

77th

Annual Report 2009

The Freshwater Biological Association (FBA) is an independent membership organisation and a registered Charity. Founded in 1929, our mission is to advance freshwater science and encourage as many people as possible to adopt it as the best way to understand, protect and manage our precious water resources.

We promote freshwater science by:

- disseminating information through websites, publications, scientific meetings and courses
- facilitating innovative and essential research
- providing sound independent scientific opinion.

Supporting Science

The FBA is based on the shore of Windermere, the Lake District in Cumbria and alongside the River Frome, East Stoke in Dorset. It supports scientific work at these and several other sites through providing specialist facilities and equipment. The research programme is also promoted by awarding grants and studentships, and by providing a working environment for Honorary Research Fellows - distinguished scientists who have retired from full time employment.

The Association works with other scientific societies, institutions and individuals around the world. It is a partner in the European Federation of Freshwater Sciences (EFFS) and supports African freshwater biologists through a knowledge exchange project and by a membership sponsorship scheme. The FBA is developing resources for biological recorders. It is also taking a lead in an initiative to rejuvenate the UK freshwater research community by developing 'The Cooperative Research Partnership', a collaborative strategic science programme with direct relevance to industry and the management of freshwater resources.

Library and Information Services

The FBA is an acknowledged leader in the provision of information on freshwater biology through:

Library and Collections - the FBA holds one of the finest freshwater libraries in

the world, housing published and unpublished collections, and is the custodian of a variety of long-term datasets from the Lake District, River Frome and other sites of scientific significance.

FreshwaterLife - an initiative to draw together information on freshwater fauna and flora and make it accessible via the Worldwide Web (www.freshwaterlife.org).

The Fritsch Collection - an active and growing reference collection containing millions of illustrations, identification notes and taxonomic bibliographic references for algae (www.fritschalgae.info).

Knowledge Transfer

Publications - the FBA is renowned for its range of high quality, scientifically accurate, keys, reference texts and analysis guides. Members are entitled to a 25% discount on all publications.

Scientific Meetings and Courses -the Association arranges a variety of national and international meetings (by itself or jointly with others), and runs general and specialist courses in freshwater biology. In addition to its Annual Scientific Meeting and the prestigious international summit series 'FBA conferences in Aquatic Biology', it works with other national European freshwater societies to organise the biennial Symposium for European Freshwater Sciences.

Membership

Membership is open to individuals and organisations who are interested in freshwater science and who wish to support the Association. Our members are drawn from around the world and include professionals working in research, education, and the management and conservation of fresh waters, as well as students and amateur enthusiasts. Members receive a regular Newsletter and free on-line access to the Association's journal *Freshwater Reviews*. They are entitled to a generous discount on FBA Scientific Meetings, on Scientific, Occasional and Special Publications, and on Library and Information Services. Members are encouraged to visit the Windermere or East Stoke sites and preference is given to

Members for use of the scientific facilities and the Library.

Annual Membership rates for 2009 are as follows:

Individual Member..... £35
 Student Member..... £20
 Corporate Membership..... £300
 Life Membership is also offered at a single payment of £600 (or £325 at age 60 or over).

All enquiries about the FBA to:

The Freshwater Biological Association,
 The Ferry Landing, Far Sawrey, Ambleside,
 Cumbria, LA22 0LP, UK.

Tel: +44 (0) 1539 442468.

E-mail: info@fba.org.uk,

Web: www.fba.org.uk

The FBA is a registered charity, number 214440 and a company limited by guarantee, registration number 263162, England.

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Front Cover: Waterfall at Skelwith Bridge, Cumbria, a winning image taken by Ronnie Edwards, a student at Myerscough College, Preston.

In a joint initiative the FBA invited photographic students from Myerscough College to visit and photograph the FBA for one of their location shoot modules.

© R. Edwards, Myerscough College.

THE FBA – RECOGNISED AND REVIVING

Sir Martin Holdgate, CB, MA, PhD, Hon.DSc, FIBiol



Several times this year I have been heartened by meeting people who asked about the FBA – and made it clear that they both knew about it and respected it. A number, indeed, were surprised and saddened to learn that we are no longer grant-aided by Government to carry out the original research that earned the Association its reputation. Others were deeply concerned that, in order to keep going, we have been

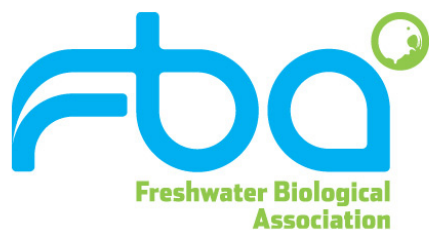
digging into our financial reserves and eroding our endowments.

Yet there are ‘green shoots’ of encouragement. Last September’s international scientific meeting at Windermere was outstanding in the calibre of the freshwater biologists it brought together. *Freshwater Reviews* is a high-quality journal – it simply needs subscribers to match praise

with pounds. At East Stoke the River Laboratory is beginning to hum with new life. As I move towards the end of seven fascinating years of Presidency, I remain confident that the FBA will have a future worthy of its past.

Mission:

The mission of the FBA is to advance freshwater science and encourage as many people as possible to adopt it as the best way to understand, protect and manage our precious water resources.



OFFICERS AND COUNCIL at 31st MARCH 2009

President

Sir Martin Holdgate, CB, MA, PhD, Hon.DSc, FIBiol

Chairman of Council

Professor A.G. Hildrew, PhD

Honorary Treasurer

Dr I.G. Dunn, MIBiol

Representative Members

The Fishmongers' Company

Dr C. Askew

Royal Society

Prof. B. Finlay, FRS

Elected Members of Council

Mr P.M. Andrewes

Dr M.J. Burgis

Dr S.J. Clarke

Ms G. Douglas

Dr D. Evans

Dr J.I. Jones

Prof. B. Okamura

Prof. C.S. Reynolds

Dr C.J. Spray

Prof. B. Whitton

Dr I. Winfield

Vice Presidents

Dr A.D. Berrie, CBIol, FIBiol

Dr E. Buttle, CBE, CBIol, FIBiol

Sir John Gray, ScD, MB, CBIol, FIBiol, FRCP, FRS

Prof. Sir F.G.T. Holliday, CBE, DSc, FIBiol, FRSE

Prof. C.T. Ingold, CMG, DSc, Dlitt, DCL

J. Jeffery, CBE, MSc, FCIWEM, FRIPH

E.D. Le Cren, MA, MS, CBIol, FIBiol, FIFM

Dr J.W.G. Lund, CBE, DSc, CBIol, FIBiol, FCIWEM, FRS

Prof. C.H. Mortimer, DrPhil, DSc, FRS

Prof. Sir W.D.P. Stewart, DSc, CBIol, FIBiol, FRSE, FRS

Dr J.F. Talling, DSc, FRS

The Duke of Wellington, MVO, OBE, MC, DL

The Duke of Westminster, KG, OBE, TD, DL

Finance and General Purposes Committee

Prof. A.G. Hildrew (Chairman)

Dr I.G. Dunn

Sir Martin Holdgate

Prof. C.S. Reynolds

Dr M. Dobson (Director)

*G.A. Freeman (Business Manager)

*C.M. Humphreys (Finance Officer)

* Attendees

Honorary Members of the Association

The Countess of Albermarle

P.V. Allen

R.M. Badcock

Dr T.B. Bagenal

J.A. Black

Prof. R.O. Brinkhurst

A.J. Brook

V.M. Brown

K.E. Burnand

T. Carrick

Dr J.C. Chubb

Dr D.W. Claridge

D. Crookes

D.J. Cross

Dr D.H. Dalby

Dr M.R. Droop

J.H. Elliott

Prof. J.M. Elliott

Prof. D.W. Ewer

R.S. Fort

Prof. J. Green

T.V. Gudjonsson

D. Harding

Dr J.E. Harker

E.V. Hart

Dr R. Hartland-Rowe

J. Henderson

J. Hobart

P.H. Holway

J.E.M. Horne

Dr J.V. Howarth

Prof. Dr U.H. Humpesch

B.M. Jones

Dr A.J. Juniper

B.M. Kipling

I. Lane

G.H. Lauff

Dr R.H. Lowe-McConnell

Prof. M. Macfadyen

Dr P.S. Maitland

K.F. Mansfield

C.C. McCready

Prof. P.J. Miller

W.A. Mitchell

L.R. Peart

D.H. Rhodes

J. Roskell

Dr D. Scott

D. Stevenson

Dr V.M. Stout

Dr D.W. Sutcliffe

Prof. J.J.A. Symoens

O. Simmonite

Dr H.I.S. Thirlaway

Prof. J.D. Thomas

Dr M.P. Thomas

M. Thompson

J.F. Turpin

Dr M.E. Varley

The Duke of Wellington

The Duke of Westminster

F.M. Wiseman

CAUSES FOR OPTIMISM

Prof. Alan Hildrew, PhD



A Chairman's report must achieve a difficult balance between pessimism – making sure we face up to the harsh realities of life as a small science charity in a tough world – and optimism – pointing out the opportunities for the FBA and taking pride in the progress made. This is brought into sharp focus looking back over a 12 month period of financial turmoil that has hit those charities and other organisations living off endowments. While the markets were high, we could point to the growing assets of the FBA, at the moment we cannot. This has focused Council's mind on the absolute need to concentrate on those activities and assets that can pay their way.

This has had several consequences. First, we have had to lose staff that in other circumstances we would not have wanted to lose. More positively, the Director is carrying out an options appraisal that is already influencing decisions. Included here is Council's realisation that the present

costs of the library cannot be sustained and that we must find some solution that will allow us to concentrate on the rare, and in some cases unique, assets of this, the National Freshwater Library, among the largest concentrations of freshwater material in the world. The process of evaluating the FBA's holdings has begun, with a view to finding a robust, long-term strategy for their stewardship. Council faces some more difficult decisions, I am sure, over the coming period.

Another dilemma for the Association concerns its need to be seen as active in the very best that freshwater biological research can offer, yet at the same time offering a home to ALL those people, from professors to schoolchildren, who have an enthusiasm for the subject. There can be a tension in this, but we must do both. A personal highlight for me was the inaugural FBA Conference in Aquatic Biology, in which the FBA and the Pearsall Building

put on their Sunday best to welcome the most prestigious group of freshwater ecologists to grace our Windermere site for many years. This was the Association in unashamedly elitist research mode – but this cannot and should not be all we do. You will find the Association expanding its outreach activities and involvement with local freshwater groups in the future – and you can be confident that Council does take the need to involve its members very seriously.

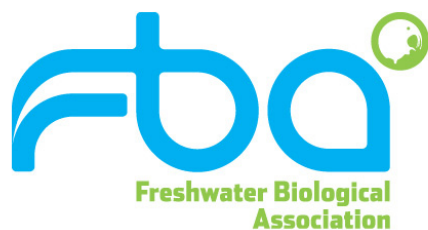
There are many positives to give us heart, and the financial situation, while serious, must not be a cause for gloom. We expect some exciting and innovative developments in our publications portfolio in the near future; and we are delighted by the continuing scientific activity at the River Laboratory and by business options at Windermere. The Association is undoubtedly moving forward.

Strategic objectives:

- *To meet the information needs of those involved in freshwater research and management (whether as amateurs or professionals) by maintaining specialist information resources, along with effective knowledge transfer and knowledge exchange mechanisms.*
- *To support high quality research in freshwater science by providing grants, international standard research facilities and mechanisms for facilitating research partnerships.*
- *To maintain itself as a thriving membership organisation in which those committed to freshwater biology can share common interests.*

Supporting objectives

- *To maintain a complement of staff and honorary research fellows with the expertise to respond to requests for information or advice.*
- *To adopt a financial strategy which will ensure the FBA's long term sustainability.*



COMPLEMENT AT 31st MARCH 2009

Director
Personal Assistants to the Director

Dr Michael Dobson
Sarah A. Johnson / Julie P. McNicol

Business Manager
Finance Officer
Finance and Administration Assistants

G. Andrew Freeman
Catherine M. Humphreys
Carolyn Fletcher
Sarah Rigby
Lynda Durrell
Christian E. Ripley

Marketing and Communications

Facilities Management, Windermere

Ken Clarke
Matthew Freeman
Brian Godfrey
Russell Smith
Gordon Lancaster

Facilities Management, East Stoke

Domestic Assistant, Windermere

Library and Information Services

Library
Library, Windermere

Kearon S. McNicol
Hardy Schwamm
Olive Jolly
Ian Pettman
Stephanie Smith
Dr Michael Haft
Louise Miles
Elaine Monaghan
Rebecca Close

Library, East Stoke
Bioinformatician / Web-developer
Freshwater *Life* / Journals
Fritsch Collection

Knowledge Transfer
Science and Publications
Training and Education

Dr Karen J. Rouen
Dr Melanie Fletcher
Simon Pawley

*The majority of staff are employed on a part-time basis
and/or fixed term contracts.*

Honorary Posts

Honorary Curator of the Fritsch Collection
Honorary Research Fellows:

Dr Elizabeth Y. Haworth
Prof. Patrick Armitage
Ken Clarke
Prof. J. Malcolm Elliott
Prof. D. Glen George
Terence Gledhill
Dr Elizabeth Y. Haworth
Dr Mike Ladle
Dr Allan Pentecost
Prof. Colin S. Reynolds
Dr Roger A. Sweeting

Honorary Editors:
Scientific and Special Publications
FBA News
Freshwater Reviews

Dr David W. Sutcliffe
Prof. Terry E.L. Langford
Prof. Colin S. Reynolds

DELIVERING THE STRATEGY

Dr Michael Dobson, FLS, MIEEM



In a period when there is so much bad news, it is pleasing to be able to report some positive developments at the FBA. Activities and products such as training courses, *Freshwater Reviews*, the FBA Conference in Aquatic Biology and local outreach, all of which are considered in more detail later in this report, have contributed to the generally enhanced profile that the FBA is gaining. The disparate information holdings of the FBA have been brought together into a single integrated information resource – the Library and Information Services (LIS) – and we have taken the opportunity in this report to provide some brief general information about its components and contents; information is a key resource, and the reorganisation will enable better future delivery to those who need the information that we hold.

Of course, there have been some problems over the year, most notably those caused by the general financial situation beyond our control, and securing new sources of income is an inevitable requirement. It is pleasing to announce, therefore, that we were successful in being awarded two significant grants. The first of these, from the Pilgrim Trust, has allowed us to initiate the long overdue digitisation of the Fritsch Collection of Algal Illustrations; this is considered in more detail on page 8. The second, from the Esmée Fairbairn Foundation, will fund the production of a new guide to freshwater invertebrates, which we hope will be a fitting substitute for the classic (and now difficult to obtain) 'Guide to Freshwater Invertebrates' by T.T. Macan; this work is not mentioned further, as it belongs more properly in next year's report, but we are keen to make it known that this book is on its way!

The two grants are wonderful demonstrations of the confidence that external funders have in us, but of course they are not enough to reverse the financial mishaps that have befallen the FBA. We have, therefore, had to make some savings, resulting in the loss of several staff members. Salman Elahi left us in January, after several years in which we benefitted hugely from his software development skills; for example, he was responsible for the online infrastructure supporting *Freshwater Reviews*, so whenever you submit a paper, download a pdf or simply log in, you are benefitting from his skills. We also said goodbye at the end of the financial year to Christian Ripley who, over three years, completely transformed the appearance of the FBA, as well as being an excellent co-editor of *FBA News*. Both of these people will be missed as individuals, and for their skills.

On a more positive note, we made three new appointments. Michael Haft joined us as a Bioinformatician / Web-Developer, Hardy Schwamm as an Information Scientist to take over running of the Library and associated collections, and Rebecca Close to work on the Fritsch Collection and Publications. All have contributed greatly to the organisation and I thank them for their efforts and enthusiasms.

The report presented here considers key developments at our two sites, and then presents activities under the four headings by which we now organise our activities: Membership, Information, Knowledge Transfer and Supporting Science. All four fields show positive developments, with the occasional setback and, despite our difficulties, FBA staff have much they can be proud of to show for the past year.

Looking to the future, our key priorities will be to reduce expenditure and increase income, but always bearing in mind that we are a charity, with a clear scientific mission, and not a commercial organisation. Major specific activities are as follows:

- a) Ensuring that our new tenants move into the East Stoke site with as little disruption as possible, and that all settle in well.
- b) Further development of training courses, with a move towards a process of accreditation of identification skills.
- c) Continuing to support and expand *Freshwater Reviews* and to work on new journal ideas.
- d) Investigating options for making better use of some of the facilities on the Windermere site, in particular the Annex Building.
- e) Ensuring that both the Annual Scientific Meeting and the 2010 FBA Conference in Aquatic Biology are successful and of a high standard.
- f) Securing the future of our key information holdings.

Through all these activities, we will continue our policy of working closely with other organisations – commercial consultancies, statutory authorities, other charitable organisations, research institutions, etc – and individuals to ensure that our understanding of freshwater systems continues to grow and their future well-being looks more secure.

FBA Facilities and Sites

The FBA manages a wide variety of research facilities for field and laboratory work in the freshwater sciences and owns two sites. Each site contains specialist indoor and outdoor research facilities and supporting infrastructure, including laboratories and meeting rooms. All facilities are available for short-term and long-term hire.

Windermere

Over the past year the old jetty was replaced with a generous donation from Robert Hughes and Applethwaite Ltd (the developer of The Ferry House), and the stone jetty adjacent to the car ferry improved with support from Windermere Lake Cruises and Cumbria Vision. The Hatchery and Aquarium returned to the FBA's control at the beginning of the financial year and since then improvements and alterations have been made to the fabric of the installation, including the tanks and flumes, and to the maintenance schedules. Alterations have also been made to reduce the water pumping costs and Dr Roger Sweeting has been successful in obtaining funding for a new rotary water filter installation. At the end of the year, preliminary work began to investigate options for the future use of the Annexe and work continues to attract more scientific activity and the increased use of the FBA's facilities at Windermere.

The major development on the Windermere site was the construction of the FBA Pond, made possible through a grant from the Big Lottery Fund. Although in itself small (see page 14), this proved to be a big headache because on commencement of construction we discovered a major problem: its location, on the site of the 19th century gas manufacturing plant for the former Ferry Hotel, was clearly contaminated with residues from this activity. All work stopped for several months while the local authority, the Environment Agency and a firm of specialist consultants assessed, reported, cleared and re-assessed the site. The final bill was considerably more than we would have liked, but the FBA can be rest assured that the contaminated land problem has been solved.

East Stoke

Whereas 2007-8 was marked by the arrival of new tenants at East Stoke, 2008-9 was

dominated by the planned departure of the largest of these – the Centre for Ecology and Hydrology (CEH) – and attempts to secure replacements. We are happy to welcome the following organisations, who will be moving in at various times over the coming year: APEM Ltd, Game and Wildlife Conservation Trust, GT Environmental and Roehampton University. These will join Bournemouth University, the Environment Agency, Plymouth University, Queen Mary University of London and Soil Mechanics Ltd, all of whom are now established with

different interests on the site. East Stoke has also hosted the field-based research associated with the PhD Studentship awarded by the FBA to Marian Yallop at Bristol University (see page 15).

Beyond the Laboratory site itself, the fishermen who use the river now have a new hut in which to shelter. There is, however, still some work to be done – there are several foot bridges that are in a dangerous condition and in urgent need of repair, so the work goes on.

FBA Site Facilities

Windermere, Cumbria

- Situated on the western shore of the lake, this site contains the following:
- The Hatchery – 78 circular tanks (volume 1.6 m³), fed by water pumped from the lake and delivered at individually controllable rates. Some tanks can be supplied by water that has passed through a drum filter.
- The Aquarium – approximately 50 m of shelving for aquarium tanks supplied with filtered lake water. This includes use of various clear-sided tanks, varying in volume from 0.03 m³ to 1.5 m³.
- The Annexe and Jetty – landing and mooring facilities for boats, plus basic office, storage and wet laboratory space
- The Pearsall Building – a laboratory equipped for basic ecological research, including light microscopes, plus an electron microscope suite; both with technical support. Meeting rooms and full conference facilities for up to 70 people.

East Stoke, Dorset

- Situated on the River Frome, this site contains the following:
- The River – Access to 5 km of the River Frome, including fishing rights.
- Experimental Channels – seven gravity-fed artificial stream fishing channels, up to 10 m long.
- The Fluvarium – a running water aquarium which directs the flow of the former mill stream through two glass-sided channels.
- The Fish Counter – a structure across the river designed to support automatic fish counters and tag detectors for monitoring migrating fish.
- The River Laboratory – a building containing nine purpose-built laboratories and associated facilities, including offices, fume cupboards and storage facilities. The building also contains a large conference room (capacity 120), a smaller meeting room and part of the FBA library.



TOP LEFT Jetty construction day two

LEFT Jetty construction day five

ABOVE The new jetty

Membership

Membership continues to rise, and in 2008 it passed a significant landmark: for the first time in over forty years there were more annually paying Members than Life Members. For many years the bulk of the membership has been the large cohort who took out Life Membership when it was offered cheaply in the 1960s, and this has inevitably led to a gradual increase in average age. Now, however, we are attracting new members and, more importantly, keeping them. On 31 March 2009, membership stood at 1517, still well short of its historical high of 2200, but definitely moving in the right direction. Among Corporate Members, we were pleased to welcome two major institutions: the Centre for Ecology and Hydrology and Natural England.

Members who have been with the FBA for 50 years are offered Honorary Membership to acknowledge their support of the Association. In addition, Council may, at its discretion, celebrate the outstanding achievements of individuals by awarding Honorary Membership before they reach

this milestone. So it was in early 2009, when Honorary Membership was bestowed upon Professor Uwe Humpesch, recently retired from the University of Vienna, for his contribution to two editions of the FBA's key to larval Ephemeroptera.

During the year, we carried out a survey of members' opinions about the FBA. Thank you to all who responded; the information gained has been useful in planning for the future. Full details appeared in the members' newsletter *FBA News* (No. 45: Spring 2009), but its key findings are as follows. There was support for current activities but a strong desire to see more of those activities from which the membership sees a real benefit: training courses, in-house research projects, publications and, for members themselves, networking opportunities. There was also a feeling among some respondents that the FBA is not doing enough to champion freshwater issues, and could become more of a lobbying and debating body. In terms of both information provision and communication with members, electronic delivery was

highlighted as something that we should be doing more of. In particular, members felt they had insufficient knowledge of the information holdings of the FBA and few opportunities to find out; this is something that the Library and Information Services team is now addressing.

One of the key findings of the survey was identifying a desire for greater involvement by members in the FBA. In this respect, we have begun to make progress; several members suggested regional meetings, and the North East England regional group, highlighted on page 12, is now active in that part of the world. Members' committees, giving members more say in the running of the Association, are popular, and the Grants and Awards Committee and Meetings Committee are now established ways in which the FBA is involving more than just its staff and trustees in important decision-making processes. In due course, we will develop more such mechanisms for greater members' involvement in their Association.

Library and Information Services

Introduction

The FBA is custodian of some internationally important information resources, including its library, datasets, Unpublished Collection, Fritsch Collection of Algal Illustrations and the contents of its Freshwater *Life* website.

With the advent of the new Library and Information Services section (LIS) within the FBA, it has become possible for the LIS team to set up rota service to enable a quick and reliable customer service. Now a team of five is able to deal with all kinds of freshwater-related enquiries.

The Library

The last year saw many changes for the FBA's library, including appointment of new staff, a review of products and price structures, and policies on use of data and of acceptance of donations. There has been a constant stream of new library material via the FBA's long-standing exchange arrangements with organisations and individuals worldwide, who provide books, journals and reprints in return for

FBA publications. These are particularly valuable contributions because they represent documents that can be hard to access elsewhere. The library at East Stoke is now a working resource providing an enquiry service, borrowing facilities and an inter-library loans service from Windermere. It is well-used by tenants, FBA members and visitors, including FBA course attendees.

Unpublished Collection

In October 2008, Dr Susan Jones completed the task of reviewing and organising the FBA's Unpublished Collection. The material is now boxed and outline listed, although the daunting task of cataloguing to archive standards remains. Considering the size of the Collection, this task will take several years at least, but the FBA is able now to deal with enquiries regarding the Collection better than ever before. The outline listing gives users an indication about the material we hold, and we have developed a License Agreement to ensure appropriate use of archival material.

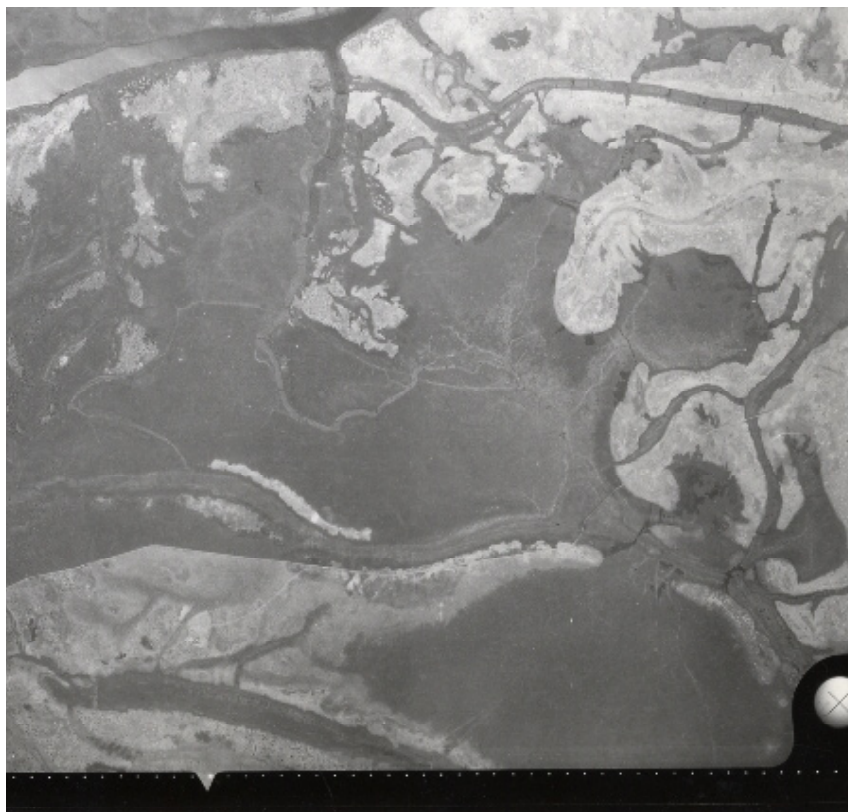
The Collection is not a closed archive and

we consider taking donations that are relevant to the FBA's mission. Examples of recently added collections are the Tutin Collection, the John Lund Collection and the Hilda Canter-Lund Collection, the books, reprints, unpublished notes, photographs and other artifacts from three eminent people who worked at Windermere.

The FBA was pleased to welcome the first official users of the Unpublished Collection following completion of their cataloguing: Brian Foley, an FBA-funded PhD student, from the University of Ulster, worked with field notebooks relating to the studies of Blelham Tarn (see page 17) and Ian Wallace from World Museum Liverpool is currently assessing the FBA's collections of caddis (Trichoptera) specimens.

Fritsch Collection of Algal Illustrations

In November 2008, thanks to a generous grant from the Pilgrim Trust, work started on a project to conserve and digitally archive the Fritsch Collection, starting with the taxonomically discrete desmid section. The aim of the project is to take archive-quality digital photographs of the sheets, whilst recording the conservation status of each sheet and repairing if necessary.

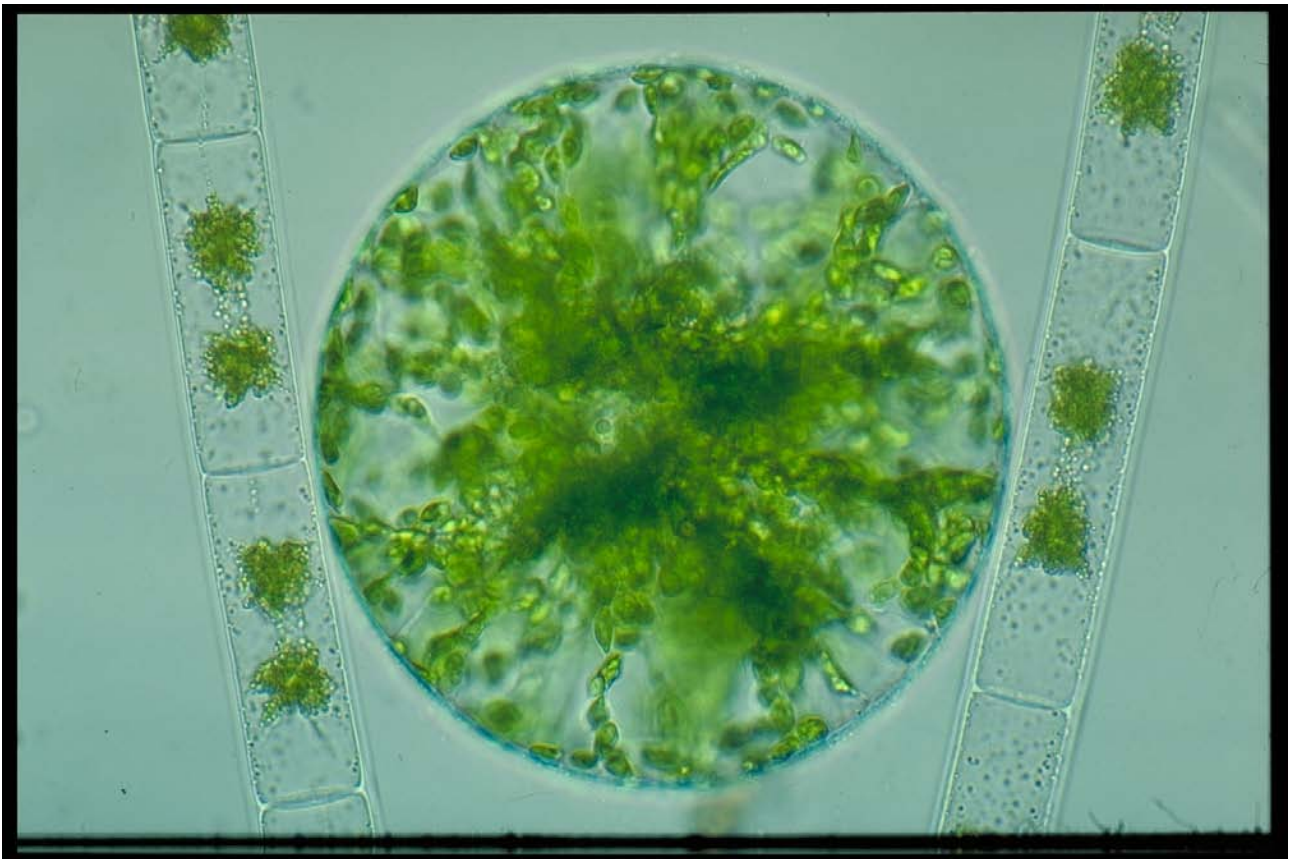


One of the treasures of the Unpublished Collection: an aerial photograph of the path of the Sudd Wetland (Sudan), one of a large number taken c. 1938.

About the Library

The library is one of the largest and most comprehensive sources of published and unpublished material on fresh waters in the world (2.2 kilometres of shelving, 400 000+ catalogued items). It is mainly situated at Windermere (approximately 80%), with a satellite library at East Stoke.

This world class resource is global in its coverage, with hard to find publications from Eastern Europe, Russia and China being of particular importance. It is a major international collection and historical archive covering freshwater biology, taxonomy and ecology from 1930 to 2002, and its unique catalogue includes book chapters from multi-authored books as well as individual journal articles (for the period 1930-2002) from over 2500 journal titles and the wide range of grey literature in its holdings.



A picture of *Eremosphaera* by Hilda Canter-Lund is just one of the many images to be found online in the Image Archive at www.freshwaterlife.org/imagearchive

Approximately 7500 sheets have now been photographed and recorded. The project has also presented an opportunity to review the taxonomic information associated with the sheets. A total of 1750 species have now been entered with authorities and dates. In many cases, the collection has been found to include the original type illustrations and diagnoses, and it is hoped that future projects will capture this valuable information electronically so that it can be more easily located.

In terms of the conservation status of the sheets, most are in remarkably good condition, but there are problems with old glues and repair tapes. Some of Professor Fritsch's original entries are nearly 100 years old but show few problems, whereas some later additions are showing signs of deterioration. The assistance of the conservation expertise from the National Trust and the Linnean Society of London has been invaluable, and we are grateful to the Steering Committee of assessors appointed as part of the Pilgrim Trust grant (see below) for their input and support for the project so far.

The project showed that the number of sheets of desmids in the Collection is in the region of 14 000, twice the original estimate, and necessitating a further six months to complete the desmid section.

We are therefore seeking funding to complete this project and to make the collection available online.

The generally sound condition of the Fritsch Collection and the progress made over the year are due largely to the activities of the Curator, Dr Elizabeth Haworth (see page 20), who is to be congratulated for her achievements in developing a future for the Collection.

Fritsch Collection Steering Committee

- Caroline Cotgrove, adviser on conservation (National Trust)
- Dr John G. Day, adviser on science (SAMS, curator of freshwater and protozoa culture collections)
- Gina Douglas, adviser on conservation and digitisation (FBA Council and Honorary Archivist, Linnean Society of London)
- Prof David M. John, adviser on science (Natural History Museum, London)
- David B. Williamson, adviser on science (desmid specialist)

FreshwaterLife

During 2008-9, the software on which the FreshwaterLife website runs was completely redeveloped, and the opportu-

nity taken to create a more user-friendly and intuitive system. New and exciting features include authentication via IP address range, which means that when

What is FreshwaterLife?

FreshwaterLife is a collaborative programme which aims to promote easy access to the world's information on freshwater organisms and their habitats. The aims of FreshwaterLife are:

1. To support the information needs of those with an interest in freshwater biology.
2. To encourage communication and information sharing throughout the freshwater interest community.
3. To promote an appreciation and understanding of freshwater ecosystems.

The objectives of the FreshwaterLife project are met partly through the website www.freshwaterlife.org, which encourages users to contribute information in order to build a better resource for all.



ABOVE Samples from the Unpublished Collection. BELOW The FBA Library at Windermere



members of an organisation known to *FreshwaterLife* go to the website they are automatically logged in and are given access to parts of the website that may be restricted to others. The revamped species pages include links to the NBN (National Biodiversity Network) Gateway, which provides distribution maps, the Natural History Museum species pages, which provide taxonomic information, and the image archive, which supplies links to any relevant images.

Over 1000 users have now registered with *FreshwaterLife*. *Freshwater Matters*, the electronic newsletter providing headlines in the world of freshwater biology and links to full articles, continues to be one of its most popular outputs, with much positive

feedback from readers.

The Image Archive is a repository for images of freshwater habitats and species that can be freely accessed and added to. It can be used as a repository for personal, departmental or organisational photographs, with access permissions and security being under the contributor's control. Users can make their folders completely secure so that only they or members of their organisation can access them, or photos can be open access so other users can browse them. Full sized images can be made freely available or fees can be charged for access/use of images. Additions to the Image Archive during 2008-9 include some of Hilda Canter-Lund's excellent photographs of algae. If you would like to add your images, please contact the *FreshwaterLife* team at info@freshwaterlife.org.

Other activities

The FBA continued its long time collaboration with the Food and Agriculture Organization of the United Nations (FAO) with two new projects started in December 2008. The first is to update the Geographic Authority List of the Aquatic

About FBA Datasets

In order to understand environmental changes and their impacts upon living organisms and ecological systems, we depend upon the availability of good data. Particularly valuable are historic datasets that present a reliable snapshot of a period in time, and those that cover long periods. Long-term datasets allow changes to be identified and tracked over time. Unfortunately, funding for data collection is usually over short periods of time, and until recently the value of routine monitoring was not fully appreciated, so few such datasets exist.

The FBA is custodian of long-term datasets which are internationally important. These include some ongoing series of data, notably the Windermere surface temperature and lake level data collected since 1931, and those held jointly with the Centre for Ecology and Hydrology (CEH), covering zooplankton, phytoplankton, fish and water chemistry from Windermere, Grasmere, Esthwaite Water and Blelham Tarn, collected in some cases since the 1940s. There are further datasets from the River Frome in Dorset and counts of wildfowl from Windermere compiled since the 1960s.

The FBA looks after more than 60 historical datasets, from many parts of the UK and across the world, in which data collection continued over at least three years. There are also numerous snapshot surveys, such as those from historic African expeditions.

Sciences and Fisheries Abstracts (ASFA). ASFA is the premier reference in the field of aquatic resources and the Geographic Authority List is one of the tools used for new input to its contents. The second project includes identification and sorting of duplicate publications from the FBA's holdings and assessing the potential value of the material for ASFA partners in Africa. In total, 60 archive boxes of material are being reviewed.

About the Unpublished Collection

The Unpublished Collection is among the unsung highlights of the FBA's assets. Thanks to generous donations of well known researchers such as Frost, Jenkin, Macan, Pearsall and Reynolds, the Collection contains a large number of field notebooks, unpublished data, correspondence, drawings, photographs, specimens and samples. Currently the Collection comprises 16 four-drawer filing cabinets, four plan chests, 640 standard size archive boxes, 300 slightly smaller correspondence boxes and 20 metres of reference samples on shelving. The Collection also houses the corporate archive of the FBA.

Knowledge Transfer

Scientific Meetings and Publications

Scientific Meetings

Annual Scientific Meeting

The Association's Annual Scientific Meeting was held on 15–16 July 2008, in the splendid setting of the Fishmongers' Hall, London, by courtesy of the Worshipful Company of Fishmongers. Attended by some 60 delegates, the theme was 'Science in Industry: The Application of Freshwater Science in Practice'. The conference opened with the guest speaker, Richard Aylard, External Affairs and Sustainability Director at Thames Water. A diverse range of scientific papers followed, including the application of freshwater science in the power and water supply industries, the uncertainties associated with assessments of ecological quality for the EC Water Framework Directive and, in South Africa, the role of aquatic systems in democratic reform. The impacts of pollution and invasive species were considered by several speakers, along with several that considered entirely natural phenomena. The meeting included an open discussion on the idea of a Cooperative Research Partnership for Freshwater Biology, which fed into the ongoing consultation into the idea. Posters were displayed throughout the meeting, with a prize awarded to the best student poster; the winner was Shaun Cotter of Queen Mary University of London, for his poster entitled 'Impacts of water-cross farms on the ecological integrity of chalk streams'.

FBA Conferences in Aquatic Biology

Sixty-six delegates, including some of the world's pre-eminent freshwater biologists, gathered for a week long 'summit' at Windermere on 1–4 September 2008, for the inaugural 'FBA Conference in Aquatic Biology'. This series of prestigious,



Professor Louise Heathwaite talks about challenges for land and water management

international workshops is intended to be a platform for the free exchange of ideas, the pooling of knowledge and the gathering of scientific evidence.

The theme of this first conference, convened by Professor Steve Ormerod, was

The FBA's programme of scientific meetings, publications and training activities is integral to our aim of promoting science.

Scientific meetings include the Association's Annual Scientific Meeting, the recently launched 'FBA Conferences in Aquatic Biology', and regional meetings in the north-east of England to complement independent groups in other regions of the country. We also work with other national freshwater societies in Europe, to organise the biennial Symposium for European Freshwater Sciences (SEFS), which will be held in Romania in August 2009.

The Association is an established publisher of scientific texts on freshwater science. We are particularly well known for our keys to identifying freshwater organisms and last year launched a new, peer-reviewed international journal *Freshwater Reviews*.

Our programme of courses is now in its second year of development and we are currently investigating options to expand this to systems of accreditation. We are also involved in various outreach activities, promoting freshwater biology in the wider community.

'Multiple Stressors in Aquatic Ecosystems', looking at how they combine/interact, the consequences, and the implications for water managers. The conference was opened with an address by Professor John Beddington, the Chief Scientific Advisor to the UK Government, and included a series of thought-provoking talks on the interacting roles of urbanisation, salinisation, nutrient enrichment, climate change, channelisation and invasive species in streams, ponds and lakes across the world. Seventeen internationally-renowned scientists spoke at the meeting: Kurt Fausch, Nancy Grimm, David Hart, Margaret Palmer, Vince Resh and David Strayer from the USA; Bob Hecky and John Smol from Canada; Stuart Bunn, Jenny Davis and Barbara Downes from Australia; John Quinn from New Zealand; Klement Tockner from Switzerland; Bernhard Statzner from France; and Louise Heathwaite, Stephen Maberly and Brian Moss from the UK.



The CRP special session convened at the Annual Scientific Meeting by Alan Hildrew, Mike Dobson, Alastair Ferguson and Bill Brierley (Photo: Louise Miles, FBA)



re-established the previous year under the auspices of the FBA, held two meetings during 2008-9. The first hosted by Jane Reed, at the University of Hull in June, focused on managing inland waters with respect to the EC Water Framework Directive and Habitats Directive. The second, hosted by Dr Martyn Lucas and Professor Brian Whitton at the University of Durham in March, carried a broad theme of 'Rivers and streams'.

Publications

Scientific, Occasional & Special Publications

Two publications were completed during 2008-9. The first, Occasional Publication (OP) No. 32, lists published work on freshwater science from the FBA, Institute of Freshwater Ecology and Centre for Ecology and Hydrology (CEH), from 1929 to 2006. Compiled by Ian McCulloch (CEH), Ian Pettman, Jack Talling and Olive Jolly (FBA), it updates a previous list published in 1979 (OP 7) and provides not only a record of the scientific contributions of the three organisations but also a useful resource to complement bibliographic databases or for those without access to modern literature search tools. In publishing OP32, we took the opportunity to introduce a new look and mode of production for Occasional Publications, with new titles (from OP32 onwards) now being available online and printed in-house on demand.

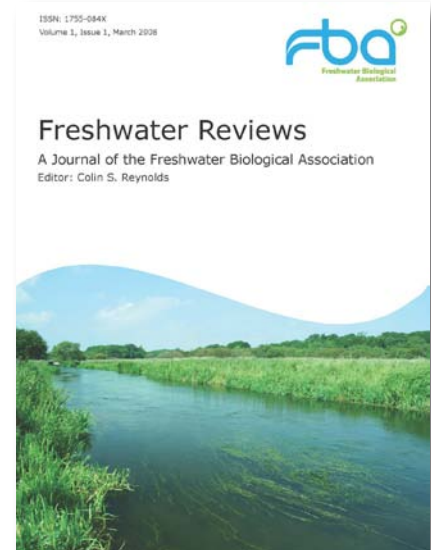
The second publication, a revised key to freshwater Megaloptera and Neuroptera by Malcolm Elliott (Scientific Publication No. 65), was published in February 2009. The aquatic Megaloptera and Neuroptera (alderflies, lacewings and stoneflies) are low in species diversity and yet are fascinating and important elements of the freshwater fauna. This revision represents the fifth edition, with an updated section on life cycles and ecology, and a comprehensive reference list, as well as keys to identifying the adults and larvae. As with previous publications in this series, we are most grateful to the Environment Agency for their financial support for this new key. Our attention now turns to further revisions of existing keys, to new texts, and to a redesign of the Scientific Publication series.

Journals and Members' Publications

As usual, our newsletter *FBA News* was published quarterly during 2008-9, and continues to carry articles and news about freshwater matters, news of members, and updates on FBA activities. We welcome

contributions from members and others, whether an article, a note on the natural history of a particular organism or habitat, a report from a conference, an item to add to the 'Diary of Events', or a thought-provoking letter to spark debate! The editors – Terry Langford and Christian Ripley – are to be congratulated for their efforts in producing this newsletter over the year.

Our new journal, *Freshwater Reviews*, has now completed its first full year since the first paper was published online in December 2007. The journal – dedicated to providing comprehensive, modern reviews of topics in the freshwater sciences – was officially launched with the first print issue in March 2008, the second print issue being published the following December. Interest from contributing authors and feedback from readers has been encouraging, and we are actively marketing the journal to build our subscriber base. We are grateful for the support of the Editorial Board, the peer-review panel, those FBA members who have acted as volunteer copy-editors, and not least our Editor, Professor Colin Reynolds. The journal is an 'online first' service, with papers published online as they are ready (www.fba.org.uk/journals) and then subsequently in print in two full-colour issues (bi-annually). FBA Members benefit from free online access to the journal and have received complimentary copies of the first two print issues; members wishing to continue receiving print copies can subscribe at a special discounted price



Research on the impacts of multiple stressors in the natural environment and under experimental manipulation was presented, and the importance of experimental/survey approach and design highlighted. Throughout the meeting, the significance of long-term datasets was emphasised, the best-documented multi-stressor impacts in lakes benefiting from over 40 years' intermittent data in the case of Lake Victoria and over 60 years' data from Windermere. Approaches to mitigate the impact of multiple stressors, by involving stakeholders in the management of fresh waters, were considered, with examples provided from Australia and New Zealand. One of the conclusions agreed at the end of the conference was that 'The complex nature of multiple stressors means that "ecological surprises" are to be expected. Ecological thinking is needed to explain such events and to give us the ability to predict potential new impacts and avoid further surprises'.

The conference was supported by the Environment Agency and by Wiley-Blackwell. Papers from the conference, guest-edited by Steve Ormerod, will appear in a special online-only issue of *Freshwater Biology*, with free access to all.

North-East England Regional Freshwater Group

The North East Regional Freshwater Group,

Training, Education and Outreach

Courses and Accreditation

During spring and summer 2008, the FBA ran a varied programme of one- and two-day identification courses, which were well attended with participants coming from a wide range of backgrounds (see box). Tutored by some of the top experts in their fields, the aim of the courses is to equip participants with the skills and confidence to sample and identify freshwater organisms to a level appropriate to the individual, and to provide key field and laboratory experience. Following on from the success of the 2008 programme, we have put together our second full course programme for spring–summer 2009.

To support our training programme, and to make our laboratory facilities attractive to external users, a number of investments were made during the year, including the purchase of new dissecting and stage microscopes. The Windermere laboratory has been equipped and organised so that routine equipment is easily available for biological identification courses and the East Stoke facilities have also been improved.

Building on our experience of running courses, in March 2009 we ran two one-day pilot training courses (to be followed by two one-day assessments) as part of an investigation with the Environment Agency into an accreditation process for the identification of aquatic invertebrates.

Recorders and Schemes Project

This year saw the end of the Esmée Fairbairn Foundation (EFF) funded 'Recorders and Schemes Project', which aimed to support volunteer-based biological recording of freshwater plants and animals in the UK. As well as helping to initiate the FBA's training course programme, other outcomes included setting up websites for a number of schemes, providing support in data management, producing promotional materials for schemes and developing 'how-to' guides in collaboration with scheme co-ordinators for the recording of specific species. EFF funding for the project has ended but aspects of its activity continue, including further support with data and website development and the Recorders' Fund, for which applications are still being accepted. The Fund provides



ABOVE Course participants hard at work in the laboratory at FBA Windermere. **BELOW** Sampling on the River Endrick, during the invertebrate course at SCENE, Loch Lomond



small grants for costs such as travel expenses for meetings, conferences or sampling trips, the purchase of equipment or the production of publicity materials

such as newsletters. Details of how to apply can be downloaded from the project website www.fba.org.uk/recorders.

FBA Training Courses run in 2008-2009

Identifying larval dragonflies

15–16 April 2008, FBA East Stoke.
Tutors: Steve Brooks & Steve Cham.

Identifying aquatic invertebrates, with specialist caddis and beetle day

17–18 April 2008, FBA East Stoke.
Tutors: Ian Wallace & Garth Foster.

Identifying macroalgae

22–23 April 2008, FBA Windermere.
Tutors: Martyn Kelly & Allan Pentecost.

Identifying freshwater bugs

3 May 2008, FBA Windermere.
Tutor: Sheila Brooke.

Introduction to identifying wetland plants

22–23 May 2008, FBA Windermere.
Tutor: Richard Lansdown.

Fish health, parasites and disease

6 June 2008, FBA Windermere.
Tutor: Roger Sweeting.

Introduction to pond survey methods – the PSYM method

16–18 June, FBA Windermere.
Tutors: Pascale Nicolet & Terry Gledhill.

Entomology for fly tyers

12 July 2008, FBA Windermere.
Tutors: Stuart Crofts & Andrew Dixon.

Identifying freshwater invertebrates, with a specialist mayfly and stonefly day

5–6 August 2008, SCENE, University of Glasgow, Loch Lomond. Tutor: Craig Macadam.

Identifying freshwater invertebrates, with a specialist mayfly and stonefly day

31 March–1 April, SCENE, University of Glasgow, Loch Lomond. Tutor: Mike Dobson.



Outreach

FBA staff visited schools to run activities on the theme of colour in fresh waters as part of the British Science Association National Science Week.

In conjunction with National Moth Night, which is run by the National Moth Recording Scheme and Butterfly Conservation, the FBA held an event to encourage moth enthusiasts and the general public to look out for adult fresh-water insects, particularly caddisflies which are a regular bi-catch in moth traps.

As part of the Windermere on Water Festival (WoW), visitors were invited to view a display of the work of the FBA and samples of live invertebrates to learn more about life in the lake.

National Insect Week is a bi-annual event which aims to promote wider awareness and understanding of the importance and fascination of insects. This year was particularly relevant to us as the theme focused on aquatic insects. A stall showing



ABOVE Moth enthusiasts gather round to examine the catch on National Moth Night (Photo: Melanie Fletcher, FBA). **LEFT** Small Elephant Hawkmoth (Photo: Simon Pawley, FBA)

fascinating facts about aquatic insects was set up at FBA Windermere and members of the public were encouraged to 'ask an entomologist' with a special box for questions that were answered by FBA staff.

With the support of the Big Lottery Fund's 'Breathing Places' campaign a wildlife pond has been constructed on site at Windermere, providing an opportunity to educate and inform the many people who pass our doors every year on foot. The pond is only 15 m² in surface area and has been deliberately designed and placed to provide a contrast to the much larger lake, Windermere (c. 14 000 000 m²), whose nearest shore is only 10 m away from the pond. The pond has filled with rain water and will be largely left to colonise naturally; at the moment it is just a depression filled with muddy water and dead leaves but with lots of potential! It will be used for educational visits by schools and the public and includes a dipping platform, seating area (outdoor classroom), interpretational signage and specially designed leaflets on the identification of freshwater invertebrates.



ABOVE The FBA pond during construction. **LEFT** The completed pond and interpretation board.

Supporting Science

Overview of Activities

The main methods used by the FBA to support science are provision of grants and awards, and the hosting of Honorary Research Fellows, both of which we describe in detail below. In addition to these, however, there were some smaller activities during the year.

The FBA is involved from time to time in small research projects, often in the form of desk studies. Thus in 2008-9, Allan Pentecost carried out desk studies for the Environment Agency on macrophyte monitoring, and for Plantlife on invasive water plants; both of these are detailed in his report (page 21). Melanie Fletcher and Anne Powell worked with the Environment Agency on a review of options for multi-taxa indicators. Among field-based activities, Dr Fletcher and Simon Pawley assisted in an ultimately unsuccessful search for the rare snail *Myxas glutinosa* in Windermere and Dr Fletcher and Mike Dobson assisted in surveys of fish at the Lake District sites in the Acid Waters Monitoring Network.

Taking advantage of our custodianship of several populations of pearl mussels, Louise Miles has commenced a part-time PhD studentship at the University of Cumbria investigating interactions between mussels and their fish hosts. The FBA is supporting this through payment of her fees and providing some of her time to carry out her research. Louise represented the FBA at an international meeting on rearing mussels, held in Luxembourg in May 2008, where she gave a presentation on the work of the FBA in their conservation.

Staff have continued to be actively involved in the Cumbria Tarns Project which has now collected data for 370 tarns. The project was set up by Cumbria Wildlife Trust and the FBA in 2003 with the aim of engaging trained local volunteers in re-surveying tarns that had been surveyed 30 years previously by a member of both organisations, Mr Ralph Stokoe. Trial fish surveys proved popular with volunteers and tarns were surveyed during the summer – fish lengths and weights were recorded and scale samples taken for fish age determination. Preliminary analysis of the macrophyte data suggests some changes have

taken place in the plant assemblages over 30 years and with financial help from the Environment Agency further analysis is planned together with the development of the next stage of survey work. It is hoped that the results of the survey will help to inform any decisions made about the management of Cumbria's tarns and how best to protect them in the future.

Finally, we were pleased to welcome, in early 2009, Dr Haifa Jewair from the University of Baghdad. Dr Jewair is spending several months at Windermere, enhancing her and our knowledge of the oligochaete fauna of the region.

Grants & Awards

The FBA awards an annual grant of £4000 for scientific research into freshwater biology. The grant – the Hugh Cary Gilson Memorial Award – is in memory of a former Director of the FBA and is open to all current FBA Members. In 2008 it was

awarded to Jorge Salgado (Natural History Museum and University College London), whose progress report is presented overleaf.

Part-funded PhD Studentships

Helen Rosenkranz commenced her PhD at the University of Bristol in November 2008, jointly funded by the FBA and the Lady Emily Smythe Agricultural Research Station (LESARS). Her PhD, entitled 'Biofilm dynamics: biodiversity, architecture and functioning in response to agrochemical gradients', is an interdisciplinary project supervised by Dr Marian Yallop (School of Biological Sciences, University of Bristol), Dr Alex Anesio (School of Geographical Sciences, University of Bristol) and Dr Martyn Kelly (Bowburn Consultancy, Durham). The aims of the project are to: (i) quantify the microbial biofilms in terms of their bacteria, viruses and eukaryotes along a gradient of anthropogenic stress



Helen Rosenkranz, sampling the biofilms in the river channels facility, at FBA East Stoke, Dorset

Hugh Cary Gilson Award Report

The roles of dispersion, patchiness and environmental conditions in structuring shallow lake communities

Jorge Salgado

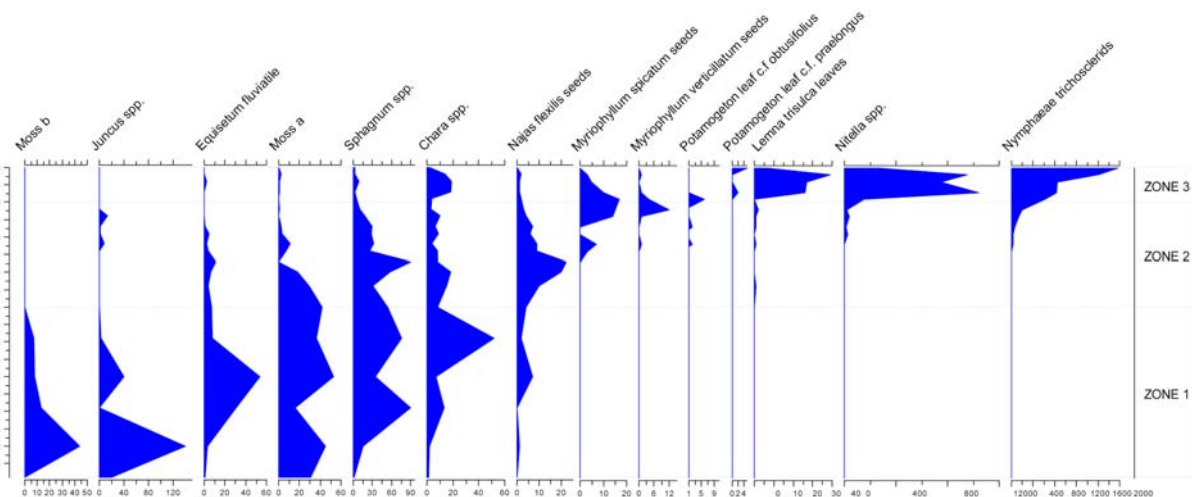
The processes that determine the patterns of distribution and abundance of co-occurring species are a central issue for conservation biology and restoration ecology. As community ecology has moved towards a greater understanding of open systems, recent studies suggest that freshwater communities are structured not only by a combination of local factors, such as environmental conditions, productivity, predation and competition, but also by regional processes like patchiness, dispersion, colonisation and extinction (e.g. Cottenie, 2005; Beisner et al., 2006). Within this framework, much attention has been focused on understanding contemporary (1–5 years) assemblages. However, the importance of longer time scales (10 to hundreds of years) that offer more realistic insights into the extinction and colonisation of different species, has largely been ignored. Given this oversight, this study aims to investigate the processes that structure freshwater communities in a landscape of well connected satellite lakes at the Upper Erne Lough System, Fermanagh, Northern Ireland, by using contemporary and palaeolimnological techniques.

The Upper Lough Erne Lough system is situated in Co. Fermanagh in the west of Northern Ireland. It is a Special Area of Conservation (SAC) under the EC Habitats Directive. It consists of a large river-fed, mostly eutrophic lake with a predominantly limestone catchment, including numerous associated satellite lakes with different levels of connection to the main Lough. This large and complex freshwater system is of particular interest, as, despite its conservation status, most of its satellite lakes are affected by eutrophication. Additionally, since the end of the 1990s, the zebra mussel, *Dreissena polymorpha*, has invaded most of these systems, displacing other native mussel species and creating shifts in the water clarity and alterations in the freshwater communities (Rosell et al., 1999). For these various reasons, the Upper Lough Erne Lough system provides an ideal natural study system for assessing the processes that structure aquatic communities from a local to a regional perspective over historical timescales.

Thanks to the support received from the FBA, I have successfully completed the first field expedition to the Upper Lough Erne system. With the award I carried out a 12-day palaeolimnological and contemporary survey of three SAC lakes (Mill Lough, Castle Lough and Lough Head). I retrieved seven short (< 1 m), wide bore sediment cores from three spatially separated stations on Mill Lough and Castle Lough and one from Lough Head. I also conducted detailed contemporary macrophyte surveys of Castle Lough. I found a total of 13 submerged macrophytes in this Lough, including *Nuphar lutea*, *Myriophyllum verticillatum*, *Lemna trisulca*, *Elodea canadensis*, *Stratiotes aloides*, *Sparganium emersum*, *Sagittaria sagittifolia*, *Potamogeton praelongus* and *Utricularia vulgaris*.

Thus far I have analysed a total of 20 core samples of between 75 and 80 cm³ for microfossils in one core from Castle Lough. Although I am still in the process of analysing the data, my preliminary analyses suggest that there were two major shifts in the aquatic plant and invertebrate community composition. The first shift occurred in the periods corresponding (approximately) to the top 40 cm and 15 cm of the core. Previously the lake was dominated by charophytes, bryophytes and the endangered species *Najas flexilis* and subsequently these species were replaced by a more typical 'eutrophic' vegetation, including *Myriophyllum spicatum*, *M. verticillatum*, water lilies (possibly *Nuphar lutea*, the only species recorded for the Lough), *Lemna trisulca* and *Potamogeton obtusifolius*. The animal remains exhibit trends which seem to follow the macrophyte community changes, with for example, an initial decrease in concentrations of the bryozoans (*Plumatella* spp. and *Fredericella* spp.) at c. 40 cm. Zebra mussel remains were found in the top c. 5 cm of the core, indicating a recent invasion. Overall, these preliminary analyses suggest that community composition has changed dramatically over the time period represented by the core (see figure below).

Following the results of a second field trip this summer, I should be in a position to compile a more comprehensive dataset from all the SAC lakes of the system allowing me to establish the relative roles of local and regional factors in structuring this changes. Our study will reveal useful information on the implications for assessing regional vs. local management targets for lake systems.



References

- Beisner, B.E. Peres-Neto, P.R. Lindström, E.S., Barnett, A. & Longhi, M.L. (2006). The role of environmental and spatial processes in structuring lake communities from bacteria to fish. *Ecology* **87**, 2985–2991.
- Cottenie, K. (2005). Integrating environmental and spatial processes in ecological community dynamics. *Ecology Letters* **8**, 1175–1182.
- Rosell, R.S., Maguire, C.M., & McCarthy, T.K. (1999). First reported settlement of zebra mussels *Dreissena polymorpha* in the Erne system, Co. Fermanagh, Northern Ireland. *Biology and Environment: Proceedings of The Royal Irish Academy* **98b**, 191–193.



Jorge Salgado sampling macrophytes at one of the shorelines of Castle Lough

(nutrients and herbicides); (ii) improve our understanding of the functioning of the biofilms by quantification of the balance between autotrophic and heterotrophic processes along the gradient of degradation; and (iii) investigate the role of viruses in controlling biofilm formation and activity in 'stressed' versus 'pristine' communities under experimental conditions.

Brian Foley has now successfully completed the first year of his PhD, in a collaborative project between the University of Ulster at Coleraine (UUC) and the Centre for Ecology and Hydrology (CEH), Lancaster. Supervised by Professor Brian Rippey (UUC) and Drs Ian Jones and Stephen Maberly (CEH), his PhD is entitled 'Controls and consequences of oxygen depletion in lakes'. Brian is investigating the interacting effects of climate change and nutrient load on dissolved oxygen (DO) depletion in lakes, as well as assessing some of the consequences of DO depletion in terms of the habitat available to fish and phosphorus release from sediments.

Brian's work started with the further development of a statistical model based on the relationship between hypolimnetic dissolved oxygen (DO) depletion and both chlorophyll a and total phosphorous, which are indicators of lake trophic state. Fieldwork was carried out on five eutrophic lakes in Northern Ireland and the data contributed towards improving the predictive ability of the model.

Since summer 2008, Brian has been based at CEH Lancaster, analysing long-term data sets for a selection of Cumbrian lakes. He is investigating whether there has been a change in DO depletion rates over a time period when anthropogenic influences on the lake systems have increased considerably. In addition to long-term data, he has

been particularly interesting in extracting data from the Unpublished Collection on the experimental enclosures, commonly referred to as Lund tubes, that we installed in Blelham Tarn in 1970. Various experiments were undertaken in the tubes in order to improve understanding of phytoplankton dynamics.

These included increasing the concentration of nutrients in the water, which led to a wide range of inter-annual rates of primary production. Brian is using the data to explore the relationships between epilimnetic phytoplankton production and the depletion of DO in the hypolimnia of the tubes during the period of thermal stratification.

Regrettably, **Angela Gooderham** withdrew due to illness at the end of the first year of her PhD at the University of Durham. We wish her well in the future and are sorry that she could not complete her studies. Her supervisors, Dr Martyn Lucas and Professor, Rus Hoelzel have appointed a new student to continue the project 'Behavioural and evolutionary ecology of lampreys – jawless archetypes in a 21st century landscape'. **Fiona Bracken**, currently working for the Central Fisheries Board in Ireland, starts in October 2009, with a replacement year's funding from other sources.

CASE PhD Studentship

Julia Reger started her PhD at the University of Sheffield in October 2008.

Supervised by Drs Andrew Beckerman, Jon Slate (University of Sheffield) and Mike Dobson (FBA), her project is entitled 'Molecular basis of adaptation to predator regimes using *Daphnia*'. Julia has completed her literature review and the project is proceeding well. The FBA is the CASE (Collaborative Awards in Science and Engineering) partner in this project, providing a small amount of money towards fieldwork expenses and offering use of the FBA Library and Laboratories.

MSc Bursaries

This year the FBA launched a new scheme to support MSc students undertaking courses in which there is a strong element of taxonomy or identification training. The FBA will pay the fees for a student, to be identified by the course leader, with our preference being that a student is supported who shows a clear interest in the taxonomic side of the subject. The first course to be awarded such a bursary is the MSc in Freshwater and Coastal Science run by Queen Mary University of London and University College London. The student receiving the bursary is **Hillery Driscoll**.



Brian Foley during fieldwork

Reports from the Honorary Research Fellows

FBA Honorary Research Fellowships are awarded to distinguished scientists who wish to continue their research after retiring from full-time employment.

The FBA provides desk space and laboratory facilities and in return gains scientific recognition through published papers and promotion of the Association through presentations and support

Current Honorary Research Fellows:

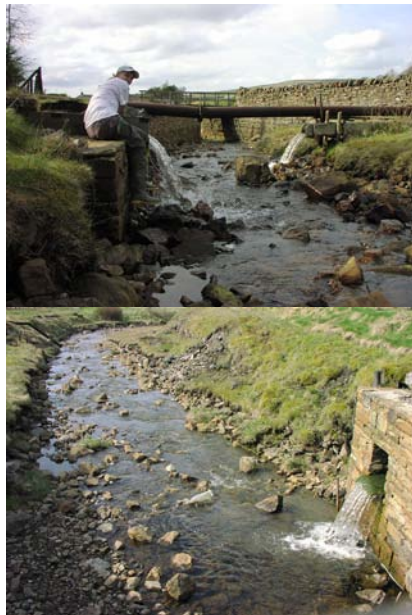
- Prof. Patrick Armitage
- Ken Clarke
- Prof. J. Malcolm Elliott
- Prof. D. Glen George
- Terence Gledhill
- Dr Elizabeth Y. Haworth
- Dr Mike Ladle
- Dr Allan Pentecost
- Prof. Colin S. Reynolds
- Dr Roger A. Sweeting

Patrick Armitage Applied Invertebrate Ecology

Since retiring I have continued to study the effects of catchment activities on the fauna of streams and rivers and have been involved in research on lowland rural catchments in Dorset and urbanised rivers in the Birmingham area. In addition I have examined long-term changes in the faunal communities of a heavy metal polluted stream in Cumbria,



Patrick Armitage



Zinc-rich mine water entering the River Nent

the River Nent. Twenty-eight years after the original survey in 1976 the faunal communities were not significantly different. The recent activities in the catchment have had little effect on the overall controllers of faunal communities in this system, which are zinc concentrations and geomorphological characteristics, but at the lower sites (N4-N1) taxa numbers do show some variation between years (Fig. 1). The faunal and algal communities have been exposed to high zinc concentrations over at least 100 years and the present community shows a strong resistance to heavy metal pollution. However, further disturbances involving movement of spoil heaps and channel

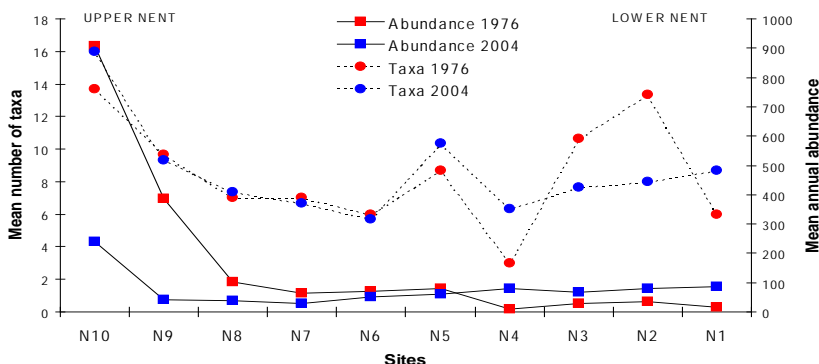


Fig 1. Mean abundance and numbers of taxa per site on the R. Nent based on samples collected in 3 seasons

alterations in the upper catchment may increase both sediment and heavy metal loadings to the river.

In the past year I have examined the relationship between land use and the faunal communities of small streams in Dorset, in particular the differing effects of anthropogenic disturbance in alkaline and acid streams. In addition I have studied the effects of agricultural disturbance (increased nutrients and channel modification) on the faunal communities of a small acid stream.

Ken Clarke

Electron microscopy

An active year dealing with the practicalities of the organisation, development and maintenance of the FBA Windermere site (with Matt Freeman) was balanced by involvement in three teaching courses and a number of research projects.



Ken Clarke

Electron microscopic examination of the ciliated protozoon *Histiobalantium* was completed. The organism is recognisably undergoing evolutionary change enabling it to feed and survive in both oxic and anoxic waters. The work was carried out as a team collaboration with Dr Genoveva Esteban and Prof. Bland Finlay at the QMUL study lab, FBA East Stoke (Esteban, Finlay & Clarke, 2008). Transmission EM was used in a new study of body-scales in the recently described flagellated protozoon, *Aurigamonas solis* (Vickerman et al., 2005). The scale forms and ultrastructure will be compared with scales occurring in *Paraphysomonas* and other morphologically related genera. The scanning EM study was continued on the growth of the glochidium stage of the pearl mussel *Margaritifera margaritifera*, with an examination of the young, developing mussel at the period approaching separation from its site on the gills of its salmonid host (with Dr Roger Sweeting). A start has been made on the EM study of the relationships between the ciliated protozoon *Loxodes* and its microalgal endosymbionts (with Bland Finlay).

Some 17000 EM exposures have been taken during the past twenty or so years during my time as electron microscopist with the FBA. These negative exposures

include many important records of type-species, cell ultrastructure, and associations between microorganisms (e.g. viruses, chytrids, bacteria, protozoa and micro-algae) as well as exposures of transient importance that are now redundant. Work has recently commenced to down-size, rationalise, re-catalogue and archive those images that are considered unique and important. Eventually, copies of the final image archive will be electronically stored and be made available for a wide scientific audience.

Photographic students from Myerscough College, Preston, visited in May and were introduced to EM as an application of scientific photography; a demonstration of examples of Victorian photography's first processes was also given. Students from the University of Cumbria visited the FBA in July and were introduced to scanning and transmission electron microscopy and its application to aquatic microbiology; EM techniques, and size relationships between organisms, were demonstrated and students were given an opportunity to control the instrumentation.

A further publication is perhaps relevant here. A paper was published describing the commercial operation of a local photographer amongst whose images are recorded the heavy icing of Windermere in the winters of the late 1800s and early 1900s. A few of these resulting images are held within the FBA's collections (Clarke, 2008)

J. Malcolm Elliott Ecology of Freshwater Fish and Zoobenthos

My first scientific product of the year was a paper on the rare medicinal leech, *Hirudo medicinalis* L. (Elliott, 2008a). It is important for species recovery and conservation management projects to know the minimum viable population size for rare and endangered species, such as the medicinal leech. Therefore, using a catch-removal method, this study estimated every two years (1986, 1988, 1990, 1992) the total number of medicinal leeches in a tarn in the English Lake District, and the number of mature adults in the population. Four samples were taken each year in June and July, when water temperatures exceeded 20°C. Population size was estimated both by maximum likelihood and regression methods. All leeches were weighed alive and size groups were separated by polymodal frequency analysis. A small sample of the blood meal in each leech gut was taken before the leeches were returned to the



Malcolm Elliott

tarn, and was used to estimate the proportion of mammalian and non-mammalian blood in the meals. Both methods of estimation produced similar values, increasing confidence in the population estimates. Values for the total population in June and July varied among years from 248 to 288, the maximum value being only 16% higher than the minimum. Values for the number of mature leeches varied from 48 to 58 (19 - 20% of the total population), and this was an estimate of the effective population size. There were four size groups. The largest mature leeches (live weight >5 g) in group IV formed only 1% of the population, and the smallest (0.02 g - 0.5 g) in group I 14-17%. Most leeches were in two overlapping groups of immature (64-67% of population) and mature (18%) leeches with size ranges of 0.4 g - 3.4 g and 2.5 g - 5 g, respectively. The percentage of leeches in each size group was very consistent among years. Blood meals were found in 38 - 44% of the leeches in group I, 45 - 50% in group II, 70 - 75 % in group III, and 100% in group IV, but mammalian blood was present only in larger mature leeches (>3.5 g). Medicinal leeches were first detected in the tarn in 1980 and were still present in 2007, so the population has persisted for at least 27 years. Compared with minimum viable population sizes for other species, including many endangered species, values for this medicinal leech population are extremely low, but may be typical of some rare freshwater invertebrates in isolated habitats.

In my report for last year, I reported on the second and third papers in a series on riffle beetles (Elmidae). Having just read a lot of the literature on this fascinating family of water beetles, it seemed appropriate to write a review of their ecology for *Freshwater Reviews* (Elliott, 2008b). Riffle beetles are frequent members of the invertebrate community of running water. Over 80 species have been recorded in North America and 46 in Europe. This number decreases in the western and northern fringes of Europe with only 12 species in Britain, many rare, four in Ireland and three in Norway. The review described their habitat, food and predators, their life cycles, their dispersal, and human threats to their survival. Most elmidae species occur in well-aerated streams and rivers, but some also occur on wave-washed lake shores. A few species live in more unusual habitats, such as thermal pools and hot springs, subterranean habitats, and decaying wood. Little is known about the food of adults or larvae, but they appear to be collector gatherers and scrapers that feed chiefly on algae and detritus. Adults and larvae are rarely taken by invertebrate predators, but are eaten by fish, especially salmonids. However, their proportion in the diet is always lower than that in the benthos, indicating low

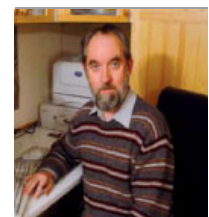
availability to the fish. Human threats to the survival of elmids include reduced oxygen concentrations, elevation of water temperature, extremes of flow, especially spates, and pollution, especially by soaps and detergents. Therefore, riffle beetles provide excellent indicators of water quality and perhaps also climate change.

I also spent some time revising the FBA publication on freshwater Megaloptera and Neuroptera (alder-flies, sponge-flies and the large lace-wing, *Osmylus fulvicephalus* (Scopoli)). This monograph was published early this year (Elliott, 2009).

D. Glen George Zooplankton Factors influencing the spatial distribution of phytoplankton

In 2008, I spent some time re-processing the results of airborne remote sensing surveys completed in the 1990s. These surveys were conducted by the Natural Environment Research Council using their own Piper Chieftain aircraft. Eight papers describing the results of these studies have already been published but there is still scope for further analysis. The data now being analysed were acquired by a multi-spectral scanner known as the Airborne Thematic Mapper. This records upwelling radiance in eight spectral bands ranging from the blue visible to the thermal infrared. In these surveys, the instrument was flown over Esthwaite Water at 15-minute intervals to map the spatial variation in the surface temperature and the distribution of phytoplankton. The data acquired showed that an accumulation of phytoplankton had developed in a 'dead zone' of warm water. Dead zones of this kind have been observed in meandering rivers but these analyses show that they can also occur in lakes.

Two papers published in 2008 and 2009 (Moreno-Ostos et al., 2008, 2009) also deal with the impact of wind-mixing on the spatial distribution of phytoplankton. Here, we used an automatic water quality monitoring station to study the spatial dynamics of phytoplankton in a large Spanish reservoir. The first author, Dr Moreno-Ostos, spent some time at Ferry House whilst working on his PhD and is now an Assistant Professor at the University of Malaga. I also contributed to a book chapter (Moss et al., 2008), based on a lecture delivered at a meeting that reviewed the threats posed to aquatic systems by global-scale changes in the climate.



Glen George

Terry Gledhill

Invertebrate Taxonomy

My studies on water mites have continued. Detailed examination of some problematical species within the *Sperchon denticulatus*-group has resulted in the re-establishment at species level of a former synonymised species and the placing into synonymy of another. Examination of another sperchontid species, on loan from the National Museum of Ireland, Dublin, has shown it to be a species of uncertain status. Two species of *Sperchonopsis*, recorded from the interstitial habitat, have been shown to be conspecific. Such studies by myself and my continental colleagues are requisite for our key to the water mites of central and north western Europe. We aim to publish such data prior to the publication of Volume 2 of the 'key', the manuscript of which is more-or-less ready for the publishers. Publishing such taxonomic changes first, reduces the amount of taxonomic data required for Volume 2 which deals with two large superfamilies, Hydryphantoidea and Lebertioidea, both having numerous genera and many species.



Terry Gledhill

Whilst on holiday in Cornwall I found a third British site for the enigmatic water mite *Trichothyas (Lundbladia) petrophila* (Michael, 1895). This species was described from specimens found at Lands End. Access to the cliffs there was unfortunately impossible, but collecting in a small stream flowing into the sea at Kynance Cove near Lizard Point produced two specimens. I also know this species from a small stream flowing into the sea near Lyme Regis in Dorset (collected by Patrick Armitage). All three British records of this species are from sites that are only a few metres from the sea and subjected to sea spray. In contrast, continental European material is known from diverse habitats.

I examined and confirmed the identity of bathynellids (very small c. 1 mm long 'subterranean' crustaceans) from two different sites, the River Lathkill in Derbyshire (coll. Rachel Stubbington, Loughborough University) and the River Skirfare in Yorkshire (coll. Mark Dunscombe, Roehampton University), as *Antrobathynella stammeri* (Jakobi). These are the first records of bathynellids in Britain since 1985 (see Stubbington et al., in press). However, these crustaceans are probably more abundant and widespread in the UK than the records indicate due to insufficient and ineffective sampling of subterranean habitats.

I was a tutor for the FBA 'Identifying Freshwater Invertebrates' course held at the Windermere Laboratory in March, and also tutored at the 'Introduction to Pond Survey Methods' course held with Pond Conservation at the Laboratory in June. I was asked to contribute to a series of training modules for the Environment Agency (EA); these are to assist in 'species level' identification of freshwater invertebrate groups used by the EA for water quality assessment. With help from colleagues Anne Powell, Melanie Fletcher and Simon Pawley, a draft of the module 'Miscellaneous taxa including Crustacea' has been completed and submitted to the EA.

Elizabeth Haworth

Diatoms and Palaeolimnology Honorary Curator of the Fritsch Collection

Focus this year has almost entirely been on an application to the Pilgrim Trust for funding, and planning for the digitisation of the desmid section of the Fritsch Collection which began in October.



Elizabeth Haworth

So that correct information will accompany the images, Elaine Monaghan and I have concentrated on checking the species sheets. This was harder than anticipated and demonstrated the importance of careful preparation for such a project. It appears that authors often cause considerable confusion by their publication, leading to inaccuracies in an archive and conflicts to be resolved and this was an opportunity to make corrections. Literature searches have proved very rewarding and we find that desmid entries include over 75% of the original species illustrations and many of the diagnoses (i.e. type material). The majority of references are in the FBA library, including the great taxonomic works of the Wests, Fritsch, and Lund; and others which may have slipped from notice.

It has taken an enhanced team of four to complete the initial digitisation project. This first complete assessment of this section of the Collection revealed that there were rather more sheets and species than estimated. To date 7488 images have been produced and we are now looking to phase 2 with the help of our expert steering committee. Discussion with the British Phycological Society biodiversity group and others indicates considerable support for the digitisation, our future programmes, and funding. Meanwhile, a new set of Fritsch notelets have been designed around algologists and their algal species to raise a few pounds!

An enquiry to FBA from the Isle of Wight



The River Stour at Blandford

concerning an S. Pring later revealed a connection to the algologist G.S. West and a previously unknown publication. In return we provided a copy of his portrait to the Medina Valley Centre, for a Centenary Exhibition.

My diatom research has therefore taken a back seat. As I made the first investigation of the sedimentary diatom record, I was invited to the Celebration of 40 years of study of Loch Leven, Kinross – a fitting memorial to the late Tony Bailey-Watts. I am also reviewing our diatom chapter for the British Algal Flora update scheduled for 2010.

I continue to survey tarns for the Lakeland Tarns project of the Cumbria Wildlife Trust and am involved with the Windermere sediment study of the National Oceanography Centre, Southampton.

Mike Ladle

Dorset Fishery Management and Ecology

I collaborate annually with Dr Stewart Welton on the control of the Blandford Fly (*Simulium posticatum*) for a number of local authorities



Mike Ladle

in Dorset. Prior to the development of the present treatment (using a strain of *Bacillus thuringiensis*) the insect caused a great deal of distress in Dorset and resulted in a considerable cost to the local authorities. In 2008 estimated population densities of larvae were considerably greater than in many previous years (Walton & Ladle 2008). This demonstrates the capacity for rapid increase in numbers of this insect should treatment be discontinued.

Mean mortality of larvae following treatment was 91% at Blandford and 88% at Longham. These excellent results show that even after 18 years of regular Bti application the population is still susceptible to the pesticide.

I again attended meetings of the Wessex Region Fisheries Forum throughout the

year and will continue to do so as required. The new pass for migratory fish on Louds' Mill gauging weir is now up and running. Hopefully this will result in more spawning salmonids in the upper reaches of the River Frome. I have also continued as chairman of the River Frome Conservation Trust which is considering providing financial support to the River Frome fish counting facility and as ecological advisor to the River Allen Association.

I am still responsible for the administration of the FBA fishing at West Holme dealing with the fishermen, fees, fishing rota, the state of the fishery, its banks and bridges etc. The run of salmon on the Frome was again poor (FBA Counter figures) but as in 2007 catches were substantial. All salmon are now returned alive to the river.

In collaboration with my former research student Dr Jerome Masters (currently working for the Environment Agency) I have completed a book on pike biology and pike fishing (Ladle & Masters, in press) which is to be published by The Crowood Press. Two other books are in preparation

As usual I volunteered my services to the annual fund raising auctions of the Atlantic Salmon Trust and the Salmon and Trout Association.

Allan Pentecost Algal Ecology

The year began with a small contract for the Environment Agency involving the methodology employed in British river macrophyte surveys. A critical review of methods currently employed in different European countries was undertaken as a consultation document. Another larger contract was completed later in the year for Plantlife. This involved a survey of about 500 plants listed by the aquarist trade in an effort to establish a hierarchy of invasiveness using criteria such as rate of spread, seed production and extent of naturalisation abroad. One of the species, the well-known *Gunnera tinctoria*, seemed an unlikely invader but my opinion soon changed after a visit to western Ireland, where it is a serious pest in both wet- and waste land. Although the two studies had different aims, both provided me with new insights into applied ecology and revived my interest in the aquatic macrophytes. In between the contracts, further work was undertaken connected with my review work of phosphorus in fresh waters. This included a visit to Rothamstead Field Station library at Harpenden to consult literature on the 'land side' of phosphorus transport. The transport of phosphorus from land to water



Allan Pentecost

is a well-investigated topic, but the interaction of soil types, land use, topography and climate does not permit many generalisations. Literature relating to lake remediation and the bioavailability of different phosphorus forms has also been consulted and this was worked up into two lectures presented to the MSc course in Aquatic Resource Management at King's College London in March of this year.

A paper was presented at the Yorkshire Dales National Park HQ on the Holocene history of the sediments of Malham Tarn, in September and small grants from the YDNP and the Field Studies Council were used to date a sediment core from the Tarn. Further calibration of the dates is required and this has started with a small grant from the Open University (with Dr P. Coletta). A short paper on the green alga *Cephaleuros endophyticus* has been published (Pentecost, 2009), giving a further description of the plant from its most northerly station (Cumbria); it is an essentially tropical genus and it was intriguing to discover it in the north of England. Work has started in collaboration with Prof. Brian Whitton on a chapter for the new edition of the Ecology of Cyanobacteria. We have started a review centred on the subaerial cyanophytes, although the final title of the work has yet to be decided. This has stimulated a collection spree and uncovered how little we really know about these algae. Work has also begun on a revised edition of the British Freshwater Algae Flora which will be completed later in 2009.

We have received a number of freshwater algal enquiries at the FBA, among the more interesting being a collection of the rare red alga *Balbiania* from Cornwall. There also remains a large backlog of work to clear from my King's College days that is gradually being cleared.

Our FBA introductory course on freshwater algae was successful and benefited from the acquisition of some additional and interesting collecting sites. Other work undertaken at the FBA includes some editing for *Freshwater Reviews* and the odd editorial for the *FBA News*. Some editing of the pictorial archive was also undertaken and considerable use of the Fritsch collection was made for identification of critical algal material found locally and the new Freshwater Algal Flora.

Colin Reynolds Ecology and Modelling of Phytoplankton

Microorganisms, especially the pigmented ones, are astonishingly beautiful organisms. Their compactness and physiological sophistication have enormous



Colin Reynolds

appeal. Of particular interest is the shortness of the generations on real time scales. These are ideal subjects for observing the principles of ecosystemic ecology in action.

The perception of the place of phytoplankton in aquatic ecology has changed in recent years. In very large water bodies, it is properly regarded as the fundamental productive base and a net producer of atmospheric oxygen, even if (as we now recognise) much of the carbon fixed is cycled through bacteria and protists. Such systems draw new carbon from the atmosphere but at finite, restricted invasion rates. There is an important terrestrial supplement, in the form of dissolved carbon dioxide and of dissolved and particulate organic matter, whose decomposition yields yet more carbon dioxide. In smaller lakes, this supplement is the main source of carbon, driving their metabolism. Whether they are dominated by large concentrations of phytoplankton or by lush aquatic macrophytes, heterotrophic consumers and accumulated detritus represent major sinks of photosynthetic oxygen. Benthic-dwelling macroinvertebrates are more attractive and more nutritive than zooplankton to adult fish of many species. Far from being net autotrophic producers of oxygen, most small lakes are, on balance, heterotrophic, releasing more carbon dioxide than oxygen to the atmosphere.

This altered appreciation of the role of producers in lakes must modify approaches to management, in the context of the Water Framework Directive, in relation to fish production and to the place of water quality in amenity. A macrophyte-dominated steady state is truly more desirable than one pervaded by a dense phytoplankton, which typically has only minor relevance to the nutrition of many species of fish. On the other hand, the virtues of a nutrient-constrained phytoplankton to the success of primarily planktivorous whitefish and salmonids over benthic-foraging coarse fish are brought into sharp focus.

My present activities continue to deliberate these issues. My book, 'Ecology of Phytoplankton', published in 2006, sets out a detailed perspective of process and the role of water-body size in governing the carbon pathways and fates in small and shallow lakes. In this reporting year, I have condensed his perspective into a short paper (Reynolds, 2009), which suggests that definable 'large pelagic systems', in which the dynamics are determined by local aquatic processes, rather than by what flows in from the bounding terrestrial catchment, start at about 500 km² in area and maybe 200 m in depth.

Working with others, former colleagues in Windermere and international contacts, I

am also presently engaged in re-examinations of the role of algal morphology in governing the ecophysiology of planktic algae that underpins the population dynamics that lead to the familiar species successions in lakes and seas.

Roger Sweeting

Water Quality and Fish Biology

The development of the FBA Windermere Hatchery as a viable facility for rearing and breeding experimentally rare and threatened freshwater organisms has been my major aim since becoming an Honorary Research Fellow in June 2007. In 2006, during my last year as Chief Executive, I began the development of a project with the Environment Agency and Natural England to create an ark for the threatened freshwater pearl mussel, *Margaritifera margaritifera*. Subsequently a five year project grant from the Environment Agency and Natural England has enabled us to run this conservation science project and refurbish some of the hatchery infrastructure. Seed mussels were produced for two populations in 2008. During 2009 I hope that a further five populations of seed mussels will be produced: these are currently at the glochidial stage on the gills of brown trout in the hatchery. Eventually we anticipate holding significant numbers of young mussels from these populations in order to return them to their former (but restored) natural environments.



Roger Sweeting

At present we hold eight populations of adult pearl mussels in our hatchery tanks: these are from rivers in Cumbria, Yorkshire, Northumberland and Devon. The total number of adult mussels (estimated at between 50 and 130 years old) is 242. Windermere is a mesotrophic lake and as a source of water for pearl mussels is rather rich: the normal water quality in pearl mussel rivers is oligotrophic. Hence, although water is abstracted from 10 metres depth in the South Basin, at certain times of year and for the rearing of seed mussels it is beneficial for it to be filtered. One rotary filter (funded by Natural England) was installed in 2008, a second larger one (funded by the Environment Agency), will be commissioned in the first half of 2009. Both filters will remove particles above 20 microns in diameter, enabling the culture of seed mussels and the capture of glochidia to be in water of a more suitable quality.

In May 2008 Louise Miles and I provided a joint presentation on "the freshwater

pearl mussel: an English perspective" at the EU Life sponsored international seminar in Luxemburg on the rearing of unionid molluscs with special emphasis on the freshwater pearl mussel. In 2009 we will make a second presentation to an international workshop in Sweden.

Publications

Clarke, K.J. (2008). The Brunskills of Sedbergh and Bowness-upon-Windermere: Victorian Photographers and their studios. *The Sedbergh Historian* **5**, 26-31.

Elliott, J.M. (2008a). Population size, weight distribution and food in a persistent population of the rare medicinal leech, *Hirudo medicinalis*. *Freshwater Biology* **53**, 1502-1512.

Elliott, J.M. (2008b). The ecology of riffle beetles (Coleoptera: Elmidae). *Freshwater Reviews* **1**, 189-203.

Elliott, J.M. (2009). *Freshwater Megaloptera and Neuroptera of Britain and Ireland: keys to adults and larvae, and a review of their ecology*. Freshwater Biological Association, Scientific Publication No. 65. 71 pp.

Esteban, G.F., Finlay, B.J. & Clarke, K.J. (2008). Sequestered organelles sustain aerobic life in anoxic environments. *Environmental Microbiology* **11**, 544-550

Harris, R.M.L., Milner, A.M.M., Armitage, P.D. & Ledger, M.E. (2007). Replicability of physicochemistry and macroinvertebrate assemblages in stream mesocosms: implications for experimental research. *Freshwater Biology* **52**, 2434-2443.

Ladle, M. & Masters, J. (In press). *Tactical Pike Fishing*. Crowood press.

Ledger, M.E., Harris, R.M.L., Armitage, P.D. & Milner, A.M. (2008). Disturbance frequency influences patch dynamics in stream benthic algal communities. *Oecologia* **155**, 809-819.

Ledger, M.E., Harris, R.M.L., Armitage, P.D. & Milner, A.M. (in press). Realism of model ecosystems: an evaluation of physicochemistry and macroinvertebrate assemblages in artificial streams. *Hydrobiologia*.

Moreno-Ostos, E., Cruz-Pizarro, L., Basanta, A. & George, D.G. (2008a). The spatial distribution of different phytoplankton functional groups in a Mediterranean reservoir. *Aquatic Ecology* **42**, 115-128.

Moreno-Ostos, E., Cruz-Pizarro, L., Basanta, A. & George, D.G. (2009). The influence of wind-induced mixing on the vertical distribution of buoyant and sinking phytoplankton species. *Aquatic Ecology* **43**, 271-284

Moss, B., Bronmark, C., George, D.G., Hansson, L.-A. & Jeppesen, E. (2008). The future of small lakes and ponds. In: *Aquatic Ecosystems: Trends and Global Perspectives* (ed. N. Polunin), pp. 65-80. Cambridge.

Pentecost, A. (2009). Remarks on the identity of *Cephaleuros endophyticus* (F.E. Fritsch) Printz and a new record of the species from Northern England. *Naturalist* **134**, 141-144.

Pentecost, A. & Zhang, Z. H. (2008). Microfossils and geochemistry of some modern and fossil travertine (freshwater carbonate) deposits from North Yorkshire and Derbyshire. *Proceedings of the Yorkshire Geological Society* **57**, 79-94.

Reynolds, C.S. (2008). A Changing Paradigm of Pelagic Food Webs. *International Review of Hydrobiology* **93**, 517-531.

Stubbington, R., Dunscombe, M.P. & Gledhill, T. (in press). Occurrence of *Antrobathynella stammeri* (Jakobi, 1954) (Crustacea: Syncarida: Bathynellidae) in the hyporheic zones of two English karst rivers. *Cave and Karst Science*.

Stubbington, R., Greenwood, A.M., Wood, P.J., Armitage, P.D., Gunn, J. & Robertson, A.L. (in press). The response of perennial and temporary headwater stream invertebrate communities to hydrological extremes. *Hydrobiologia*.

Vickerman, K., Appleton, P.L., Clarke, K.J. & Moreira, D. (2005). *Aurigamonas solis* n. gen., n. sp., a soil-dwelling predator with unusual Heliophilic flagellate organisation and belonging to a novel clade within the Cercozoa. *Protist* **156**, 335-354.

Welton, J.S. & Ladle, M. (2008). An experimental treatment of *Simulium posticatum* with Bti at selected sites on the River Stour, Dorset. Report to North Dorset District Council, 20 pp.

Trustees' Report

for the year ended 31st March 2009

The members of the Council of the Freshwater Biological Association (FBA), acting as Trustees of the Association submit their Annual Report and audited Accounts for the year ended March 31st 2009.

The financial statements have been prepared in accordance with current UK statutory requirements, the Association's Memorandum and the Statement of Recommended Practice 2005 (revised). The Accounting Standards Board recognises SORP as being in line with its code of practice and the Freshwater Biological Association agrees to follow these principles.

Trustees

The Trustees of the Freshwater Biological Association during the period 1st April 2008 to 31st March 2009 are listed on page 2 of the Annual Report. The majority of the members of the Council of Trustees are nominated by either the Council or the general membership and proposed for election at the AGM. These appointments are for four years and Council Trustees cannot be elected for a further term until one year has elapsed since the end of their previous term of office. A further two Trustees are nominated by The Royal Society and the Fishmongers' Company. A review of Trustees skills has been previously undertaken and this has been used to inform the nomination process for prospective Trustees.

Statement of Trustees Responsibilities

Company law requires the members of Council to prepare financial statements for each financial year which give a true and fair view of the state of affairs of the Association and of the surplus or deficit of the Association for that period. In preparing those financial statements, the Council is required to:

- select suitable accounting policies and apply them consistently
- make judgements and estimates that are reasonable and prudent

- prepare the financial statements on the going concern basis unless it is inappropriate to assume that the Association will continue its activities.

The members of Council are responsible for the management of the Association's activities in accordance with its Memorandum and Articles of Association and the keeping of proper accounting records which disclose with reasonable accuracy at any time the financial position of the Association, to enable them to ensure that the financial statements comply with the Companies Act 1985. They are also responsible for safeguarding the assets of the Association and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

In accordance with company law, as the Members of Council, we confirm that:

- So far as we are aware, there is no relevant audit information of which the company's auditors are unaware; and
- We have taken all the steps that we ought to have taken in order to make ourselves aware of any relevant audit information and to establish that the Charity's auditors are aware of that information.

Status

The Association is a Company Limited by Guarantee (registered number 263162) and a registered Charity (registered number 214440). Council Trustees have no interests in the Association as defined by the Companies Act 1985 and receive no remuneration for their services to the Association. Council Trustees do receive reimbursement of travel and subsistence costs necessarily incurred in the performance of their duties. The liability of the Members is laid out in clauses 7 and 8 of the Articles of Association and limits the liability of the members to 50 pence each.

The Trustees of the Association meet twice yearly to discuss and review the strategic direction of the Association, with responsibility for the operational activities of the Association fully delegated to the Director.

A sub-committee of the Council, The Finance and General Purposes Committee has delegated strategic responsibilities and meets on a regular basis to receive reports on activities from the Director, Finance Manager and Business Manager. The terms of reference for the Finance and General Purposes Committee are reviewed annually by the Council of Trustees. The delegation of authority to the Director is also reviewed by the Council of Trustees.

Objectives of the Charity

The principal strategic objectives and activities of the Association, as defined by its Memorandum, are to promote the investigation of the biology (in the widest interpretation of the word) of the animals and plants found in fresh (including brackish) waters. The completion of the five year Business Plan has resulted in a refinement of the strategic objectives, focusing on:

- Meeting the information needs of all those involved with freshwater research or management, whether professionally or as an amateur
- Supporting research through the provision of grants and research facilities
- Maintaining a thriving membership.

Review of Activities

The Statement of Financial Activities (SOFA) and the Balance Sheet show that the resources available to the Association have reduced for a second year, with a negative net movement of funds totalling £1,649,908, giving a closing fund balance of £4,123,933. The reduction in the fund value has arisen from:

- Realised and unrealised losses on the FBA's investments of £1,204,511
- A deficit of £445,397 on the Income and Expenditure Account.

This year's deficit on the Income and Expenditure account has arisen primarily through operational charitable activities, with some depreciation charged in year as detailed in Note 11 to the Accounts. There

has also been an improvement in the reporting of direct and indirect costs in this year's accounts which has led to a number of significant differences in the comparative figures. The most significant movement has been the write down in value of the investment assets by £1.2 million; whilst this was not unexpected given the current economic climate, it does represent a drastic fall in the level of resources available to the Association with which to carry out its charitable and strategic objectives.

In terms of the estate, the East Stoke site remains both financially and scientifically viable, covering all of its direct and indirect costs, including Head Office governance and administrative costs relating to the site. However the major tenant at the site, the Centre for Ecology and Hydrology, served notice of their intention to leave during this financial year and the reduction in rental income during the year is largely due to their withdrawal. New tenants have been secured and the East Stoke site remains key to achieving the strategic and charitable objectives of the Association. Generating a return at the Windermere site continues to prove difficult, due mainly to the number of activities undertaken from the site that do not make a positive financial contribution and including some activities that are completely subsidised. In addition the unique scientific nature of the site located in the centre of the Lake District National Park attracts significant overhead costs.

The number of members has remained constant; the reduction in membership income reflects the higher level of arrears income received in the prior year. The cost of providing a membership service is subsidised by the Association at a cost of £28,500. The Technical Service Agreement with the Environment Agency is treated as membership income which, combined with membership subscriptions, gives a total membership income of £46,414. The Trustees have taken the view that the membership fee should be kept low in order to attract students and a broader spectrum of freshwater enthusiasts in line with the Association's charitable objectives as well as ensuring that access to the FBA is not financially prohibitive. The training course programme continues to be successful, with significant levels of demand. The courses are subsidised by the FBA in order to attract amateur enthusiasts in freshwater ecology, which achieves one of the key objectives of the Freshwater Biological Association and contributes to the Association's compliance with the Public Benefit Test as laid out in section 3 of The Charities Act 2006. The Pearl Mussel

Project continues as a partnership project with funding commitment into 2009-10: during this financial year the funding commitment from the partners amounted to £34,250 and there have been a number of infrastructure improvements in the Hatchery as a result of this project included in the Scientific Research expenditure.

The FBA's new journal, *Freshwater Reviews* was successfully launched in April 2008 and sales have been encouraging during the year, meeting the expected target for the financial year. The expenditure on the journal relates to printing costs and salaries in equal parts: printing costs will reduce during 2009-10 as the free copy distribution comes to an end. Disappointingly sales income from the scientific publications fell during the year.

The Fritsch Collection received a grant from the Pilgrim Trust in November 2008 in order to assess and carry out a pilot project to digitise a sample of the Collection, with a view to making it more widely available. The project was successfully completed and a further grant application is underway. The *FreshwaterLife* programme continues to be supported by the Trustees, although this year it has been subsidised to the cost of £78,000 in order that the *FreshwaterLife* website could be redesigned with a view to stimulating renewed activity during the forthcoming financial year. The Library however remains a significant net drain on the resources of the FBA, accounting for over 20% of the deficit on the Income and Expenditure account with increased costs and no income received to contribute towards the running costs. Increased utility costs and the staff requirement to maintain the Library and its associated collections account for the significant rise in costs this year.

The Trustees are actively considering options for the future of the Library and recognise that the current levels of support are not viable.

The Honorary Research Fellows continue to be provided with space and facilities which incur a hidden cost to the FBA not separately identified in the Accounts. The Fellows do however make a contribution to all areas of scientific activity within the Association, including the Fritsch Collection and the training courses and general enhancement of scientific profile. This contribution is welcomed by the Trustees.

In September 2008, the Freshwater Biological Association hosted the first in a series of freshwater scientific conferences, entitled 'Multiple Stressors in Aquatic Ecosystems'. The Trustees consider the first

conference to have been highly successful in terms of scientific output as well as raising the profile of the Freshwater Biological Association. The overall cost to the Association was just over £15,000 which was lower than expected but the subsequent conferences are expected not to run at a deficit.

The Association continues to fund PhD studentships and has made a number of smaller awards in the year from the Hugh Cary Gilson Fund and the Freshwater Science Fund, totalling £24,598 plus a small salary cost to cover administration. The Trustees consider the provision of grant awards to be a major contribution towards its compliance with the Public Benefit Test.

Bank interest has reduced during the year by £23,779 whilst investment income has increased by just over £6,200. The FBA's investment assets remain central to its financial stability and its ability to achieve its objectives. The combined effect of the write down in value of the investments and a financial year in which a number of key activities were being supported through a transitional or developmental stage has had a serious impact on the resources available to the FBA, as reflected in the Statement of Financial Activities and the Balance Sheet. This situation is being addressed through the ongoing Strategic Options appraisal and a review of key areas of expenditure. The Trustees recognise that salaries and estate costs are significant, but also that they are areas of expenditure which are key to achieving the Association's objectives.

The reduction in Governance costs has been achieved through improved analysis of expenditure costs in the Accounts and the reapportionment of more costs across activities, which better reflects their true cost.

Reserves

The level of Reserves, as reflected in the Unrestricted General Fund Account, is considered necessary to maintain the viability of the Association in order to promote its principal objectives. Cash balances reflect the amount necessary for the FBA to meet its short term expenditure obligations in respect of salaries, creditors and others, assuming no inflow of funds.

Investment Policy

The FBA's investments are detailed in Note 11(b) to the Financial Statements. The Finance and General Purposes Committee approved an Investment Policy in December

2005, which provides the framework for the complete investment portfolio of the FBA. The policy states that the portfolio should be structured to provide a balanced return between income and capital growth, whilst being sufficiently diversified to spread risk. The Trustees ensure that any investments held reflect the ethical considerations of the Association and that no investment shall be held that is contrary to the charitable objectives of the FBA.

The majority of the FBA's investments (59%) are managed by Rensburg Sheppards and are considered to be satisfactorily managed by the Trustees. The Investment Policy was reviewed by the Trustees in March 2008 and no changes were made.

Plans for Future Periods

It remains the Association's aim to bring income and expenditure into balance during future periods, through a combination of expanding its income generating activities in line with its charitable objectives and continued rigorous control of expenditure.

Risk Management

During the year a complete review of the risks to which the Association is exposed was completed and documented in the Association's Corporate Risk Register. This document was approved by the Council of Trustees, to be reviewed as part of its Governance arrangements.

Public Benefit Test

Under the terms of The Charities Act 2006, the Trustees have a statutory duty to report on the charity's compliance with the Public Benefit Test, as laid out in section 4 of the Act. The Trustees consider that the aims and objectives of the Association are able to deliver a public benefit and have given due regard to that fact.

Trustees

The following were members of the Council during the year, appointed in accordance with the Articles of Association.

President

Sir Martin Holdgate, CB, MA, PhD,
Hon.DsC, FIBiol

Chairman of Council

Prof. A.G. Hildrew, PhD

Honorary Treasurer

Dr I.G. Dunn, MBiol

Representative Members

The Fishmongers' Company

Dr C. Askew (from 16.07.08)

Royal Society

Professor. B. Finlay, FRS

Elected Members

Mr P.M. Andrewes (from 16.07.08)

Dr M.J. Burgis

Dr S.J. Clarke

Ms G.L. Douglas (from 16.07.08)

Dr D. Evans

Dr J.I. Jones

Dr S.M. Kett (to 16.07.08)

Prof. T.E.L. Langford (to 16.07.08)

Dr B. Okamura

Prof. C.S. Reynolds

Dr A.L. Robertson (to 16.07.08)

Dr C.J. Spray

Prof. B. Whitton

Dr I.J. Winfield (from 16.07.08)

Auditors

In accordance with Section 385 of the Companies Act 1985, Messrs Couch Bright King & Company will be proposed for reappointment.

Dated this 4th June 2009

By Order of the Council

Professor A.G. Hildrew
Chairman of Council

The Ferry Landing, Far Sawrey, Ambleside,
Cumbria, LA22 0LP

THE FRESHWATER BIOLOGICAL ASSOCIATION
STATEMENT OF FINANCIAL ACTIVITIES
(INCLUDING INCOME AND EXPENDITURE ACCOUNT)
FOR THE YEAR ENDED 31st MARCH 2009

Incoming Resources		Unrestricted Funds		Total	Total
Incoming resources from generated funds	Note	<u>General</u>	<u>Other</u>	<u>2009</u>	<u>2008</u>
		£	£	£	£
<u>Voluntary income:</u>					
Awards and donations	4	24,326	-	24,326	12,891
Activities for generating funds	5	213,841	-	213,841	306,775
Investment income & bank interest	6	127,389	4,039	131,428	148,978
		-----	-----	-----	-----
		365,556	4,039	369,595	468,644
Incoming resources from charitable activities:					
	7				
Membership services		46,414	-	46,414	46,954
Scientific Research & activity		62,606	-	62,606	36,584
Information & Collections		21,000	14,175	35,175	99,698
Knowledge Transfer activities		51,530	-	51,530	14,837
		-----	-----	-----	-----
		181,550	14,175	195,725	198,073
		-----	-----	-----	-----
Total incoming resources		547,106	18,214	565,320	666,717
		-----	-----	-----	-----
Resources expended					
<u>Cost of generating funds:</u>					
Cost of generating voluntary income					
Cost of generating funds	8	299,427	-	299,427	306,435
<u>Costs of charitable activities:</u>					
	9				
Membership Services		74,995	-	74,995	46,576
Scientific Research & activity		115,379	25,330	140,709	87,159
Information & Collections		122,452	19,255	141,707	185,568
FBA Library		104,427	-	104,427	58,982
Knowledge Transfer activities		119,262	-	119,262	17,369
Governance costs	10	130,190	-	130,190	270,693
		-----	-----	-----	-----
Total resources expended		966,132	44,585	1,010,717	972,782
		-----	-----	-----	-----
Net (outgoing)/incoming resources before transfers and other recognised (losses)/gains		(419,026)	(26,371)	(445,397)	(306,065)
Realised and unrealised (losses) on investments	11b	(1,091,374)	(113,137)	(1,204,511)	(569,605)
		-----	-----	-----	-----
Net movement of funds in year		(1,510,400)	(139,508)	(1,649,908)	(875,670)
Reconciliation of funds					
Total funds brought forward 2008		3,179,549	2,594,292	5,773,841	6,649,511
		-----	-----	-----	-----
Total funds carried forward 2009		1,669,149	2,454,784	4,123,933	5,773,841
		=====	=====	=====	=====

All incoming resources and resources expended derive from continuing activities and the Statement of Financial Activities includes all gains and losses recognised in the year.

**THE FRESHWATER BIOLOGICAL ASSOCIATION
BALANCE SHEET AS AT 31st MARCH 2009**

	Note	2009		2008
		£	£	£
Fixed Assets				
Tangible	11a		1,745,695	1,756,621
Investments	11b		2,398,873	3,803,384
			-----	-----
			4,144,568	5,560,005
Current Assets				
Debtors and Prepayments	12	64,366		99,932
Cash at Bank and in Hand		68,810		182,338
			-----	-----
		133,176		282,270
Less Current Liabilities				
Creditors (due within 1 year)	13	153,811		68,434
			-----	-----
Net Current (Liabilities)/Assets			(20,635)	213,836
			-----	-----
Total Assets Less Current Liabilities			£ 4,123,933	£ 5,773,841
			=====	=====
Representing Members' Funds				
Unrestricted				
General Fund	14		1,669,149	3,179,549
Designated Funds	15a		2,454,784	2,594,292
			-----	-----
			£ 4,123,933	£ 5,773,841
			=====	=====

These accounts have been prepared in accordance with the special provisions relating to small companies within Part VII of the Companies Act 1985.

Approved on behalf of Council by Professor A.G. Hildrew: Chairman 4th June 2009

THE FRESHWATER BIOLOGICAL ASSOCIATION
(Limited by Guarantee)
NOTES TO THE ACCOUNTS

1. Status

The Association is a Company Limited by Guarantee and not having a Share Capital. The liability of the Members who constitute the Association is limited to 50 pence per Member.

The affairs of the Association are managed by an elected Council of Members who constitute honorary directors of the Company for Companies Act purposes. Details of the Council Members are given in the Annual Report.

2. Accounting Policies

(a) Accounting Convention

These accounts have been prepared under the Historical Cost Convention as modified by the revaluation of fixed assets (note 11) and provide the required information in accordance with the Statement of Recommended Practice 2005 (revised), applicable UK standards and the Companies Act 1985.

(b) Fund Accounting

The General Fund is made up of unrestricted funds, which are available for use at the discretion of the Trustees of the Association in the furtherance of the general objectives of the Association.

Designated funds represent unrestricted funds that have been bequeathed, donated or set aside by the Trustees to the Association for the furtherance of its activities by means of specific sponsorship.

(c) Incoming Resources and Resources Expended

Membership, donations, and other voluntary income is included only when received, whilst all other income, such as rent, publications, ferry commission, and confirmed grant income is accounted for on a receivable basis. Grant income is deferred when it relates to activities in future periods. All expenditure is accounted for on an accruals basis, net of VAT. Irrecoverable VAT is expensed in the statement of Financial Activities under the heading of Governance costs. Directly attributable costs are charged in full to the relevant activity; indirect costs are apportioned across all activities on the basis of area for building related overheads and headcount for all other administration, I.T. and consumable costs.

(d) Tangible Assets and Depreciation

Freehold property at the Windermere and East Stoke sites is recorded at valuation in line with FRS15; it is considered that the value of the assets relates principally to the land at each site and that any depreciation of the property would therefore be immaterial. Scientific apparatus and other equipment below the value of £1,000 are not capitalised.

Depreciation rates are provided on a straight line basis, in order to write off the assets over their useful lives as follows:

Computer Equipment over 4 years
Scientific Equipment over 5-10 years

(e) Library and Stocks

No value is included in these accounts for the library or for stocks of publications and other materials.

(f) Cash Flow

The FBA is considered a small reporting entity for the purposes of FRS1 and is exempted from producing a cash flow statement.

THE FRESHWATER BIOLOGICAL ASSOCIATION
NOTES TO THE ACCOUNTS (Continued)

3. Net (outgoing)/incoming resources for the year

This is stated after charging:

	<u>2009</u>	<u>2008</u>
	£	£
Depreciation	19,187	10,956
Auditors remuneration	2,500	2,500
	=====	=====

	Unrestricted Funds		<u>2009</u>	<u>2008</u>
<u>Incoming Resources</u>	<u>General</u>	<u>Other</u>	<u>£</u>	<u>£</u>
	£	£	£	£
4. Voluntary Income				
Membership donations	14,366	-	14,366	5,464
Legacies and other donations	8,589	-	8,589	6,016
Gift Aid	1,371	-	1,371	1,411
	-----	-----	-----	-----
	24,326	-	24,326	12,891
	-----	-----	-----	-----
5. Activities for generating funds				
Scientific and special publications	13,948	-	13,948	21,221
<i>Freshwater Reviews</i>	4,964	-	4,964	390
Land and building income:				
Windermere	15,578	-	15,578	22,384
East Stoke	161,627	-	161,627	205,113
Contract income - <i>FreshwaterLife</i>	-	-	-	20,760
Windermere ferries commission	16,382	-	16,382	36,664
Miscellaneous income	1,342	-	1,342	243
	-----	-----	-----	-----
	213,841	-	234,841	306,775
	-----	-----	-----	-----
6. Investment income				
Bank deposit interest	7,237	1,166	8,403	32,182
Investment Income	120,152	2,873	123,025	116,796
	-----	-----	-----	-----
	127,389	4,039	131,428	148,978
	-----	-----	-----	-----
7. Charitable activities				
Membership services	26,414	-	26,414	27,254
Technical service agreements	20,000	-	20,000	19,700
Scientific research & activity	62,606	-	62,606	36,584
<i>FreshwaterLife</i> programme	21,000	-	21,000	45,420
Esmée Fairbairn grant	-	-	-	50,000
Fritsch Collection	-	14,175	14,175	4,278
Training courses and meetings	51,530	-	51,530	14,837
	-----	-----	-----	-----
	181,550	14,175	195,725	198,073
	-----	-----	-----	-----

THE FRESHWATER BIOLOGICAL ASSOCIATION
NOTES TO THE ACCOUNTS (Continued)

<u>Resources Expended</u>	Unrestricted Funds		<u>2009</u> £	<u>2008</u> £
	<u>General</u> £	<u>Other</u> £		
8. Cost of generating funds				
Scientific and special publications	37,396	-	37,396	44,393
<i>Freshwater Reviews</i>	37,734	-	37,734	31,335
Land and Buildings:				
Windermere	78,536	-	78,536	74,400
River Laboratory	137,259	-	137,259	149,977
Windermere ferries commission	8,502	-	8,502	6,330
	-----	-----	-----	-----
	299,427	-	299,427	306,435
	-----	-----	-----	-----
9. Charitable activities				
Membership services	74,995	-	74,995	46,576
Scientific research activity and Awards	115,379	25,330	140,709	87,159
Freshwater <i>Life</i> programme	99,639	-	99,639	97,039
Esmée Fairbairn (Recorders project)	-	-	-	56,455
Fritsch Collection	22,813	19,255	42,068	32,074
The FBA Library	104,427	-	104,427	58,982
Training courses and meetings	119,262	-	119,262	17,369
	-----	-----	-----	-----
	536,515	44,585	581,100	395,654
	-----	-----	-----	-----
10. Governance Costs				
Council Meetings and reimbursements to Trustees	4,274	-	4,274	6,384
Other costs – direct and indirect:				
Audit Fees	2,500	-	2,500	2,500
Other fees, including Personnel fee	5,303	-	5,303	10,750
AGM & ASM	-	-	-	7,439
Depreciation charges	-	-	-	10,956
Windermere site	96,413	-	96,413	209,538
Irrecoverable VAT	21,700	-	21,700	23,126
	-----	-----	-----	-----
	130,190	-	130,190	270,693
	-----	-----	-----	-----

THE FRESHWATER BIOLOGICAL ASSOCIATION
NOTES TO THE ACCOUNTS (Continued)

11. Fixed Assets

(a) Tangible

	<u>Freehold Land & Buildings</u> £	<u>Computer Equipment</u> £	<u>Scientific Equipment</u> £	<u>Total</u> £
Cost or Valuation				
At 1st April 2008	1,674,723	66,820	26,034	1,767,577
Additions	-	14,016	-	14,016
Disposals	-	(6,645)	-	(6,645)
	-----	-----	-----	-----
At 31st March 2009	1,674,723	74,191	26,034	1,774,948
	-----	-----	-----	-----
Accumulated Depreciation				
As at 1st April 2008	-	8,352	2,604	10,956
Charge for the year	-	16,583	2,604	19,187
Disposals	-	(890)	-	(890)
	-----	-----	-----	-----
At 31st March 2009	-	24,045	5,208	29,253
	-----	-----	-----	-----
Net book value				
At 31st March 2009	1,674,723	50,146	20,826	1,745,695
	=====	=====	=====	=====
At 31st March 2008	1,674,723	58,468	23,430	1,756,621
	=====	=====	=====	=====

The Freehold Land & Building at historical cost is £1,344,842 (2008: £1,344,842).

The Association has taken advantage of the FRS15 transitional provisions not to revalue Freehold Land and Buildings. The estimated market value obtained in 1999/2000 of Freehold Land and Buildings is based on independent professional advice from Chartered Surveyors Davis & Bowring (Windermere) and FPD Savills (Dorset) and reflects the terms of lease agreements then in place for tenancy of the principal laboratories by the Natural Environment Research Council.

(b) Investments

Quoted investments are valued in accordance with their UK Stock Exchange listings at the balance sheet dates.

	£	<u>Quoted Investments</u> £
Market Value at 1st April 2008		3,803,384
Additions at cost		310,775
Disposal proceeds		(310,775)
Capital withdrawn in year		(200,000)
Realised and unrealised (losses) on investments:		
Realised losses on disposals	(235,265)	
Losses on revaluation	(856,109)	

Attributed to General Fund Account (Note 14)		(1,091,374)
Losses on revaluation attributed to the Frost Bequest (Note 15)		(113,137)

Market Value at 31st March 2009		2,398,873
		=====

THE FRESHWATER BIOLOGICAL ASSOCIATION
NOTES TO THE ACCOUNTS (Continued)

11. Fixed Assets (Cont)

	<u>Quoted Investments</u> £
Acquisition Values	2,848,552
Represented by:	
Investments held on UK Stock Exchange	2,375,912
Cash held as part of Portfolio	22,961

	2,398,873
	=====

The principal investments at 31st March 2009 were:

	<u>Market Value</u> £	<u>% of Total</u> %
<u>M & G Charifund</u>		
19,366 Income Units	158,654	7.0
6,026 Accumulation Units	482,433	20.0
<u>J P Morgan Asset Management Ltd</u>		
153,977 Bond Units	203,831	8.0
94,223 UK Equity Fund Units	148,039	6.0
	-----	-----
	992,957	41.0
	=====	=====

The accumulated units received during the year that were reinvested for capital growth had a cash value equivalent of £53,453 (2008: £48,624).

Investment management fees (VAT inclusive) of £15,791 (2008:£16,351) were deducted from the Capital Account held at Rensburg Sheppards during the year.

12. Debtors

	<u>2009</u> £	<u>2008</u> £
Trade Debtors	8,466	50,477
Other Debtors	44,896	41,329
VAT Repayment	2,421	-
Prepayments	8,583	8,126
	-----	-----
	64,366	99,932
	=====	=====

13. Creditors

PAYE, NIC and pension	15,138	14,849
Trade Creditors	38,362	37,326
Other Creditors and Accruals	11,549	15,948
Deferred income	88,762	-
VAT liability	-	311
	-----	-----
	153,811	68,434
	=====	=====

14. General Fund Account

	<u>2009</u> £	<u>2008</u> £
<u>General Fund Account</u>		
Balance brought forward	3,179,549	3,988,970
Net movement in funds before transfers and other recognised (losses)	(445,397)	(306,065)
	-----	-----
	2,734,152	3,682,905
Transfer net movement to Other Funds (Notes 4 to 10)	26,371	95
Loss arising from revaluation of Investments (Note 11b)	(1,091,374)	(503,451)
	-----	-----
	1,669,149	3,179,549
	=====	=====

THE FRESHWATER BIOLOGICAL ASSOCIATION
NOTES TO THE ACCOUNTS (Continued)

15. Other Funds

	<u>31.3.2008</u>	<u>Income</u>	<u>Expenditure</u>	<u>Transfers</u>	<u>31.3.2009</u>
	£	£	£	£	£
a) <u>Unrestricted Designated</u>					
Director's Fund	21,328	320	-	(21,648)	-
Fritsch Fund	6,547	14,175	(19,255)	-	1,467
Frost Bequest	509,970	-	(113,137) *	-	396,833
Frost Exhibition	32,757	3,364	(3,202)	-	32,919
Hugh Cary Gilson Fund	23,690	355	(4,000)	-	20,045
Freshwater Science Fund	2,000,000	-	(18,128)	21,648	2,003,520
	-----	-----	-----	-----	-----
<u>Total Unrestricted</u>	<u>2,594,292</u>	<u>18,214</u>	<u>(157,722)</u>	<u>-</u>	<u>2,454,784</u>
	=====	=====	=====	=====	=====

* Loss on revaluation of investments (Note 11b).

The balances of these funds are included in the Balance Sheet totals of Assets and the portions attributed to the Unrestricted Funds being:

	<u>31.3.2008</u>	<u>31.3.2009</u>
	£	£
Tangible Fixed and Current Assets	206,990	180,619
Quoted Investments	2,387,302	2,274,165
	-----	-----
	<u>2,594,292</u>	<u>2,454,784</u>
	=====	=====

Designated Funds represent sums bequeathed or donated to the Association for the furtherance of its activities by means of specific sponsorship.

The unrestricted designated funds have been set up in order to support the furtherance of the FBA's charitable activities. Briefly:

Director's Fund – to support initiatives by the Director at his discretion. This fund is now redundant and the intention of the fund is no longer relevant to the current role of the Director. The balance of the fund is therefore being transferred to the Freshwater Science Fund.

Fritsch Fund – fund established to support the scientific collection of algal illustrations together with taxonomic references.

Frost Bequest – the fund was established from a bequest from the estate of Winifred Frost. The purpose of the fund is to provide income and interest to the Frost Exhibition Fund and represents the original capital sum and accumulated capital growth.

Frost Exhibition – this fund represents the income and interest received from the investments associated with the Frost Bequest. The purpose of this fund is to support studentships and fellowships in freshwater biology and limnology and in particular, studies associated with freshwater fish.

Hugh Cary Gilson – this bequest from Hugh Cary Gilson provides a yearly award to support Members' research activities irrespective of their organisation or status. Council has agreed to increase the fund in line with inflation.

Freshwater Science Fund – this is a new fund established by Council in order to support the attainment of the FBA's core charitable activities. This represents a long term commitment by the FBA to the promotion of freshwater science. It has been decided in the short-term that the Fund will be kept constant by allocating sufficient investment income each year.

16. Capital Commitments and Contingent Liabilities

There were no capital commitments or contingent liabilities at 31st March 2009.

17. Taxation Status

As a Registered Charity (No 214440), the FBA is not liable to Income and Corporation Taxes.

THE FRESHWATER BIOLOGICAL ASSOCIATION
NOTES TO THE ACCOUNTS (Continued)

18. Staff

There were 26 paid employees (2008:25) of the Association at 31st March 2009.

Total Staff Costs in the year were:	<u>2009</u>	<u>2008</u>
	£	£
Salaries	450,899	464,517
Employer National Insurance Contributions	30,489	33,748
Employer Pension contributions	44,996	40,588
	-----	-----
Total	526,384	538,853
	=====	=====

There were no employees in the remuneration band £60,000 to £69,999, or above (2008: none).

19. Retirement Benefits

The Association participates in the Universities Superannuation Scheme, a defined benefit scheme which is externally funded and contracted out of the State Second Pension (S2P). The assets of the scheme are held in a separate trustee-administered fund. The Association is unable to identify its share of the underlying assets and liabilities of the scheme on a consistent and reasonable basis and therefore accounts for the scheme as if it were a defined contribution scheme as required by FRS 17. The amount charged to the income and expenditure account represents the contributions payable to the scheme for the year.

The latest actuarial valuation of the scheme was at 31st March 2008. This is the scheme's first valuation under the new statutory regime that arose from the Pensions Act 2004 and it encourages a new, scheme-specific approach to funding. The assumptions which have the most significant effect on the result of the valuation are those relating to the rate of return on investments (i.e. the valuation rate of interest) and the rates of increase in salary and pensions. In relation to the past service liabilities the financial assumptions were derived from market yields prevailing at the valuation date. It was assumed that the investment rate of return for pre and post retirement would be 4.4% per annum, salary increases would be 4.3% per annum and pensions would increase by 3.3% per annum. In relation to the future service liabilities the assumptions used are an investment return of 6.1% per annum, including an additional investment return assumption of 1.7% per annum, salary growth of 4.3% per annum and pension increases of 3.3% per annum. The valuation was carried out using the projected unit method, which is in common use for funding pension schemes in the UK.

At the valuation date, the market value of the assets of the scheme was £28,842.6 million and the value of the past service liabilities for all members was £40,619.2 million leaving a valuation deficit of £11,776.6 million. The assets therefore were sufficient to cover 71% of the benefits which had accrued to members after allowing for expected future increases in earnings. On the FRS 17 basis the actuary estimated that the funding level at March 31st 2008 was 104% and on a Pension Protection Fund basis the estimate was 107%.

The institution contribution rate required for future service benefits alone at the date of the valuation was 14% of pensionable salaries and the Trustee Company decided to increase the institution contribution rate to 16% of salaries from October 1st 2009.

Surpluses or deficits which arise at future valuations may impact on the institution's future contribution commitment. An additional factor which could impact on the funding level of the scheme is that with effect from 16th March 2006, USS has positioned itself as a "last man standing" scheme so that in the event of the insolvency of any of the participating employers in USS, the amount of any pension funding shortfall (which cannot otherwise be recovered) in respect of that employer will be spread across the remaining participant employers and reflected in the next actuarial valuation of the scheme. The next formal valuation of the scheme is due at 31st March 2011 but at the date of approval of these financial statements no further information had been published.

The total pension cost for the Association for the year to 31st March 2009 was £44,996 (2008:£40,588) which was 14% of pensionable salaries. The pension benefits of presently retired and seconded staff of the Association are administered by the Natural Environment Research Council.

20. Trustee Remuneration

No members of Council received any remuneration during the year. Travel costs and Council expenses amounting to £4,274 (2008: £6,384) were paid to 15 (2008: 17) members of Council.

INDEPENDENT AUDITORS' REPORT TO THE MEMBERS OF THE FRESHWATER BIOLOGICAL ASSOCIATION

We have audited the financial statements of The Freshwater Biological Association for the year ended 31st March 2009, on pages 26 to 34, which comprise the Statement of Financial Activities, the Balance Sheet and the related notes. These financial statements have been prepared under the historical cost convention as modified by the revaluation of certain fixed assets and the accounting policies set out on page 28.

This Report is made solely to the Association's Members, as a body, in accordance with Section 235 of the Companies Act 1985. Our audit work has been undertaken so that we might state to the Association's Members those matters we are required to state to them in an Auditor's Report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the Association and the Association's Members as a body, for our audit work, for this Report, or for the opinions we have formed.

Respective responsibilities of the Council and Auditors

As described in the statement of the Council's Responsibilities, the Members of the Association's Council are responsible for preparing the financial statements in accordance with applicable law and United Kingdom Accounting Standards (United Kingdom Generally Accepted Accounting Practice).

Our responsibility is to audit the financial statements in accordance with relevant legal and regulatory requirements and International Standards on Auditing (UK and Ireland).

We report to you our opinion as to whether the financial statements give a true and fair view and are prepared in accordance with the Companies Act 1985. We also report to you if in our opinion, the Statutory Report of the Council is not consistent with the financial statements, if the Association has not kept proper accounting records, if we have not received all of the information and explanations we require for our audit, or if information specified by law regarding Council's remuneration and other transactions with the Association is not disclosed.

We read the Statutory Report of the Council, and consider the implications for our report if we become aware of any apparent misstatements within it.

Basis of audit opinion

We conducted our audit in accordance with International Standards on Auditing (UK and Ireland) issued by the Auditing Practices Board. An audit includes examination, on a test basis, of evidence relevant to the amounts and disclosures in the financial statements. It also includes an assessment of the significant estimates and judgements made by the Council in the preparation of the financial statements, and of whether the accounting policies are appropriate to the Association's circumstances, consistently applied and adequately disclosed.

We planned and performed our audit so as to obtain all the information and explanations which we considered necessary in order to provide us with sufficient evidence to give reasonable assurance that the financial statements are free from material misstatement, whether caused by fraud or other irregularity or error. In forming our opinion we also evaluated the overall adequacy of the presentation of information in the financial statements.

Opinion

In our opinion, the financial statements:

- give a true and fair view, in accordance with United Kingdom Generally Accepted Accounting Practice of the state of the Association's affairs as at 31st March 2009 and of its incoming resources and application of resources, including its income and expenditure, for the year then ended;
- have been properly prepared in accordance with the Companies Act 1985; and
- are consistent with the information given in the Statutory Report of the Council.

Couch Bright King & Co
Chartered Accountants &
Registered Auditors

91 Gower Street
London, WC1E 6AB
5th June 2009

Leave a lasting legacy for the future of freshwater biology

Remember the FBA in your will

Leaving a legacy to the Freshwater Biological Association will make a real difference to continuing the work of the Association in future years.

Our scientists and supporters have always had foresight. Legacy giving is one way for the FBA to continue to be able to look far into the future. For the donor, legacy giving is a way of making sure that lifetime interests continue.

Gifts from legacies to the FBA are used to fund fellowships and studentships, to maintain the library and information services, to host meetings and courses, to safeguard our historical assets and to inspire ideas, people and facilities for future generations.

Legacies already make a real contribution to the Association's work, through, for example, bequests from the fish biologist Winifred Frost and from the FBA's former Director, Hugh Gilson. The Hugh Cary Gilson Award is an annual grant given to an FBA member to help fund new and novel research into any aspect of freshwater science. The Frost bequest is given to help fund research, specifically into fish biology.

Why legacies are important

For nearly 80 years, the FBA has promoted freshwater biology through research, publications, education and independent opinion. At our laboratories on the shores of Windermere and on the banks of the River Frome in Dorset, the FBA works to understand the life of fresh waters worldwide. We publish identification keys to freshwater organisms and other specialist volumes and have one of the finest freshwater libraries in the world. Long-term records of lakes and rivers started by the FBA are some of the longest in existence and are invaluable to the future of the freshwater environment.

The FBA is an independent Registered Charity and membership organisation. We receive no direct Government funding and rely on legacies, grants, subscriptions and donations to support the furtherance of our Charitable Objectives.

How your gift could be remembered

A significant legacy can be marked in some way, for example, to name a research grant. Or you may prefer to

help secure the future of key activities of the FBA by asking the Trustees to use your legacy for a specific purpose. These could include support to:

Science – for research projects, provision of equipment, support for training

Information – for the library, maintaining the archive, support for publication and digital information services

Fritsch – for the curation of a unique collection of algal illustrations

General – for furthering the FBA's mission and vision.

How to leave a legacy

Making a gift to the FBA in a will is straightforward (though we'd always advise seeking a solicitor's advice).

A leaflet is available from the FBA (or can be downloaded from the website) which provides an outline form of words to include in a new will or as a codicil to an existing will. Your solicitor can also advise on how to complete an 'Expression of Wishes' so that the Trustees can take into account your views in using any monies received most effectively.

Because the FBA is a charity, leaving a legacy to the FBA is free of inheritance tax.

If you have already included the FBA in

your will, please let us know so that we can acknowledge your generosity. If you would like the legacy marked in some way, for example, to name a research grant, please contact the Director for a confidential discussion. All intentions will be honoured, provided there is no conflict with the charitable objectives of the FBA.

For specific legacies (such as property, equipment, books etc), for gifts during your lifetime, or for gifts in memory of someone else, please contact the Director.

Contact Information

Your instructions will be treated with respect and discretion.

For further information please contact:

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The Freshwater Biological Association
A Company Limited by Guarantee
Reg No. 263162, England
Registered Charity No. 214440

For general information about legacy giving go to www.rememberacharity.org.uk



FBA Windermere

