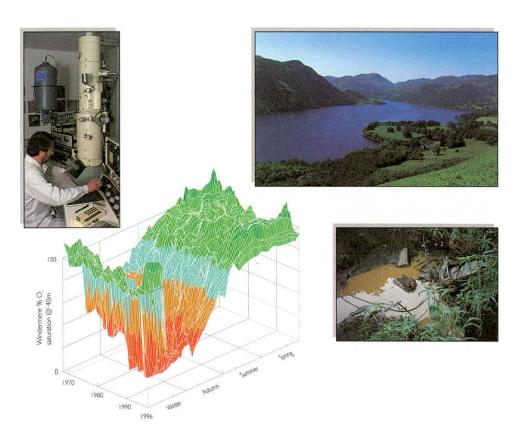


An Audit of Performance in the Analysis of Biological Samples. WBB Devon Clays Ltd

R J M Gunn, BA

J H Blackburn, BSc J Davy-Bowker, MSc

Report To: CEH Project No: IFE Report Ref. No: WBB Devon Clays Ltd T04071R7 RL/T04071R7/15





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R J M Gunn, J H Blackburn and J Davy-Bowker

Project Leader:

Report Date: Report To:

IFE Report Ref. No:

R.J.M. Gunn

March 1999

WBB Devon Clays Ltd

RL/T04071R7/15

Centre for Ecology & Hydrology

Institute of Freshwater Ecology Institute of Hydrology Institute of Terrestrial Ecology Institute of Virology & Environmental Microbiology

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1. INTRODUCTION

The use of aquatic macro-invertebrate communities for the biological assessment of river quality is now a well-established technique that is employed by many environmental consultancies throughout the United Kingdom. In much of the biological monitoring undertaken, specimens are identified to family level and the level of pollution measured by use of the Biological Monitoring Working Party (BMWP) score system. This provides a reliable measure of organic pollution but has limited value as an indicator of other stresses on a particular site. Furthermore, family level data is of limited use when assessing the conservation value of a particular site. For this purpose, species-level data is required.

The analysis of biological samples and subsequent identification of macro-invertebrates to species level is a highly specialised task. Biologists, especially those working alone, often make consistent errors when using taxonomic keys. This can result in important decisions being made on the basis of inaccurate lists of the invertebrate fauna present at a site. For this reason, the Environment Agency (EA) commissioned the Institute of Freshwater Ecology (IFE) to set up a system to audit the performance of their biologists, and contractors working under their guidance, in the analysis of biological samples. This report summarises the findings of an audit of work undertaken for WBB Devon Clays Ltd by G.J. Robinson. The audit comprised a qualitative re-analysis at species level of one sample (T9) from the River Teign and the verification of voucher specimens from all samples included in the project.

2. SAMPLE PROCESSING

The protocol employed G.J.Robinson was to place the invertebrates removed from the sample in a separate bottle of preservative before reconstituting the sample. The specimens in the bottle and the remainder of the sample were preserved in 70% industrial alcohol. The taxa found in the sample were listed on a data sheet. For the verification of each taxon found in the whole project, an individual specimen of each taxon was placed in a labelled vial. This was accompanied by a data sheet listing, in alphabetical order, the taxa found.

The protocol employed by IFE for the sample audit was to sort the remainder of the sample in a gridded tray, a small aliquot at a time, without reference to the data sheet or to the vial of animals. The invertebrates picked out were identified. Then the species contained within the vial were identified. Comparisons were then made with the data sheet.

3. REPORTING

For the sample audit, three listings were entered, in full, into the IFE database: a) taxa found in the vial, b) taxa found in the sample and c) taxa entered on the data sheet. Comparisons were made automatically between the listing of taxa and the specimens identified by IFE from vial and sample. "Losses" or "gains" from the original listing of taxa were noted. In the case of "losses", an interpretation of the possible cause of error was offered. The results of the sample audit were recorded on a standard report form (Appendix 1). The results of the verification of identifications are tabulated in Appendix 2.

4. ACKNOWLEDGEMENTS

Grateful thanks to John Murray-Bligh of the Environment Agency's Thames Region, who provided an invaluable service in the development and implementation of improved methodology.

APPENDIX

Results of the sample audit



RESULTS OF QUALITATIVE AUDIT

These results are produced for:

WBB Devon Clays Ltd -

Report printed on:

12-Mar-99

River and site: Teign at SX 8621 7296

Original Sample Code: T9

16

Sample date:

27/05/98

Analyst: GJR

IFE Sample Code:

	<u>In Vial</u>	<u>In Sample</u>	Data sheet	Losses/Gains
Potamopyrgus antipodarum (Gray)	*	*	*	
Lymnaea peregra (Muller)	*		*	
Ancylus fluviatilis Muller	*		*	
Sphaeriidae	*		*	
Oligochaeta	. *	*	*	
Piscicola geometra (L.)	*		*	,
Theromyzon tessulatum (Muller)	Mis-id		*	LOSS
Hemiclepsis marginata (Muller)	*			GAIN
Glossiphonia complanata (L.)	*		*	
Helobdella stagnalis (L.)	*		*	
Erpobdella octoculata (L.)	*		*	
Hydracarina	*	*	*	. '
Asellus aquaticus (L.)	* .	*	*	
Crangonyx pseudogracilis Bousfield	*		*	
Gammarus pulex (L.)	*	*	*	
Siphlonurus lacustris Eaton	*		*	•
Baetis muticus (L.)	. *		*	
Baetis rhodani (Pictet)	*	*	*	
Baetis scambus group	*	*	*	
Heptagenia sulphurea (Muller)	*	,	*	
Habrophlebia fusca (Curtis)	*		*	
Ephemera danica Muller	*		*	
Ephemerella ignita (Poda)	*	*	*	
Caenis rivulorum Eaton	*	*	*	
Brachyptera risi (Morton)	*		*	
Amphinemura sulcicollis (Stephens)	*		*	
Leuctra sp.	*		*	
Leuctra geniculata (Stephens)	*		*	•
Isoperla grammatica (Poda)	*		*	
Chloroperla torrentium (Pictet)	*		*	,
Calopteryx sp.	*	-	*	
Calopteryx virgo (L.)	*		*	
Cordulegaster boltonii (Donovan)	*		*	
Hydrometra stagnorum (L.)	*		*	
Velia sp.	*		*	

River and site: Teign at SX 8621 729	6			Original Sample Code:	Т9
Sample date: 27/05/98	Analyst:	GJR		IFE Sample Code:	16
			*		_
Micronecta sp.		*		*	
Hyphydrus ovatus (L.)		*		*	
Potamonectes depressus elegans (Panzer)		*		*	
Oreodytes septentrionalis (Sahlberg)		*		*	
Platambus maculatus (L.)		*		*	
Gyrinus urinator Illiger		*		*	
Helophorus (Meghelophorus) grandis Illiger		*		*	
Hydraena gracilis Germar		*	*	*	
Pomatinus substriatus (Muller)		*		*	
Elmis aenea (Muller)		*	*	*	
Esolus parallelepipedus (Muller)		*	*	*	
Limnius volckmari (Panzer)		*	*	*	
Oulimnius sp.		*		*	
Oulimnius tuberculatus (Muller)		*		*	
Sialis lutaria (L.)		*		*	
Sialis nigripes Pictet		*		*	
Rhyacophila sp.	Fu	rther id poss		*	LOSS
Rhyacophila dorsalis (Curtis)		*			GAIN
Glossosoma boltoni Curtis		*		*	,
Hydroptila sp.		*			
Lype phaeopa (Stephens)			*		GAIN
Psychomyia pusilla (Fabricius)	•	*		*	U
Plectrocnemia conspersa (Curtis)		*		*	
Hydropsyche instabilis Curtis		*			GAIN
Hydropsyche pellucidula (Curtis)		*		*	-
Hydropsyche siltalai Dohler		*		•	
Brachycentrus subnubilus Curtis			*	*	
Lasiocephala basalis (Kolenati)		*		*	
Lepidostoma hirtum (Fabricius)		*	*	*	
Halesus radiatus (Curtis)	•	*		*	
Potamophylax cingulatus (Stephens)		*		*	
Goera pilosa (Fabricius)		*		*	
Silo pallipes (Fabricius)		*		*	
Beraeodes minutus (L.)		*		*	
Sericostoma personatum (Spence)		*		*	
Odontocerum albicorne (Scopoli)		•		*	
Athripsodes sp.		*		*	
Athripsodes albifrons (L.)		*	*	*	
Athripsodes cinereus (Curtis)		*	*	*	
Ceraclea sp.	Fı	orther id poss		*	LOSS
Ceraclea dissimilis (Stephens)	• •	*	*		GAIN
Mystacides sp.	N	ot new taxon		*	LOSS
•	• `			-	

River and site: Teign at SX 8621 7296			Original Sample Code	e: T9
Sample date: 27/05/98 An	alyst: GJR		IFE Sample Code:	16
Mystacides azurea (L.)	*	*	*	
Mystacides longicornis (L.)	*		*	
Adicella reducta (Mclachlan)	*		*	
Oecetis sp.	Not new taxon		*	LOSS
Oecetis testacea (Curtis)	*	*	*	
Antocha vitripennis (Meigen)	*		*	
Ceratopogonidae	*	*	*	
Simulium sp.	Further id poss		. *	LOSS
Simulium (Nevermannia) vernum group	Mis-id		*	LOSS
Simulium (Wilhelmia) sp.	*		*	
Simulium (Boophthora) erythrocephalum (de Geer)	*		4	GAIN
Simulium (Simulium) reptans (L.)	*		*	
Simulium (Simulium) ornatum group	*	*	•	GAIN
Chironomidae	*	*	*	
Atherix ibis (Fabricius)	*		*	
Atherix marginata (Fabricius)	*		*	
Atrichops crassipes (Meigen)	*	*	*	
Hemerodromia group	*	*	*	,

Score summary based on BMWP families found in sample or in vial

BMWP score: 320

ASPT score: 6.667

No. of scoring taxa: 48

Score summary based on BMWP families on data sheet

BMWP score: 320

ASPT score: 6.667

No. of scoring taxa: 48

Verification of identifications from whole project

Taxon	Status of identification	Occurrence in audit sample (T9)
Acroloxus lacustris (L.)	Identification confirmed	
Adicella reducta (McLachlan)	Identification confirmed	Present
Aeshna sp.	Identification confirmed	
Agabus bipustulatus (L.)	Identification confirmed	
Agabus sturmii (Gyllenhal)	Identification confirmed	
Agapetus sp.	No specimen provided	,
Agapetus delicatulus McLachlan	Identification confirmed	
Agapetus fuscipes	No specimen provided	
Amphinemura sulcicollis (Stephens)	Identification confirmed	Present
Anabolia nervosa (Curtis)	Identification confirmed	
Anacaena bipustulata (Marsham)	Identification confirmed	•
Anacaena globulus (Paykull)	Identification confirmed	
Ancylus fluviatilis Muller	Identification confirmed	Present
Anisus vortex (L.)	= Anisus leucostoma (Millet)	•
Antocha vitripennis Meigen	Identification confirmed	Present
Aphelocheirus aestivalis (Fabricius)	Identification confirmed	•
Armiger crista (L.)	Identification confirmed	
Asellus aquaticus (L.)	Identification confirmed	Present
Atherix ibis (Fabricius)	Identification confirmed	Present
Atherix marginata (Fabricius)	Identification confirmed	Present
Athripsodes albifrons (L.)	Identification confirmed	Present
Athripsodes bilineatus (L.)	= Athripsodes cinereus (Curtis)	
Athripsodes cinereus (Curtis)	Identification confirmed	Present
Athripsodes sp.	Identification confirmed	Present
Atrichops crassipes Meigen	Identification confirmed	Present
Baetis muticus (L.)	Identification confirmed	Present
Baetis rhodani (Pictet)	Identification confirmed	Present
Baetis scambus group	Identification confirmed	Present
Baetis vernus Curtis	Identification confirmed	
Bathyomphalus contortus (L.)	Identification confirmed	•
Beraeodes minutus (L.)	Identification confirmed	Present
Brachycentrus subnubilus Curtis	Identification confirmed	Present
Brachyptera risi (Morton)	Identification confirmed	Present
Brychius elevatus (Panzer)	Identification confirmed	
Caenis luctuosa group	Identification confirmed	
Caenis rivulorum Eaton	Identification confirmed	Present
Calopteryx sp.	Identification confirmed	Present
Calopteryx virgo (L.)	Identification confirmed	Present
Ceraclea dissimilis (Stephens)	Identification confirmed	
Ceraclea fulva (Rambur)	No specimen provided	
Ceraclea nigronervosa (Retzius)	No specimen provided	
Ceraclea senilis (Burmeister)	No specimen provided	

Ceraclea sp.	= Ceraclea dissimilis (Stephens)	Present
Ceratopogonidae	Not on listing of taxa	Present
Chelifera group	Identification confirmed	
Chironomidae	Not on listing of taxa	Present
Chloroperla torrentium (Pictet)	Identification confirmed	Present
Chloroperla tripunctata (Scopoli)	Identification confirmed	
Cloeon dipterum (L.)	Identification confirmed	•
Coenagriidae indet	Identification confirmed	
Colymbetes fuscus (L.)	Identification confirmed	
Cordulegaster boltonii (Donovan)	Identification confirmed	Present
Corixidae (nymphs)	Identification confirmed	
Corixa punctata (Illiger)	Identification confirmed	
Crangonyx pseudogracilis Bousfield	Identification confirmed .	Present
Dendrocoelum lacteum (Muller)	Identification confirmed	
Dicranota sp.	Identification confirmed	
Dixa maculata Meigen	= Dixa maculata complex	
Dixa puberula Loew	Identification confirmed	
Dolichopodidae	= Rhagionidae	
Drusus annulatus Stephens	Identification confirmed	
Dugesia polychroa group	= Polycelis nigra group	
Dugesia tigrina (Girard)	Identification confirmed	•
Dytiscus sp. (larva)	Identification confirmed	
Ecdyonurus sp.	Identification confirmed	•
Elmis aenea (Muller)	Identification confirmed	Present
Ephemera danica Muller	Identification confirmed	Present
Ephemerella ignita (Poda)	Identification confirmed	Present
Ephydridae	Identification confirmed	
Erpobdella octoculata (L.)	Identification confirmed	Present
Esolus parallelepipedus (Muller)	Identification confirmed	Present
Gammarus pulex (L.)	Identification confirmed	Present
Gerridae (nymph)	Identification confirmed	. 11000110
Gerris lacustris (L.)	Identification confirmed	
Gerris najas (Degeer)	Identification confirmed	
Glossiphonia complanata (L.)	Identification confirmed	Present
Glossosoma boltoni	Identification confirmed	Present
Glyphotaelius pellucidus (Retzius)	Identification confirmed	1103011
Goera pilosa (Fabricius)	Identification confirmed	Present
Gyraulus albus (Muller)	Identification confirmed	1 Tesent
Gyrinus substriatus Stephens	Identification confirmed	
Gyrinus urinator Illiger	Identification confirmed	Present
Habrophlebia fusca (Curtis)	Identification confirmed	Present
Haemopis sanguisuga (L.)	Identification confirmed	Flescht
Halesus digitatus (Schrank)	Identification confirmed	i .
Halesus radiatus (Curtis)	Identification confirmed	
Haliplus flavicollis Sturm		
-	Identification confirmed	•
Haliplus lineatocollis (Marsham)	Identification confirmed	n
Helobdella stagnalis (L.)	Identification confirmed	Present
Helodes an (Ingra) (=Fledes an)	Identification confirmed	
Helodes sp. (larva) (=Elodes sp.)	Identification confirmed	•

Helophorus grandis Illiger Hemerodromia group Hemerodromia group Heptagenia subluvera (Muller) Hesperocorixa sahlbergi (Fieber) Hilaria sp. Hijdra sp. Hijdra sp. Hijdra sp. Hijdra sp. Hydracarina Hydracarina Hydracarina Hydracarina Hydracarina Hydrachus nitidicollis Mulsant Hydrachus pubescens (Gyllenhal) Hydrachus nistabilis Curtis Hydrachus nistabilis	Helophorus brevipalpis Bedel	Identification confirmed	
Hemerodromia group Identification confirmed Present	· · · · · · · · · · · · · · · · · · ·		Present
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Hespreocorixa sahlbergi (Fieber) No specimen provided Hilaria sp. Empididae (adult) - No key available Hydatophylax infumatus (McLachlan) Identification confirmed Present Hydatearina Hydraena gracilis Germar Identification confirmed Present Hydraena gracilis Germar Identification confirmed Present Hydraena riparia - Kugelann No specimen provided Hydrochus nitidicollis Mulsant Identification confirmed Hydroporus memnonius Nicolai Identification confirmed Hydroporus memnonius Nicolai Identification confirmed Hydroporus palustris (L.) Identification confirmed Hydropsyche instabilis Curtis Identification confirmed Present Hydropsyche pellucidula (Curtis) Identification confirmed Present Identification confirmed Identification confirmed Present Identification confirmed Identification confirmed Identification confirmed Present Identification confirmed Identification confirmed Identification		Identification confirmed	Present
Hilaria sp. Empididae (adult) - No key available Hydrophylax infumatus (McLachlan) Hydracarina Identification confirmed Present Hydracan a gracilis Germar Identification confirmed Present Hydracana argania Kugelann No specimen provided Hydrophus intidicollis Mulsant Identification confirmed Present Hydrophus intidicollis Mulsant Identification confirmed Present Hydroporus memonius Nicolai Hydroporus memonius Nicolai Hydroporus palaustris (L.) Identification confirmed Hydroporus plaustris (L.) Identification confirmed Hydropsyche instabilis Curtis Identification confirmed Present Hydropsyche instabilis Curtis Identification confirmed Present Hydropsyche siltalai Dohler Identification confirmed Present Hydropsyche siltalai Dohler Identification confirmed Present Hydropsyche siltalai Dohler Identification confirmed Present Hydropsyche siltalai Pohler Identification confirmed Present Hydropsyche siltalai Pohler Identification confirmed Present Identification confirmed Identification confirmed Present Identification confirmed Identification confirmed Present Identification confirmed Ide		No specimen provided	;
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Nemurella picteti Klapalek	Identification confirmed	
Nepa cinerea L.	Identification confirmed	
Nephrotoma sp.	Identification confirmed	
Notonecta sp. (nymph)	Identification confirmed	
Notonecta glauca L.	Identification confirmed	;
Ochthebius dilatatus Stephens	Identification confirmed	
Ochthebius minimus (Fabricius)	Identification confirmed	
Odontocerum albicorne (Scopoli)	Identification confirmed	Present
Oecetis sp.	Not a new taxon (= 0.testacea)	Present
Oecetis furva (Rambur)	= Oecetis testacea (Curtis)	
Oecetis testacea (Curtis)	Identification confirmed	Present
Oligochaeta	Identification confirmed	Present
Orectochilus villosus (Muller)	Identification confirmed	
Oreodytes sanmarkii (Sahlberg)	Identification confirmed	
Oreodytes septentrionalis (Sahlberg)	Identification confirmed	Present
Ostracoda	No specimen provided	
Oulimnius sp. (larva)	Identification confirmed	Present
Oulimnius tuberculatus (Muller)	Identification confirmed	Present
Paraleptophlebia sp.	No specimen provided	
Paraleptophlebia submarginata (Stephens)	Identification confirmed	
Pericoma sp.	Identification confirmed	
Perlodes microcephala (Pictet)	Identification confirmed	
Phoridae	No specimen provided	
Physa acuta group	Identification confirmed	•
Pilaria filata grp	Identification confirmed	
(= Pilaria (Neolimnomyia) sp.)		
Piscicola geometra (L.)	Identification confirmed	Present
Platambus maculatus (L.)	Identification confirmed	Present
Plectrocnemia conspersa (Curtis)	Identification confirmed	Present
Polycelis felina (Dalyell)	Identification confirmed	
Pomatinus substriatus (Muller)	Identification confirmed	Present
Porifera	No specimen provided	
Potamonectes depressus elegans (Panzer)	Identification confirmed	Present
Potamophylax cingulatus (Stephens)	Identification confirmed	Present
Potamophylax latipennis (Curtis)	Identification confirmed	
Potamopyrgus antipodarum (Gray)	Identification confirmed	Present
Procloeon bifidum Bengtsson	= Centroptilum luteolum (Muller)	
Psychomyia pusilla (Fabricius)	Identification confirmed	Present
Pyrrhosoma nymphula (Sulzer)	Identification confirmed	
Rhantus suturalis (Macleay)	Identification confirmed	
Rhithrogena semicolorata group	Identification confirmed	
Rhyacophila sp.	Not a new taxon (= R.dorsalis)	Present
Rhyacophila dorsalis (Curtis)	Identification confirmed	Present
Rhyacophila munda Mclachlan	Identification confirmed	
Sericostoma personatum (Spence)	Identification confirmed	Present
Sialis lutaria (L.)	Identification confirmed	Present
Sialis nigripes Pictet	Identification confirmed	Present
Sigara dorsalis (= Sigara (Sigara) sp.)	Identification confirmed	
Sigara falleni (Fieber)	No specimen provided	
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Sigara limitata (Fieber)	No specimen provided	
Sigara nigrolineata (Fieber)	No specimen provided	
Sigara venusta (Douglas & Scott)	Identification confirmed	
Silo pallipes (Fabricius)	Identification confirmed	Present
Simulium sp.	= Simulium ornatum group	Further identification
Simulium vernum group	= Simulium erythrocephalum (de Geer)	Mis-identification
Simulium equinum L.	Identification confirmed	Present
Simulium reptans (L.)	Identification confirmed	Present
Simulium tuberosum Lundstrom	No specimen provided	
Simulium variegatum Meigen	Identification confirmed	
Siphlonurus lacustris Eaton	Identification confirmed	Present
Sisyra sp.	Identification confirmed	•
Sisyra fuscata (Fabricius)	No specimen provided	
Sisyra terminalis Curtis	No specimen provided	
Sphaeriidae	Identification confirmed	Present
Stictotarsus duodecimpustulatus	Identification confirmed	
(Fabricius)		
Sympetrum sp.	No specimen provided	
Tabanidae	Identification confirmed	
Theromyzon tessulatum (Muller)	= Hemiclepsis marginata (Muller)	Mis-identification
Tinodes waeneri (L.)	No specimen provided	
Tipula sp.	Identification confirmed	•
Trocheta subviridis Dutrochet	Identification confirmed	
Valvata piscinalis (Muller)	Identification confirmed	-
Velia sp. (nymph)	Identification confirmed	Present
Velia caprai Tamanini	Identification confirmed	•
Wiedemannia group	No specimen provided	

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