the survey was undertaken by the National Rivers Authority (NRA), the River Purification Boards (RPBs) sampled in Scotland and the Department of Economic Development (DED) undertook the work in Northern Ireland.

Approximately 7750 sites were surveyed, the majority of which were sampled in spring, summer and autumn. Standard collection procedures were used and the sampling strategy was compatible with RIVPACS (River InVertebrate Prediction And Classification System), which has been developed by the Institute of Freshwater Ecology (IFE). Most of the remaining sites were sampled in a single season only, in order to extend the scope of the survey. For a variety of reasons, a few locations were sampled in just two seasons.

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. Sample processing and recording techniques varied from region to region.

In order to undertake this massive programme of fieldwork and sample processing, a large number of new staff were employed by the surveying agencies. In view of the number of staff involved and the variability of sample processing techniques, it was recognised that an independent quality control exercise was necessary to promote a consistently high level of reliability.

The IFE was contracted to undertake an audit of the sample sorting and identification performance of each NRA region, RPB and the DED. This report collates the results of 28 samples audited for Clyde RPB. The IFE was not required to perform any statistical analyses nor interpretation of the results of the audit.

## 2. SAMPLE SELECTION

Nearly all samples from the 1990 River Quality Survey were sent to IFE for storage. They were catalogued on arrival and placed in crates, such that individual samples were readily accessible. A stratified random selection of samples for each sample processor was then made. Selection was undertaken by IFE staff and no selection was made before each sample had been received by IFE. Thus, sample processors had no means of knowing which of their samples would be audited.

The total number of sample processors employed nationally during the survey was considerably higher than that anticipated at the outset. As a consequence, the number of samples audited per processor was limited by the need to keep within the contracted overall total of 700 samples. A minimum of 4 samples was audited per processor, except where individuals processed very few samples or did not process material from each of the 3 seasons.

Sample selection was weighted towards spring samples in order to give early feedback on the blindspots of particular sorters and problems of identification.

### 3. SAMPLE PROCESSING

Biologists processing samples for the 1990 Survey were instructed to sort their samples, ideally within the laboratory, and 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 selection for audit should have included:

- i) 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 and the BMWP families listed
- b) The families contained within the vial were identified and listed
- c) A comparison was made between the RPB listing of families and those identified from the vial by IFE
- d) A comparison was made between the RPB listing of families and those found in the sample by IFE
- e) "Losses" or "gains" from the RPB 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.

For a number of different reasons, some samples did not include a vial containing representative examples of the families listed on the RPB data sheet. These samples were avoided for audit, where possible. When selection of such samples was unavoidable (eg where a particular sorter would otherwise have been excluded from the audit exercise), only operations a), d) and e) above were appropriate.

Several directives were issued to IFE relating to the treatment of BMWP taxa. Terrestrial representatives of BMWP scoring families, animals deemed to have been dead at the time of sampling, cast insect skins, pupal exuviae, empty mollusc shells and tail ends of "living" specimens were to be excluded from the listing of families present. 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 (Table 1). For audit samples where a vial of animals was included, the comparison between the RPB listing and the taxa found in the vial by IFE was shown in box A of the report form. Discrepancies could be due to carelessness, misidentifications or errors in completing the RPB data sheet. Families not on the RPB listing but found by IFE in the remainder of the sample were entered in box B of the report form under "additional families". When the families listed as "losses" in section A 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 in the "losses" box of section A and the "gains" box of section B 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" in the table which summarises the results for each season (Table 2).

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 notes section of the report form. Where the RPB data sheet indicated that a family was noted and released at the site, this was recorded in the notes section but not included as a "loss", even though the family was not found in the vial.

For those samples which did not contain a vial of animals, box A of the report form was not applicable (N/a). Families not on the RPB list but present in the sample were listed in box B under "additional families" as before. Families recorded on the RPB list but not found by IFE were indicated on the left hand side of box B. If the vial of animals was retained by the RPB, entries in this box could include the sole representative of a family which was removed by the RPB, a family seen at the site which escaped or was released (without mention being made on the RPB data sheet), inaccurate identification, the wrong family box being ticked on the RPB data sheet or the family being present in the sample but missed by IFE.

Results of the audits of individual samples are presented in Table 3.

#### **ACKNOWLEDGEMENTS**

Thanks to Mrs Jessica Winder and Mrs Kay Symes for assistance with cataloguing and storage of samples and Mrs Valerie Palmer for typing the manuscript.

TABLE 1. The IFE Report form

1990 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION  RIVER

SEASON  SITE

SORTER  SAMPLE CODE

AQC OF BMWP FAMILIES    A. IN VIAL     B. IN SAMPLE

		LOSSES	GAINS
A	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE		
B	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	

NET LOSSES     NET GAINS

NOTES

TABLE 2. The 28 samples audited for Clyde RPB, with sample sorter initials and numbers of taxa 'lost', 'gained' and 'omitted'

River	Site	Sorter	Losses	Gains	Omissions
<b>SPRING</b>					
North Calder Water	Bargeddie Bridge	SC	0	0	0
Annick Water	Hairshaw	SC	0	0	0
White Cart Water	Busby Park	SS	0	0	0
Levern Water	Linthaugh Road	SS	0	0	0
Cander Water	D/s Stonehouse STW	MT	1	0	0
Stinchar	D/s Colmonell	MT	0	1	0
Clyde	Roberton	MK	2	2	1
Endrick Water	Gartcarron Bridge	MK	0	1	0
South Calder Water	U/s Ravenscraig	RD	0	1	0
South Calder Water	Merry Street Park	KA	0	0	0
Luggie Water	Luggie Foot	HW	0	0	0
Irvine	Riccarton	KA	0	1	0
Irvine	Gatehead	RD	0	1	0
<b>SUMMER</b>					
Gass Water	A70 Bridge	MK	1	3	0
Glazert Water	U/s Hospital	SC	1	1	0
Dippool Water	Westshield Bridge	KA	0	1	0
Water of Girvan	U/s Loch Skelloch	HW	0	1	0
Rotten Calder Water	Generals Bridge	RD	0	3	0
Levern Water	Dovecothall Bridge	SS	0	0	1
White Cart Water	Linn Park	MT	0	1	0
Water of Girvan	Cairnhill Bridge	HW	3	2	0
<b>AUTUMN</b>					
Kelvin	Torrance	HW	1	1	0
Black Cart Water	U/s Johnstone STW	MT	1	2	0
Luggie Water	North Myvot Farm	KA	0	0	0
South Calder Water	Orbiston Park	RD	0	1	0
Rotten Calder Water	Barnhill Bridge	SC	0	2	0
Aray	Three Bridges	SS	0	4	0
Fyne	A83 Old Bridge	MK	0	3	0



**TABLE 3**

**Results of individual sample audits**

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION <span style="border: 1px solid black; padding: 2px;">Clyde RPB</span>	RIVER <span style="border: 1px solid black; padding: 2px;">North Calder Water</span>
SEASON <span style="border: 1px solid black; padding: 2px;">Spring</span>	SITE <span style="border: 1px solid black; padding: 2px;">Bargeddie Bridge</span>
SORTER <span style="border: 1px solid black; padding: 2px;">SC</span>	SAMPLE CODE <span style="border: 1px solid black; padding: 2px;">NRA12 0327</span>

AQC OF BMWP FAMILIES    A. IN VIAL +    B. IN SAMPLE +

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	None	None

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	None

NET LOSSES 0

NET GAINS 0

NOTES

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB		RIVER	Annick Water
SEASON	Spring		SITE	Hairshaw
SORTER	SC		SAMPLE CODE	NRA12 0429

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	None	None

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	None

NET LOSSES        NET GAINS   

NOTES

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB	RIVER	White Cart Water
SEASON	Spring	SITE	Busby Park
SORTER	SS	SAMPLE CODE	NRA12 0364

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
A	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	None	None

B	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	None

NET LOSSES   

NET GAINS   

NOTES

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB	RIVER	Levern Water
SEASON	Spring	SITE	Linthaugh Road
SORTER	SS	SAMPLE CODE	NRA12 0382

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	None	None

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	None

NET LOSSES        NET GAINS   

NOTES

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB	RIVER	Cander Water
SEASON	Spring	SITE	D/s Stonehouse STW
SORTER	MT	SAMPLE CODE	NRA12 0313

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<p style="text-align: center;"><u>VIAL</u></p> <p>Differences between:                      i) BMWP families listed on sample data sheet and                      ii) BMWP families found in VIAL by IFE</p>	<p style="text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</p> <p style="text-align: center;">1 Elmidae</p>	<p style="text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="text-align: center;">None</p>
<b>B</b>	<p style="text-align: center;"><u>SAMPLE</u></p> <p>Differences between:                      i) BMWP families listed on sample data sheet and                      ii) BMWP families found in SAMPLE by IFE</p>	<p style="text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</p> <p style="text-align: center;">(This box only completed when no vial supplied with sample)</p>	<p style="text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="text-align: center;">None</p>

NET LOSSES        NET GAINS   

NOTES

1 Terrestrial curculionid found in vial

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB	RIVER	Stinchar
SEASON	Spring	SITE	D/s Colmonell
SORTER	MT	SAMPLE CODE	NRA12 0467

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	None	None
<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	1 Limnephilidae

NET LOSSES        NET GAINS   

NOTES    1 Halesus sp. 1 only

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION <span style="border: 1px solid black; padding: 2px;">Clyde RPB</span>	RIVER <span style="border: 1px solid black; padding: 2px;">Clyde</span>
SEASON <span style="border: 1px solid black; padding: 2px;">Spring</span>	SITE <span style="border: 1px solid black; padding: 2px;">Roberton</span>
SORTER <span style="border: 1px solid black; padding: 2px;">MK</span>	SAMPLE CODE <span style="border: 1px solid black; padding: 2px;">NRA12 0287</span>

AQC OF BMWP FAMILIES    A. IN VIAL +    B. IN SAMPLE +

LOSSES		GAINS
<b>A</b> <u>VIAL</u>  Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	BMWP FAMILIES NOT FOUND BY IFE  1 Hydrobiidae 2 Sericostomatidae 3 Chironomidae*	ADDITIONAL FAMILIES FOUND BY IFE  4 Goeridae
<b>B</b> <u>SAMPLE</u>  Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	BMWP FAMILIES NOT FOUND BY IFE  (This box only completed when no vial supplied with sample)	ADDITIONAL FAMILIES FOUND BY IFE  5 Asellidae 6 Chironomidae*

NET LOSSES 2                    NET GAINS 2

NOTES

1 Small Lymnaea palustris in vial  
 3,6 Ceratopogonidae in vial and sample, only 2 Chironomids in sample  
 4 Silo pallipes  
 5 Asellus aquaticus 1 only

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB	RIVER	Endrick Water
SEASON	Spring	SITE	Gartcarron Bridge
SORTER	MK	SAMPLE CODE	NRA12 0395

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	None	None

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	1 Hydroptilidae

NET LOSSES   

NET GAINS   

NOTES    1 Hydroptila sp.

1990 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	<b>Clyde RPB</b>	RIVER	<b>South Calder Water</b>
SEASON	<b>Spring</b>	SITE	<b>U/s Ravenscraig</b>
SORTER	<b>RD</b>	SAMPLE CODE	<b>NRA12 0318</b>

AQC OF BMWP FAMILIES    A. IN VIAL +    B. IN SAMPLE +

		LOSSES	GAINS
A	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	<b>None</b>	<b>None</b>

B	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	<b>1 Dytiscidae</b>

NET LOSSES 0    NET GAINS 1

NOTES **1 Oreodytes sanmarkii (adult) 1 only**

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION <b>Clyde RPB</b>	RIVER <b>South Calder Water</b>
SEASON <b>Spring</b>	SITE <b>Merry Street Park</b>
SORTER <b>KA</b>	SAMPLE CODE <b>NRA12 0319</b>

AQC OF BMWP FAMILIES    A. IN VIAL     B. IN SAMPLE

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	<b>None</b>	<b>None</b>

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	<b>None</b>

NET LOSSES     NET GAINS

NOTES

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	<b>Clyde RPB</b>	RIVER	<b>Luggie Water</b>
SEASON	<b>Spring</b>	SITE	<b>Luggie Foot</b>
SORTER	<b>HW</b>	SAMPLE CODE	<b>NRA12 0355</b>

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	<b>None</b>	<b>None</b>

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	<b>None</b>

NET LOSSES        NET GAINS   

NOTES

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	<b>Clyde RPB</b>		RIVER	<b>Irvine</b>
SEASON	<b>Spring</b>		SITE	<b>Riccarton</b>
SORTER	<b>KA</b>		SAMPLE CODE	<b>NRA12 0416</b>

AQC OF BMWP FAMILIES    A. IN VIAL     B. IN SAMPLE

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	<b>None</b>	<b>None</b>

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	<b>1 Psychomyiidae</b>

NET LOSSES     NET GAINS

NOTES 1 *Tinodes waeneri* 1 only

1990 RIVER QUALITY SURVEY

AQC - BIOLOGICAL SAMPLES

REGION	<b>Clyde RPB</b>	RIVER	<b>Irvine</b>
SEASON	<b>Spring</b>	SITE	<b>Gatehead</b>
SORTER	<b>RD</b>	SAMPLE CODE	<b>NRA12 0417</b>

AQC OF BMWP FAMILIES    A. IN VIAL +    B. IN SAMPLE +

		LOSSES	GAINS
A	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	<b>None</b>	<b>None</b>

B	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	<b>1 Planariidae</b>

NET LOSSES 0

NET GAINS 1

NOTES **1 Polycelis nigra/tenuis 1 only**



# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB		RIVER	Gass Water
SEASON	Summer		SITE	A70 Bridge
SORTER	MK		SAMPLE CODE	NRA12 0445

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	1 <i>Nemouridae</i>	2 <i>Taeniopterygidae</i>

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	3 <i>Caenidae</i> 4 <i>Hydroptilidae</i>

NET LOSSES        NET GAINS   

NOTES	2 <i>Taeniopteryx nebulosa</i> 3 <i>Caenis rivulorum</i> 1 only 4 <i>Hydroptila</i> sp. 1 only
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# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB	RIVER	Glazert Water
SEASON	Summer	SITE	U/s Hospital
SORTER	SC	SAMPLE CODE	NRA12 0347

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	<b>1 Gyrinidae</b>	<b>None</b>

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	<b>2 Hydrophilidae</b>

NET LOSSES        NET GAINS   

NOTES    2 *Hydraena gracilis*

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB	RIVER	Dippool Water
SEASON	Summer	SITE	Westshield Bridge
SORTER	KA	SAMPLE CODE	NRA12 0301

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<p style="text-align: center;"><u>VIAL</u></p> <p>Differences between:                      i) BMWP families listed on sample data sheet and                      ii) BMWP families found in VIAL by IFE</p>	<p style="text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</p> <p style="text-align: center; font-weight: bold;">None</p>	<p style="text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="text-align: center; font-weight: bold;">None</p>
<b>B</b>	<p style="text-align: center;"><u>SAMPLE</u></p> <p>Differences between:                      i) BMWP families listed on sample data sheet and                      ii) BMWP families found in SAMPLE by IFE</p>	<p style="text-align: center;">BMWP FAMILIES NOT FOUND BY IFE</p> <p style="text-align: center;">(This box only completed when no vial supplied with sample)</p>	<p style="text-align: center;">ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="text-align: center; font-weight: bold;">1 Leptoceridae</p>

NET LOSSES        NET GAINS   

NOTES    Athripsodes albifrons (pupa) 1 only

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB	RIVER	Water of Girvan
SEASON	Summer	SITE	U/s Loch Skelloch
SORTER	HW	SAMPLE CODE	NRA12 0458

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<p style="text-align: center;"><u>VIAL</u></p> <p>Differences between:                      i) BMWP families listed on sample data sheet and                      ii) BMWP families found in VIAL by IFE</p>	<p>BMWP FAMILIES NOT FOUND BY IFE</p> <p style="text-align: center; font-weight: bold;">None</p>	<p>ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="text-align: center; font-weight: bold;">None</p>
<b>B</b>	<p style="text-align: center;"><u>SAMPLE</u></p> <p>Differences between:                      i) BMWP families listed on sample data sheet and                      ii) BMWP families found in SAMPLE by IFE</p>	<p>BMWP FAMILIES NOT FOUND BY IFE</p> <p>(This box only completed when no vial supplied with sample)</p>	<p>ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="text-align: center; font-weight: bold;">1 Sphaeriidae</p>

NET LOSSES        NET GAINS   

NOTES    1 Pisidium sp. 1 only

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB		RIVER	Rotten Calder Water
SEASON	Summer		SITE	Generals Bridge
SORTER	RD		SAMPLE CODE	NRA12 0332

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	None	None

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	<b>1 Glossiphoniidae</b> <b>2 Heptageniidae</b> <b>3 Dytiscidae</b>

NET LOSSES        NET GAINS   

NOTES

1 *Glossiphonia complanata* 1 only  
 2 *Ecdyonurus* sp. 1 only  
 3 *Oreodytes sanmarkii* (larva) 1 only

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB		RIVER	Levern Water
SEASON	Summer		SITE	Dovecothall Bridge
SORTER	SS		SAMPLE CODE	NRA12 0380

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	<b>1 Tipulidae*</b>	<b>None</b>
<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	<b>2 Tipulidae*</b>

NET LOSSES        NET GAINS   

NOTES

1 Indet Muscid? in vial  
2 Phylidorea sp. (pupa) 1 only

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB		RIVER	White Cart Water
SEASON	Summer		SITE	Linn Park
SORTER	MT		SAMPLE CODE	NRA12 0366

AQC OF BMWP FAMILIES    A. IN VIAL     B. IN SAMPLE

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	None	None

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	<b>1 Hydroptilidae</b>

NET LOSSES     NET GAINS

NOTES 1 Agraylea sp. (pupa) 1 only

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB	RIVER	Water of Girvan
SEASON	Summer	SITE	Cairnhill Bridge
SORTER	HW	SAMPLE CODE	NRA12 0462

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
A	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	1 Lymnaeidae 2 Curculionidae 3 Polycentropodidae	4 Philopotamidae

B	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	5 Hydroptilidae

NET LOSSES        NET GAINS   

NOTES	2 Terrestrial species - <i>Otiorrhynchus morio</i> 4 <i>Wormaldia</i> sp. 5 <i>Agaylea</i> sp. (pupae)
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# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB		RIVER	Kelvin
SEASON	Autumn		SITE	Torrance
SORTER	HW		SAMPLE CODE	NRA12 0339

AQC OF BMWP FAMILIES    A. IN VIAL     B. IN SAMPLE

		LOSSES	GAINS
<b>A</b>	<p style="text-align: center;"><u>VIAL</u></p> <p>Differences between:            i) BMWP families listed on sample data sheet and            ii) BMWP families found in VIAL by IFE</p>	<p>BMWP FAMILIES NOT FOUND BY IFE</p> <p><b>1 Planorbidae</b></p>	<p>ADDITIONAL FAMILIES FOUND BY IFE</p> <p><b>None</b></p>
<b>B</b>	<p style="text-align: center;"><u>SAMPLE</u></p> <p>Differences between:            i) BMWP families listed on sample data sheet and            ii) BMWP families found in SAMPLE by IFE</p>	<p>BMWP FAMILIES NOT FOUND BY IFE</p> <p>(This box only completed when no vial supplied with sample)</p>	<p>ADDITIONAL FAMILIES FOUND BY IFE</p> <p><b>2 Sericostomatidae</b></p>

NET LOSSES       NET GAINS

NOTES    **2 Sericostoma personatum 1 only**

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB		RIVER	Black Cart Water
SEASON	Autumn		SITE	U/s Johnstone STW
SORTER	MT		SAMPLE CODE	NRA12 0385

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	<b>1 Planorbidae</b>	<b>None</b>

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	<b>2 Gammaridae 3 Limnephilidae</b>

NET LOSSES        NET GAINS   

NOTES	<p>2 Crangonyx pseudogracilis 1 only</p> <p>3 Limnephilus sp. (juvenile) 1 only</p>
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# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB		RIVER	Luggie Water
SEASON	Autumn		SITE	North Myvot Farm
SORTER	KA		SAMPLE CODE	NRA12 0352

AQC OF BMWP FAMILIES    A. IN VIAL     B. IN SAMPLE

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	None	None

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	None

NET LOSSES     NET GAINS

NOTES

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION <span style="border: 1px solid black; padding: 2px;">Clyde RPB</span>	RIVER <span style="border: 1px solid black; padding: 2px;">South Calder Water</span>
SEASON <span style="border: 1px solid black; padding: 2px;">Autumn</span>	SITE <span style="border: 1px solid black; padding: 2px;">Orbiston Park</span>
SORTER <span style="border: 1px solid black; padding: 2px;">RD</span>	SAMPLE CODE <span style="border: 1px solid black; padding: 2px;">NRA12 0321</span>

AQC OF BMWP FAMILIES    A. IN VIAL +    B. IN SAMPLE +

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	<b>None</b>	<b>None</b>

<b>B</b>	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	<b>1 Coenagriidae</b>

NET LOSSES 0      NET GAINS 1

NOTES 1 Ischnura elegans 1 only

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB	RIVER	Rotten Calder Water
SEASON	Autumn	SITE	Barnhill Bridge
SORTER	SC	SAMPLE CODE	NRA12 0333

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<p style="text-align: center;"><u>VIAL</u></p> <p>Differences between:            i) BMWP families listed on sample data sheet and            ii) BMWP families found in VIAL by IFE</p>	<p>BMWP FAMILIES NOT FOUND BY IFE</p> <p style="text-align: center;"><b>None</b></p>	<p>ADDITIONAL FAMILIES FOUND BY IFE</p> <p style="text-align: center;"><b>None</b></p>
<b>B</b>	<p style="text-align: center;"><u>SAMPLE</u></p> <p>Differences between:            i) BMWP families listed on sample data sheet and            ii) BMWP families found in SAMPLE by IFE</p>	<p>BMWP FAMILIES NOT FOUND BY IFE</p> <p>(This box only completed when no vial supplied with sample)</p>	<p>ADDITIONAL FAMILIES FOUND BY IFE</p> <p><b>1 Elmidae</b> <b>2 Tipulidae</b></p>

NET LOSSES        NET GAINS   

NOTES    **1 Oulimnius tuberculatus (adult) 1 only**  
**2 Dicranota sp., Tipula sp.**

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde		RIVER	Aray
SEASON	Autumn		SITE	Three Bridges
SORTER	SS		SAMPLE CODE	NRA12 0479

AQC OF BMWP FAMILIES    A. IN VIAL     B. IN SAMPLE

		LOSSES	GAINS
A	<u>VIAL</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	None	None

B	<u>SAMPLE</u>	BMWP FAMILIES NOT FOUND BY IFE	ADDITIONAL FAMILIES FOUND BY IFE
	Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	(This box only completed when no vial supplied with sample)	1 <b>Leptophlebiidae</b> 2 <b>Hydrophilidae</b> 3 <b>Hydroptilidae</b> 4 <b>Lepidostomatidae</b>

NET LOSSES     NET GAINS

NOTES

1 **Paraleptophlebia submarginata** 1 only  
 2 **Hydraena gracilis**  
 3 **Hydroptila sp.**  
 4 **Lepidostoma hirtum** 1 only

# 1990 RIVER QUALITY SURVEY

## AQC - BIOLOGICAL SAMPLES

REGION	Clyde RPB		RIVER	Fyne
SEASON	Autumn		SITE	A83 Old Bridge
SORTER	MK		SAMPLE CODE	NRA12 0477

AQC OF BMWP FAMILIES    A. IN VIAL        B. IN SAMPLE   

		LOSSES	GAINS
<b>A</b>	<u>VIAL</u>  Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in VIAL by IFE	BMWP FAMILIES NOT FOUND BY IFE  <b>None</b>	ADDITIONAL FAMILIES FOUND BY IFE  <b>None</b>
<b>B</b>	<u>SAMPLE</u>  Differences between: i) BMWP families listed on sample data sheet and ii) BMWP families found in SAMPLE by IFE	BMWP FAMILIES NOT FOUND BY IFE  (This box only completed when no vial supplied with sample)	ADDITIONAL FAMILIES FOUND BY IFE  <b>1 Caenidae 2 Taeniopterygidae 3 Lepidostomatidae</b>

NET LOSSES        NET GAINS   

NOTES

1 *Caenis rivulorum* 1 only  
 2 *Brachyptera* sp. (juvenile) 1 only  
 3 *Crunoecia irrorata* 1 only

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