

NUMBER 52 • AUGUST 2013

NEW ZEALAND
Freshwater Sciences Society

NEWSLETTER



www.freshwater.science.org.nz

Find us on:
facebook®



MAIN COVER PHOTO:

The waterscape of Goldney Saddle tarn at Cass.

BOTTOM RIGHT COVER PHOTO:

A large rainbow trout from the Tongariro region in bright spawning colouration.

See article on page 18.

All Cover Photos © Angus McIntosh

New Zealand Freshwater Sciences Society accepts no liability with respect to this publication's content or use. This publication may not be reproduced or copied in any form without the permission of the New Zealand Freshwater Sciences Society and/or Organisation/Individual credited. All photographs within this publication are copyright of the Organisation/Photographer credited, and may not be used without written permission.

© 2013, New Zealand Freshwater Sciences Society

ISSN 1177-2026 (print)

ISBN 1178-6906 (online)



Design & layout EOS Ecology, www.eosecology.co.nz

CONTENTS

CONTENTS	1
INTRODUCTION TO THE SOCIETY	2
EDITORIAL	4
PRESIDENT'S PIECE	5
HE MAIMAI AROHA – FAREWELLS	7
INVITED ARTICLES & OPINION PIECES	8
Freshwater Limits workshop Zealand Freshwater Sciences Conference	9
Critters Corner – A New Species Described from Campbell Island	10
Massey University's Solution to Pollution Workshop	11
The Adventures of a Native Fish Tourist	13
Whitebait Connections	14
STUDENT NEWS	15
CRITTER OF THE YEAR 2013	15
RESEARCH NEWS	16
Universities	17
Government Organisations & Crown Research Institutes	24
Non-Governmental Organisations	30
Unitary Authorities	35
Research & Consultancy Companies	44
Iwi Organisations	58
Others	58
RECENT PUBLICATIONS	59
CONFERENCE 2014	63
V.H. JOLLY STUDENT TRAVEL AWARDS	63
NZ FRESHWATER SCIENCES SOCIETY MEDAL & HONORARY MEMBERSHIP	64
BUDGET FOR THE YEAR ENDED 30 JUNE 2012	67
MINUTES OF THE 45 TH ANNUAL GENERAL MEETING OF THE NEW ZEALAND LIMNOLOGICAL SOCIETY INC.	72
NEW ZEALAND FRESHWATER SCIENCES SOCIETY CONSTITUTION	76
MEMBERSHIP APPLICATION	79

An adult *Rhantus* dytiscid diving beetle with air bubble attached to the tip of its abdomen. See article on page 18.

Photo © Angus McIntosh

INTRODUCTION TO THE SOCIETY



The New Zealand Limnological Society was formed at a meeting in Christchurch in January 1968. It was renamed the New Zealand Freshwater Sciences Society (NZFSS) in 2005 to reflect the broad interests of the membership. Its fundamental aims since inception have been to promote a common meeting ground for freshwater workers in New Zealand and to encourage and promote the exchange of news and views among them. In particular, a newsletter and a list of research workers and their interests is compiled and circulated at least once a year and an annual conference is held. The 2013 subscription is \$55.00 per annum, or \$15 for students, the unwaged or retired persons. Committee members for the 2012–2013 period were:

President

Professor David Hamilton
University of Waikato
Private Bag 3105, Hamilton
d.hamilton@waikato.ac.nz

Secretary-Treasurer

Janine Wech
c/- NIWA
PO Box 8602, Christchurch
j.wech@niwa.co.nz

Newsletter Editor

Katharina Doehring
kati.doehring@cawthron.org.nz

Assistant Newsletter Editor

Natasha Petrove
npetrove@doc.govt.nz

Elected Committee Members

Dr Susie Wood
susie.wood@cawthron.org.nz
Dr Phil Jellyman
phillip.jellyman@niwa.co.nz

Māori Representative

Dr Jane Kitson
jane.kitson@es.govt.nz

Student Representative

To be decided

Website Manager

Dr Jeremy 'Jay' Piggott
jeremy.piggott@apru.org

Community Outreach

Justine Coup
justine@morphum.com

Advocacy and Submissions

Kate McArthur
kate@thecatalystgroup.co.nz

Media Monitor

Mike Patrick
emjayem@paradise.net.nz

SIL Trust Awards Committee

Natasha Grainger
ngrainger@doc.govt.nz

Mary deWinton
m.dewinton@niwa.co.nz

Honorary Membership

Brian Sorrell
Mr A.M.R. Burnet
Prof. C.W. Burns
Dr V. Cassie Cooper
Dr M.A. Chapman
Dr G.R. Fish
Dr E.A. Flint
Dr D.J. Forsyth
Dr R.M. McDowall
Dr D. Scott
Dr V.M. Stout
Dr E. White
Prof. Emeritus M.J. Winterbourn
Dr Maureen Lewis

Past Presidents

1968–73 Dr V.M. Stout
1973–75 Dr M.A. Chapman
1975–76 Dr J.M.A. Brown
1976–78 Dr C.W. Burns
1978–80 Dr M.J. Winterbourn

1980–84 Dr B.T. Coffey
1984–88 Ms S.F. Davis
1988–92 Dr J.C. Ward
1992–96 Dr P. Ryan
1997–00 Dr I.K. Boothroyd
2001–02 Dr J.S. Harding
2003–06 Mr N.A. Deans
2006–10 Dr K.J. Collier

Previous Secretary-Treasurers

1968–73 Mr A.M.R. Burnet
1973–76 Dr C.W. Burns
1976–78 Ms L.H. Tierney
Ms S.F. Davis
1978–80 Dr B.T. Coffey
1980–82 Dr J.A. Robb
1982–84 Dr D. Forsyth
1984–86 Mr B. Biggs
1986–89 Dr I.W. Lineham
1990–92 Dr D. Rowe
1992–94 Dr J. Jasperse
1994–96 Dr I. Boothroyd
1996–98 Dr. K.J. Collier
1999–00 Dr J.S. Harding
2000–12 Dr B. Sorrell

Previous Editors

1968–70 Dr M.A. Chapman
1970–72 Dr S.F. Mitchell
1972–75 Dr M.J. Winterbourn
1975–80 Dr T.K. Crosby
1980–82 Dr M.F. Beardsell
1982–85 Dr J.A. Robb
1986–88 Dr J.C. Ward
1988–89 Dr J.D. Stark
1989–02 Ms J. Talbot
2002–04 Dr R. Young
2004–06 Dr M.J. Winterbourn
2005–08 Dr N. Philips
2008–12 Hannah Rainforth ■

EDITORIAL

Kia ora koutou.

Wow – the newsletter is continuously growing, reflecting the increase in the Society’s members and showing the huge range of projects we are involved with. I would like to thank you all for your contributions, snippets and blurbs, without which this newsletter would not exist. I understand that you are all incredibly busy with your day-to-day work, so I appreciate your effort all the more.

I would also like to thank my co-editor Natasha Petrove for her hard work and valuable input, and Bronwyn Gay for giving the Newsletter a new look.

I always enjoy reading the articles, and it strikes me how well represented and anchored the Society is in trying to find ways to improve New Zealand’s freshwater. I recently talked to a member about his attendance at one of the biggest overseas freshwater sciences conferences and he thought that it was no step up from the NZFSS conferences in regards to the quality of the science, so we should be proud of that!

One thing I’ve noticed recently is that we work together more than ever. With ‘we’, I do not only mean inter-organisationally within the freshwater society, but between government, industry, iwi and community. The Land and Water Forum was only the start with terms such as ‘collaborative’, ‘shared’ and ‘common way forward’ now becoming quite dominant in our day-to-day work. It is great to see that working together is the way forward to look after our fresh water in a sustainable way. Sustainable....a strongly weighted word these days. Sustainable, not only for me, but for my children and my children’s children. Is this not the reason why we conduct research?

Other than working collaboratively, another important aspect, in fact, I think one of the most important aspects of our science is the way we report or ‘communicate’. What for and whom for do we conduct science, if not to report it

to the end user, who then use our information in practice?

Unfortunately, it doesn’t always work this way. Partly, because the end user doesn’t know where to look for our findings, and partly, because we don’t know how to communicate to them.

A classic example is the state of New Zealand’s freshwater. For years New Zealand scientists have researched and published findings that our country’s freshwater biodiversity and water quality is degrading. And yet, whomever I talk to that is not directly linked to the freshwater community seems surprised about this fact.

Doesn’t this tell us that we might have to change something in the way we communicate our science? Media statements such as the ‘Society’s key closing messages’ of the 2012 Dunedin conference seem to go a long way, reaching the general public and informing them first-hand about. So shouldn’t we try and keep this momentum up? I think so. So why don’t we consider giving annual closing conference statements, as it would be an effective way to summarise and communicate our knowledge and concerns.

Talking about closing statements – enough from me. Enjoy the read!

Ka kite,

Kati Doehring
NEWSLETTER EDITOR ■



A student samples the shallows of Lake Pearson in the Canterbury High Country. This was one of the lakes frequently studied by Dr Vida Stout while at the University of Canterbury. Dr Stout, who passed away in July 2012, was a founding member of the New Zealand Limnological Society. See article on page 18.

Photo © Angus McIntosh

PRESIDENT'S PIECE

We are currently experiencing one of the most interesting and active periods of reform of freshwater policies and regulations since the RMA in 1991. If you have not updated yourself with the range of proposed reforms and their potential implications then I refer you to the web sites of the Ministry for the Environment (for reform documents) and the New Zealand Freshwater Sciences Society (NZFSS) (for our response to the reforms). The proposed reforms will dictate the direction of future freshwater research, Regional and Local Council plans and policies for freshwater management, and also the nature of future employment for many members of NZFSS.

Many of our members have been involved in a variety of ways in contributing to the freshwater reforms, for example, as members of National Environmental Monitoring and Reporting (NEMaR) science and cultural reference panels and in the National Objectives Framework Science panel run by the Ministry for the Environment (MfE). It is pleasing to see the way that science and iwi are being engaged in the reforms to support freshwater management in New Zealand. Scientists themselves are being challenged to put numbers into the limit-setting process for different attributes (chlorophyll, periphyton, nutrients, etc.) for rivers, lakes, wetlands and estuaries. A colleague involved in policy commented to me recently: "if you cannot provide the numbers either in a timely fashion or at all, then we [the management organisation] will have to proceed with writing policy and implementing regulations in a vacuum". For too long this has been the case and we are now beginning to see leadership from MfE in demonstrating a model by which policy, planning and science are being fully engaged and used to integrate the skills of their respective disciplines.

Much credit must go to Alastair Bisley and his Land and Water Forum colleagues for articulating to government the need for a limit-setting process. Let us hope that the process that will lead to reforms by government can proceed in a timely fashion following the recommendations of the Land and Water Forum. It will be important to maintain the current momentum, as some of the limits required for freshwater management

will be adopted progressively through time, as well as to capture a co-governance framework as a basis for improved freshwater management. The process will still be contentious and the need for limit setting must continually be reinforced, particularly when there are comments from stakeholders to indicate that "we strive to intensify agriculture responsibly"; there will certainly be cases when intensification will not be possible, notably in catchments that are already over-allocated (e.g., with respect to nutrient loads).

I would like to thank many members who contributed comments about whether NZFSS should issue a media statement on the outcomes from the 2003 Clean Streams Accord and the draft of the 2013 Sustainable Dairying Water Accord. I was disappointed with the reporting bias and lack of compliance in the industry's 2012 review of the 2003 Accord with respect to both the goals and timelines outlined at its inception. My decision to refrain from issuing a media statement related in part to the strong likelihood that the new Accord will become obsolete, thanks to the high level of non-compliance with the original Accord, and the lack of backing from key stakeholders in the proposed new Accord. The proposed Accord will hopefully be replaced by a much better working model in which there are defined limits and specific consequences to not reaching targets agreed upon by the community.

With this background I urge you to attend the 2013 New Zealand Freshwater Sciences Society Annual Meeting in Hamilton in August. It has a theme of "Aquatic science at the interface" to reflect a joint conference of NZFSS with the New Zealand Marine Sciences Society and the Australian Society for Fish Biology. The meeting promises some intense and heavy discussion (as outlined above) as well as the chance for dialogue and socialising with your freshwater, salty and fishy colleagues.

David Hamilton

PRESIDENT, NEW ZEALAND FRESHWATER SCIENCES SOCIETY ■

Hmmm, something's fishy here...a Stephen Moore original.

Photo © Stephen Moore, Landcare Research Ltd

HE MAIMAI AROHA – FAREWELLS





Stephen Moore

31/08/62–16/07/13

One of Stephens rules to live by? “If you have a finite amount of time (and we all have) why waste it by being miserable?”

Stephen Moore, one of our long-standing NZFSS members and photographer and taxonomist extraordinaire passed away peacefully on Tuesday 16 July, aged 50 years. Stephen spent many years making significant contributions to freshwater ecology while at Taranaki Regional Council, Otago Regional Council and most recently Landcare Research. Stephen had an unwavering passion for freshwater invertebrates, leaving a legacy of photos and pictorial keys for others to follow. He was very committed to engaging communities (particularly young people) in freshwater science and filled a unique role in New Zealand freshwater science.

He will be sorely missed by many.

Stephens and his family have portrayed his life online <http://www.whatmattersnow.org/visit/stephen-moore/home>.

Here are some of the contributions from his guest book that only briefly describe what a passionate and talented person he was:

“An amazing passionate person with a real talent and great knowledge of freshwater. Stephen’s photos are amazing and provide the public with a great look into the New Zealand’s amazing freshwater values.”

“Stephen’s photos of stream macro invertebrates are a wonderful and ongoing treasure that will continue to be used to enable us and future limnologists to appreciate the wonder and beauty of stream life, and so help to conserve these places. Stephen’s enthusiasm, professionalism and dedication will be remembered by us all.”

“Farewell to an inspirational scientist and great person. So much dedication, so much expertise, and so much courage.” ■

Stream on Campbell Island. See article on page 10

Photo © EOS Ecology, Shelley McMurtrie

INVITED ARTICLES & OPINION PIECES



Freshwater Limits workshop, New Zealand Freshwater Sciences Conference, Thursday 6 December 2012

The two New Zealand water science conferences (Hydrological Society, November 2012 and Freshwater Sciences, December 2012) happened in the window between the release of the Third Report of the Land and Water Forum (available at www.landandwater.org.nz) and the release in 2013 of the Government's response on Water Reform (www.mfe.govt.nz/issues/water/freshwater/freshwater-reform-2013).

Conference committees saw the opportunity to invite a workshop at each conference to allow members to take a step back from their more technical work to see the new challenges for science and scientists, for sectors, communities and councils, and for land and water managers, of working in a new context that these reforms present. We will see the community, in its widest sense, getting interested in being part of the process, not apart from the process.

In this new mode, regional councils are encouraged to enable catchment-based forums to take a shared leadership responsibility for their stewardship of their locale. Scientists and the technically skilled will no longer start the work in each catchment with "doing the science first", but rather getting into conversation with a variety of complementary perspectives including that of iwi. The workshops were well attended by members of both societies and visitors, and at the Freshwater Sciences Society were complemented by an outstanding line-up of contributors at the Wai Maori workshop convened by Dr Jane Kitson.

The attendance at the workshops gave clear evidence of the dedication of society members to the overarching challenges of working in a new way, and in many of the cases cited evidence of an empathy across all interests. Sincere thanks to the speakers at the Nelson workshop who set the scene for some fascinating plenary and small group discussions. It

took courage to let us in on the anticipation, the realization and the despair of navigating the unfamiliar. Thanks also to MBIE for sponsoring the workshops, and to Andrew Fenemor, Viv Smith, Sandy Elliot, and others for helping design the sessions. The workshops illustrate the benefits of impartial groups like NZHS and NZFSS hosting discussions affecting the way we will need to work to implement collaborative water management in the future.

We further encourage society members to underpin these workshops with focused technical meetings on the challenge of limit setting; the steps, tools and realities of defining a hard limit on complex resources.

- Glen Lauder
(Workshop convener, Wellington)
- Chris Arbuckle
(Aspiring Environmental Ltd, Dunedin)
- Graham Sevicke-Jones
(Greater Wellington Regional Council, Wellington) ■

Critters Corner – A New Species Described from Campbell Island

By Shelley McMurtrie (EOS Ecology, Christchurch, shelley@eosecology.co.nz)

New Zealand's subantarctic islands are a World Heritage site of unparalleled beauty inhabited by globally rare species. With the ever increasing need to protect biodiversity values and understand how climate change will affect world ecosystems, the Subantarctic region is assuming increasing significance. However, our knowledge and understanding of the extensive freshwater ecosystems (streams, lakes, and tarns) of these remote islands is limited. Our collection of 250-odd invertebrate samples from streams and tarns of Campbell Island in 2010, as part of the 50° South Trust's Campbell Island Bicentennial Expedition (CIBE), is helping to bridge that information gap. As we process more of these samples they continue to throw up a number of new distribution records and even more exciting, a number of new species. We have already confirmed at least 45 different taxa identifications, which is far in excess of taxa numbers previously published in reports of the island's freshwater ecology.

One of the most interesting features has been discovering not only an abundant oligochaete order but also a very diverse one. With almost 9000 individuals, Oligochaeta is the third most abundant order in our freshwater samples. We have only begun to fully elucidate this fascinating group and yet they are also proving to be one of the most diverse orders. To ensure the highest accuracy of the taxonomic identifications we have commissioned Adrian Pinder of the Department of Environment and Conservation (Western Australia) to assist in the Oligochaeta identifications. To date he has identified eleven different oligochaete taxa and we have only looked closely at a fraction (2%) of the total specimens collected. Several of these are potentially new distribution records, and some are potentially new species. One in particular has been

confirmed by Adrian Pinder as a new species: *Macquaridrilus n. sp.*, which resembles the only other species in the genus, *Macquaridrilus bennettiae* Jamieson 1968, in most aspects, but shows significant differences in the anatomy of the genitalia (A. Pinder, pers, comm). Adrian plans to name the new species "*M. mcmurtrieae*" after the coordinator of the CIBE and leader of the freshwater ecology research team (Shelley McMurtrie), who collected the samples. DNA coding is also being undertaken by Christer Erseus of the University of Gothenburg (Sweden) to compare molecular data with *Heronidrilus*; the most closely related marine genus where material suitable for DNA work is available.

The description of this inconspicuous worm is currently being written up, with plans to submit it to the New Zealand Journal of Zoology (Pinder *et al.*, manuscript). To date *Macquaridrilus n. sp.*, has been found in seven stream sites and two tarn sites that are mainly clustered around the southern half of the island. However, as only 150 of the 8600 oligochaetes (from 20 of the 250 samples) have been properly identified, this new species may be even more widely distributed.

We are currently seeking funding to properly identify the remaining oligochaete specimens, which will greatly benefit the identification of this widely distributed but lesser known group. Because we have found that the Oligochaeta forms such a large part of the aquatic fauna of Campbell Island, its full elucidation is critical for the understanding of the freshwater environments of the Island, the wider Subantarctic islands, and potentially other aquatic habitats elsewhere in the world. ■



Photo © EOS Ecology

Shelley sampling Southeast Stream on Campbell Island – one of the sites where the new species of *Macquaridrilus* has been found.

Innovative River Solutions Workshop: Solution to Pollution

Monday 11 February 2013,
Massey University, Palmerston North

SOLUTION TO POLLUTION

Management of River Dynamics: Floods, Water Storage and Land Use

Venue: Massey University campus, AgHort Building, Room AHB 1.40

Information Desk: AgHort Foyer

PROVISIONAL PROGRAMME

8.30am Russell Death – Welcome and Introduction

8.40am Mike Joy (Massey University) – Is there Really a Water Quality Problem in Hobbiton?

Session 1: Maintaining Ecological Integrity – Chair: Grant Blackwell

9.00am Angela Arthington (Australian Rivers Institute, Griffith University) – Using the ELOHA Framework to Develop Flow-ecology Relationships at Regional Scale

9.20am Russell Death, Amanda Death and Ian Fuller (Massey University) – Habitat Quality – the Missing Dimension

9.40am Mike Stewardson (University of Melbourne) – Environmental Flow Setting in Victoria – Incorporating Literature, Expert Opinion and Bayesian Analysis

10.00am Kit Rutherford (NIWA) – TRIM Modelling to Manage Periphyton

10.20am Discussion and Questions

10.40am Morning Tea – AgHort Foyer

Session 2: Maintaining Geomorphological Integrity – Chair: Gary Williams

11.00am Ian Fuller (Massey University) – Catchment Connectivity: a Framework for Geomorphic Integrity

11.20am Gary Brierley (University of Auckland) – Geomorphology and River Management

11.40am Gert Lube and Jon Procter (Massey University) – Monitoring and Modelling Sediment Transport in Extreme Flood Conditions – Lessons Learnt from Directly Measuring into Life-sized Lahars

12.00pm Mark Macklin (Centre for Catchment & Coastal Research, Aberystwyth University) – Floods in the Anthropocene: Metals, Mosquitoes and Mud

12.20pm Discussion and Questions

12.40pm Lunch – Wharerata

Session 3: Land Management to Maintain River Limits – Chair: Dave Horne

1.40pm Alison Dewes (Headlands, Waikato) – Managing Stock Diet to Aid Water Quality

2.00pm Christine Christensen, Mike Hedley, James Hanly and Dave Horne (Massey University) – Stock Feeding Patterns

2.20pm James Hanly, Justine Leon and Dave Horne – Using “Middle Earth” to Treat Wastewater

2.40pm David Rassam (CSIRO Land & Water) – Land-water Connectivity. Sponsored by



3.00pm Discussion and Questions

3.20 Afternoon Tea – AgHort Foyer

Session 4: Integration, Policy and Planning – Chair: Christine Cheyne

3.40pm Helen Marr (Perception Planning) – Planning

4.00pm April Bennett (Massey University) – Maori Co-management

4.20pm Corina Jordan (Wellington Fish & Game) – Legislation – the One Plan Case Study

4.40pm Graham Sevicke-Jones (Greater Wellington Regional Council) – Collaborative Approaches

5.00pm Discussion and Questions

5.30pm Close



The first River Solutions workshop was attended by over 100 delegates representing a range of institutions and groups, including: Greater Wellington, Waikato, Hawkes Bay, Taranaki and Horizons Regional Councils, Auckland Council, Manawatu District Council, DoC, MfE, Federated Farmers, NZ Landcare Trust, Fish & Game, NIWA, Landcare Research, Green Party, DairyNZ, Water & Environmental Care Association, Save our River Trust. International speakers included Prof Angela Arthington (Australian Rivers Institute, Griffith University), Dr Mike Stewardson (University of Melbourne), Prof Mark Macklin (Centre for Catchment & Coastal Research, Aberystwyth University), Dr David Rassam (CSIRO Land & Water). Of prominence from New Zealand were Prof Gary Brierley (University of Auckland) and Dr Kit Rutherford (NIWA), as well as Helen Marr (Perception Planning) and Graham Sevicke-Jones (Greater Wellington Regional Council).

Papers were presented under four themes: 1. Maintaining Ecological Integrity, 2. Maintaining Geomorphological Integrity, 3. Land management to maintain river limits, 4. Integration, policy and planning. Each session was followed by 20 minutes of lively discussion, including, and perhaps most especially, the final session of the day. Presentations approved for release by authors will be posted in pdf format on the River Solutions website: www.massey.ac.nz/rivers. A/Prof Russell Death and Dr Ian Fuller, who co-convene the group and co-ordinated the event, are working on a White Paper based on content and discussion at the Workshop.

A key message of the day (the solution to pollution) was that effective river and catchment management has to be found in an approach that integrates a range of river-science disciplines and connects with policy makers and planners. There is no 'one size fits all', each river must be understood as a unique system in terms of its ecology, geomorphology and hydrology and must be managed by policy and planning accordingly. Innovative approaches are needed to manage the land sustainably and maintain river limits.

Delegates at the Solution to Pollution Workshop: a full house. The event was very well attended and received by a range of researchers and stakeholders including ecologists, geomorphologists, agricultural scientists, politicians and planners and several local community groups.

Unsolicited feedback on the day has to date included the following comments:

"Hey thanks so much for the Solution to Pollution workshop yesterday it was fantastic. I don't possess a scientific bone in my body and I was worried it might be a bit over my head but it was not and I had a great day of learning. I think you can tell your bosses that it was most worthwhile and that maybe a similar workshop could be held annually. The calibre of the presenters was very high and the information invaluable."

District Councillor

"Thanks for organising the workshop, I thought it went really well – heard a lot of good comments about the geomorphology component mainly as I don't think it has been really put into the integrated picture that often."

Greater Wellington Regional Council scientist

"Thank you and your colleagues for the seminar, I'm pleased I spent the day there. I have many notes and ideas that I think will be applicable for the Mangaone West Landcare Group."

Community Group ■

The Adventures of a Native Fish Tourist

By Stella McQueen

In August 2011, I received a surprise call from renowned wildlife photographer Rod Morris. He asked if I would like to write a guide to freshwater fishes with him. While trying to contain my surprise, there was only one possible answer – “Of course!”

“No, no,” he said. “You don’t need to make a decision right now. Think it over and I will call you at the end of the week.”

How much more emphatically positive could my answer become?

Ten months later, I was the proud owner of a little self-contained campervan and set off on an adventure around the country as a native fish tourist and researcher.

I headed north. After all, winter was coming and neither the fish nor I had any intention of being out and about in Otago in the middle of winter.

My first stop was the Auckland Museum, where I had heard there were actual grayling specimens. Introducing oneself as an author on a research trip opens many doors, and in this case, the lids of specimen jars. To my astonishment three pickled grayling were laid out in front of me for my viewing and photographing pleasure.

After a whirlwind tour of Cape Reinga and Ninety Mile Beach, I skipped back to Kerikeri to help Mike McGlynn with his annual Northland mudfish surveys. I had done a small amount of brown mudfish surveying before this, and am officially envious of anyone surveying for Northland muddies – they live in water deep enough to actually submerge a trap.

My next new species to locate were the dwarf inanga and dune lakes galaxias. The Kai-Iwi Lakes were astonishingly beautiful, with their white sands and bright blue waters (sadly crawling with gambusia). It took a few days for me to figure out how to find the galaxiids – first I found schools of the cutest little whitebait, then eventually was shown a few tricks by the experts and found the bright yellow, pointy-headed adults.

With the North Island species ticked off, I slowly meandered south, largely moving in time with the ‘spring thaw’. Several nights after my arrival in the South Island, and quite by chance, I found my first Canterbury galaxias. Finding a species for the first time is so much fun, but when travelling alone it is hard to express it in a satisfying manner. Many a dark and remote stream has been the silent witness to my varied and awkward happy dances and repetitive monologues about the cuteness of the species in question.

Onwards to Canterbury, where I had the easiest fishing experience of my life: Leanne O’Brien delivered a bucket of Canterbury mudfish to the door of my van. She and Nicholas Dunn then took me on ‘A Mudfish Appreciator’s Tour of Canterbury’, where the precarious position of this species was revealed to me, in all of its shocking detail.

I promptly fell in love with Otago on arrival, and was lucky enough to be escorted through some divine countryside by the wonderful fish teams from Otago’s DOC and regional council, checking off almost all of the (still-confusing) vulgaris complex species and all of the (blissfully distinctive) pencil galaxiids.

The last two galaxiids I ticked off my list were the southern flathead and the Gollum galaxias. Using the Freshwater Fish database to find localities for southern flatheads, I parked up beside a likely river in Southland. I hand-searched riffles for several hours during the day, and again at night, finally unearthing three of the most beautiful ‘textbook’ flatheads. The Gollum galaxias was a much easier find: after becoming very bored while driving to a distant location, I gave up and camped by some quarry ponds. I wasn’t intending to go spotlighting, but the urge is strong when there is water nearby and I have a torch. Within moments I had my first Gollum, and yes, they are as weird and distinctive as they look in the photographs.

My last major trek to find a species was through Molesworth Station to see the Tarndale bullies. This pilgrimage through an astonishingly huge landscape is something that all die-hard fish geeks should make. The bullies themselves are unsurprisingly small and subtly marked, but sitting there, on the edge of one of those famous tarns, feeling so very small and alone in this vast alpine landscape, with one of these little bullies in your hand is indescribably wonderful.

The result of this six month tour is a compact and comprehensive guide to both the native and exotic freshwater fishes in New Zealand, complete with utterly beautiful photos. It is due out in November, just in time for the upcoming field season. Meanwhile, I am contemplating what form my next fishy book shall take, and how I can use it as an excuse for more adventures. ■



Whitebait Connections

By Martin Rutledge (Department of Conservation)

April saw several DOC staff attend the National Marine and Freshwater Education Wānanga Conference at Te Rawhiti Marae at the Bay of Islands, run by the Mountains to The Sea Conservation Trust. For Nelson based DOC freshie Martin Rutledge, connecting with the Whitebait Connection (WBC) team and partner groups to share ideas and experiences on whitebait conservation projects and advocacy initiatives was the focus. DOC has been supporting the WBC Programme for several years as the programme has extended its influence nationally to raise awareness and help get runs on the board for whitebait habitat protection. It syncs perfectly with DOC's objective to educate and inspire broad participation in conservation by schools and communities.

Collaborating with WBC and others on the development of advocacy resources on how to find and protect those critical

inanga spawning grounds is an area of active interest. In Martin's Nelson patch training sessions led by Mike Hickford (Marine Ecology Research Group Canterbury University) on how to find and protect spawning grounds have already led to the discovery of many new spawning sites over the last couple of years. Likewise, Mike's run very successful training with Horizons and Marlborough Council staff – and Northland Council is lining up.

Back to the conference...the welcoming local hapu – Ngati Kuta and Patukeha, making whitebait connections, great food, inspiring conference dinner (including a giant kokopu guest, and fish rap session) and field trip to Tangatapu Wetland a local community restoration project were the highlights for the Nelson freshie. ■



Fish survey as part of the Tangatapu wetland trip.



'What bug is that' fieldtrip.



Off to the conference dinner!



Guests at the conference dinner.

STUDENT NEWS

We are currently looking for a new student representative after Kristy Hogsden stepped down from her position last year. If you want to give students a voice within the Society, please approach the executive and let us know. ■

CRITTER OF THE YEAR 2013

By Stephen Moore (Landcare Research)

Uropetala is our largest New Zealand dragonfly – the yellow and black adult having a wingspan that can exceed 13 cm. It belongs to the family Petaluridae, and we have two ancient endemic species in New Zealand, *U. carovei* and *U. chiltoni* (neither are considered to be threatened).

The nymphs live up to five years in tunnels in the soft, semi-submerged banks of stream or wetland habitats, and are thought to feed on other invertebrates, primarily at night. They have long, torpedo-like bodies and they are among our largest and longest stream insects. They are also

heavily armoured and have very hairy forelimbs. However, the nymphs are rarely sighted, partly because few of us spend time sampling wetland margin tunnels, and even fewer of us visit such habitats at night. Luckily the University of Canterbury had a nice nymph specimen to photograph.

Uropetala adults are noisy fliers and you may well hear them flying around you in vegetated areas close to bush-covered or wetland streams before you see them. The adults also have the nice habit of posing for photos, allowing you to take good live shots if you move slowly. ■



Adult *Uropetala* (Hunuas, Auckland)



Nymph (University of Canterbury specimen), X4



Dorsal view of head & thorax of nymph, X8



Ventral view of head & thorax of nymph, X8

A group of undergraduates negotiates recent snow on the way to sampling Rayban Spring on an early spring field course in the Canterbury high country. See article on page 18.

Photo © Angus McIntosh

RESEARCH NEWS



UNIVERSITIES

University of Otago



The event for the year for us was undoubtedly the NZFSS conference – we had a great time organising it, and would like to thank Lea and her team at On-Cue, and of course everyone who attended. It was great to catch up with everyone, and we enjoyed having you here. Looking forward to Hamilton in August.

On the overseas conference travel front, **Gerry Closs** and **Pete Jones** will attend the Indo-Pacific Fishes Conference in Okinawa in late June – looking forward to a blast of tropical sun, and some great talks as well. In May **Katha Lange** went to another Freshwater Science Society (formerly NABS) meeting, this time in Florida (decidedly hot), and she and **Romana Salis** will also attend the Symposium for European Freshwater Sciences in Germany in July.

On the research front, Gerry has been working with **Hannah Harland**, looking at timing of hatch in bluegill bully – in short, the developmental stage at which they can hatch is remarkably flexible. Gerry is also continuing to co-edit a book with **Marty Krkosek** and **Julian Olden** on the 'Conservation of Freshwater Fish', to be published by Cambridge University Press in 2014. **Christoph Matthaei** became a permanent academic staff member in the Otago Zoology Department in June. His latest multiple stressors research project, investigating the off-farm effects of the nitrification inhibitor DCD on running water ecosystems, still involves PhD student Romana Salis. This year the DCD project team was joined by **Andreas Bruder** from Switzerland, who is doing a post-doc funded by the NZ Ministry for Primary Industries, and **Yulia Kiseleva**, an Otago PGDipSci student. **Colin Townsend** continues to publish papers with colleagues and students on topics related to the effects of land-use change, multiple stressors and climate change on stream ecosystems. Recently, Colin was surprised and honoured when he was awarded the Society for Freshwater Science (formerly NABS) Award of Excellence for 2013.

Several students have completed their PhDs since the last report – **Abbas Akbaripasand** (Energetics of banded kokopu), **Jeff Vanderpham** (Mechanosensory systems in common and redfin bully) and **Vanessa Hammond** (Environmental controls on *Didymosphenia geminata*) have had their theses accepted. **Jeremy 'Jay' Piggott** completed his PhD thesis (Climate Change and Multiple Stressors in Agricultural Streams) last December and continues his research fellowship with the Association of Pacific Rim

Universities (based at the National University of Singapore).

Pourya Shahpoury, a Chemistry PhD student at Otago co-supervised by environmental chemist **Kimberly Hageman** and Christoph Matthaei, completed his thesis as well, entitled Organic Contaminants in Agricultural and Alpine Streams in New Zealand. **Lan Pham** also gained a distinction for her MSc work on the use of rotenone to control trout. Congratulations to you all!

Other students continue to work on – **Rasmus Gabrielsson** is completing his final analyses on trout migration in the Clutha River. **Doug Jones** is currently writing up the results of his experiment on brown trout migration and food supply. **Aurelien Vivanços** is currently working with **Cédric Tentelier** and **Agnes Bardonnnet** (UMR Ecobiop) in France on an experiment examining the effects of changing density on the stability of social hierarchies in juvenile brown trout. **Manna Warburton's** work on torrentfish shows evidence of relatively flexible patterns in the timing and extent of up and downstream migration. **Lance Dorsey** demonstrated conclusively that brook charr have negative impacts on galaxiids in tank environments. **Peter Jones** is writing up the results of his life history work on non-migratory galaxiids, clearly demonstrating clear differences in reproductive investment and fecundity across species. **Michael Greer's** results on the management of agricultural drains suggest that partial macrophyte clearance may actually benefit giant kokopu, although total clearing is severely detrimental. **Sourav Paul's** work on the bioenergetics of estuarine mysids indicates that individual fecundity is variable and influenced by estuarine productivity. **Javad Ramezani's** epic reach-scale experiment showed clear impacts of silt removal addition on fish abundance. **Tanya Dann** will be visiting **Brent Sinclair** (University of Western Ontario) to analyse the results of a starvation behaviour and survival experiment on the damselflies, *Austrolestes* and *Xanthocnemis*. Katha Lange completed her one-year survey of multiple stream sites in the Manuherikia River catchment, a study in which she aims to disentangle responses of stream fish and benthic organisms to stressor gradients of nutrient enrichment, fine sediment inputs and increased water temperatures due to abstraction for irrigation. She recently submitted a manuscript about the fish part of this research. **Antje Bierschenk** continues writing her PhD thesis. Her first journal article, a study of the impacts

of catchment land use on ecosystem functioning along a freshwater-marine continuum, was selected in February 2013 by 'Environment Progress', a website dedicated to "alerting the scientific community to breaking journal articles considered to represent the best in Environmental Science research". **Rowan Moore** and Josh Tabak are writing up their MSc research on 'Patch use by redfin bully', and 'Barriers to migration in coastal streams'. **Jon MacCallum** is continuing his MSc research aimed at examining the spatial ecology of didymo in large rivers.

Tina Bayer, whose research on Lakes Wanaka and Wakatipu has been co-supervised by **Carolyn Burns** and **Marc Schallenberg**, has submitted her PhD thesis, "Effects of climate change on two large, deep oligotrophic

lakes in New Zealand." The first publication from her research is in press in *Hydrobiologia* (see publications list).

PhD student, **Amy Weaver**, has almost finished the sampling and experimental work associated with her ORC-funded research on the relative importance of new nutrients versus internally-cycled nutrients in Lake Wanaka.

Carolyn and Marc continue their collaborative research with NIWA on aspects of lake restoration. Carolyn is preparing illustrated descriptions of a new species of indigenous *Daphnia* collected in two alpine lakes in the Garvie Mts, Central Otago, and a pond near Lake Ohau; genetic support for the proposed new species is being provided by Ian Duggan and Ian Hogg, University of Waikato. ■

University of Canterbury



The **Freshwater Ecology Research Group (FERG)** at the University of Canterbury, also part of the Waterways Centre for Freshwater Management, has been as busy as ever.

Oldies but Goodies!

The senior members of the FERG group have been involved in really interesting projects this year. **Mike Winterbourn** has started a study on the life history and reproduction of the estuarine snail *Potamopyrgus estuarinus* in the lower reaches of rivers in and around Christchurch. He is also assisting biologists at EOS Ecology with identification of freshwater invertebrates collected during the recent Campbell Island expedition. **Jon Harding** is continuing research on Acid Mine Drainage and earthquake impacts on Christchurch streams, as well as work on Riparian Management in agricultural streams. Jon is also busy on Canterbury Water Management Zone Committees. **Angus McIntosh's** work on the first phase of research funded by the Mackenzie Trust on enhancing the effectiveness of riparian management is drawing to a close with multiple students finishing and many papers in the pipeline. Angus is also working on finishing a large body of work on the effects of habitat size and flows on stream food webs.

What Would we do Without Them!

Our technicians are the glue that keeps us all together. **Linda Morris** provides technical support for FERG staff and students and has been busy moving and organizing equipment into our new Biology building on campus. **Maggie Bayfield** and **Milen Marinov** are busy organising the next phase of the Mackenzie Trust, funded for five years, aimed at field testing

strategies for successful riparian management and stream rehabilitation.

Movin' on Up!

There are a few people in the group that have finished their degrees or positions and are starting new positions either within FERG or abroad. **Kristy Hogsden** finished her PhD on the structure and function of food webs in acid mine drainage streams early this year and has started postdoctoral work on the effects of mining-related sediment on fish.

Richard White submitted his MSc on the metabolic controls on distribution and abundance in freshwater fish, and is now investigating the effects of hydrological disturbance on density dependant regulation in brown mudfish populations using mark-recapture. **Frank Burdon** has submitted his PhD thesis titled "Impacts of sedimentation on the structure and functioning of agricultural stream communities". Frank will be travelling to Switzerland in June to start a postdoc at EAWAG working on the impacts of micropollutants in aquatic ecosystems. **Hamish Greig** has been working with Angus McIntosh and Helen Warburton on the effects of ecosystem size on stream food webs. He has also been co-leading a NCEAS working group on the temperature dependance of species interactions. He will be starting an Assistant Professor position at the University of Maine in August.

Mackenzie Trust Post-Doc **Jon O'Brien** has been offered a faculty position at Canisius College, a small university in the United States, and will be leaving New Zealand later this year. Research technician, Milen Marinov, is moving to a new job at the Ministry for Primary Industries. He will be working on a Lucid key to Theridiidae spiders which have been intercepted

at the border at many occasions and are considered as a potential threat to New Zealand biodiversity.

Almost There!

The FERG group has many students with the finish line in sight. **Elizabeth Graham** is currently writing her PhD dissertation on the links between productivity, community composition, and food web structure in lowland Canterbury streams. **Jon Bray** is busy writing, with a bit of lab work to finish his PhD. He is aiming to finish before Feb 2014, and has drafts of two primary data chapters written. **Simon Howard** is currently writing up his PhD thesis. His recent work has included a third summer sampling of bignose galaxias populations and an experiment that manipulated flows in natural channels to test the effects of local flow changes on bignose galaxias. **Danladi M. Umar's** PhD research was to investigate the effects of land use changes on benthic stream communities in highland tropical streams in Nigeria. His next aim is to develop a score tolerance value for benthic invertebrates in running waters of the highland tropical streams in Nigeria.

Keep on Keepin' on

Many of the members of FERG are here to stay...at least for now! **Helen Warburton** has been working this field season with Hamish Greig carrying out a series of experiments to investigate how varying predator body sizes and prey abundances influences predation rates in aquatic food webs. **Amanda Klemmer** has been working on a large, long-term mesocosm experiment at the Cass Field Station, as a part of her PhD, looking at the effects of terrestrial invertebrates and terrestrial leaves on food-web interactions within pond

ecosystems. **Mark Galatowitsch**, as a part of his PhD, has been testing pond generalist invertebrate developmental and behavioural flexibility when exposed to varying drying periods and different predators. In addition, he has been using microsatellite analyses to understand whether dispersal between ponds is critical to sustain regional generalist populations. **Emma Porter** is currently working on her MSc, looking at the effects of over-land sediment flow through different riparian zones associated with a variety of management practices. This involved doing a public perception questionnaire and a wide field survey across Canterbury. **Tom Moore** has conducted a stream field survey investigating nitrate effects on community structure, and is currently processing invertebrate samples. This will partially form chapter two of his MSc and compliment forthcoming ecotoxicological fish trails in chapter three.

It's Only Just Begun...

We have many members that are just starting new degrees or positions within the group. **Nixie Boddy** is starting her Honours project on isolating factors controlling the distribution of *Galaxias paucispondylus* and will be using predictive modeling techniques to quantify the potential effects of climate change on their distributions. **Sophie Hunt** has recently joined FERG and is doing part one of her Masters. For her thesis she hopes to work towards understanding how climate change will mediate biotic invasions. **Steve Pohe** and Mike Winterbourn, together with Olly Ball (NorthTec), have recently concluded their series of studies on the littoral fauna of Aupouri dune lakes in Northland. Steve started a PhD in April, investigating the diversity and distribution of New Zealand mayflies, and the potential impact of climatic warming on their reproduction biology. ■



Photo © Angus McIntosh

Dr Hamish Greig, who has just taken up an Assistant Professor position at the University of Maine in Orono, talks to a group of students about eels in Grasmere Stream.



A) A brown mudfish (*Neochanna apoda*) from a shallow rimu forest pool on the South Island west coast. Although these fish are famed for their ability to survive periods of de-watering, MSc student Richard White has observed that the drought on the west coast this autumn had a massive effect on brown mudfish populations. He recorded 25 per cent of fish dying in most areas and up to 45 per cent dying in the most shallow, drought-prone pools. B) Lake Sarah, near Cass in the South Island High country, after a late winter storm. C) Braids of the upper Waimakariri River on the edge of Arthur's Pass National Park. D) A wrybill on the bed of the Waimakariri River. Although their curved bill helps these birds forge for insects under river-bed stones, they face a much greater challenge as their habitats are affected by abstraction for irrigation. All photos © Angus McIntosh



D

School of Geography, Environment and Earth Sciences

Alexa van Eaton found diatoms from paleolake Taupo are present in volcanic ash from the Oruanui super-eruption, and has now returned to the USA on a NSF post-doctoral

fellowship. **Margaret Harper** will be analysing the volcanic flora in more detail once she has finished documenting the mainly brackish water diatoms collected during the Miranda Bioblitz in February. ■

University of Waikato



The Toxic Avengers

David Hamilton has recently started his Marsden-funded research on “Toxic in crowds: how cyanobacterial blooms regulate toxin production” with **Susie Wood** (Cawthron) and **Daniel Dietrich** (University of Konstanz, Germany). Lake Rotorua, Kaikoura, was the site of the initial fieldwork due to its high levels of the toxin-producing species *Microcystis aeruginosa*. **Jonathan Abell** has now successfully defended his PhD thesis on “Variability in nutrient loading to lake ecosystems and associated impacts on lake water quality”. **Dylan Clarke** has submitted his MSc thesis on “The performance of detainment bunds for attenuating phosphorus and sediment loss from pastoral farmland”. Both of these theses had fieldwork components focused on Lake Rotorua. Several PhD studies are in progress: **Rebecca Eivers** (remediation measures to mitigate sediment and nutrient inputs from agricultural catchments to Waikato lakes), **Arianto Santoso** (greenhouse gas emissions from Rotorua lakes), **Hannah Mueller** (socio-economic contexts and tools for more efficient policies and regulation of diffuse nutrient loads to lakes), **Monica Peters** (a framework to evaluate the effectiveness of community environmental monitoring toolkits for meeting end-user needs), **Theodore Kpodonu** (an integrated ecosystem assessment for water quality management of Lake Okataina) and **Ian Kusabs** (an ecological study of koura in Te Arawa lakes; co-supervised with John Quinn at NIWA).

Big Rivers, Kevin Delivers

Kevin Collier has continued to supervise projects in the Large Rivers Group, including co-supervising **Michael Pingram**’s PhD thesis on food webs in the lower river. Post-doctoral fellow **Konrad Górski** recently left the group to work on large rivers in Chile, but not before submitting several papers on his work in the Waikato River looking at fish-floodplain interactions. MSc student **Alicia Caitlin** will be following up on some of Konrad’s work by investigating the effects of floodplain vegetation structure on zooplankton community development following inundation, and the implications for larval fish diet. Kevin also supervised **Tammy Valler**’s recently-completed MSc thesis on the ecological effects of metal contamination in sediments of urban streams in Hamilton, and is assisting with **Jeremy Garrett-Walker**’s thesis on the effects of pest fish on waterfowl production in ponds.

Appreciating the Little Things

Ian Duggan has continued his collaborations on zooplankton genetics with Ian Hogg. Recent work has included identifying the new South Island *Daphnia* invader as North American *Daphnia ‘pulex’*, with **Karen Robinson** (NIWA), **Carolyn Burns** (University of Otago), and others (published), and examining the evolutionary relationships among New Zealand and Australian calanoid copepod species, with **Russ Shiel** (University of Adelaide), **Yoshi Kobayashi** (NSW Department of Premier and Cabinet), and others (submitted). Other genetic datasets are coming together with a number of exciting papers in the pipeline for the next couple of years. ■

Ian Henderson is continuing to study the anoxygenic photosynthetic bacteria in Lake Namunamu. Recent results show bacteriochlorophyll densities higher than ever reported from a non-saline, holomictic lake. However, water temperature profiles suggest that the rate of cooling may be insufficient to allow mixing this winter and the lake could become meromictic. Despite the exceptionally high levels of Chlorophyll *a* at the thermocline (and Bacteriochlorophyll *d* just below) Secchi transparency is 6 m and the stocked rainbow trout fishery is doing well.

Russell Death is continuing in his efforts to become a geomorphologist now that he has discovered he doesn't have what it takes to be an ecologist. Along with his daughter **Amanda Death** and **Ian Fuller** (an actual geomorphologist) they are developing an Index of Natural Character (NCI) for use in assessing habitat quality. We are using this with Greater Wellington Regional Council to ensure flood control works do not adversely affect trout populations. On the east coast of the GW region we are also conducting more standard BACI investigations of the effect of small scale flood control works on sediment, periphyton, invertebrates and fish. Along with Ian Fuller we presented a lot of this work along with a number of other scientists from Australia, NZ and UK in a Massey University sponsored 'Solutions to Pollution' workshop. This was well attended by 120 people from Regional Councils, local river care groups and government (see page 9). I am sure the free lunch had nothing to do with attendance...Powerpoints from most talks can be found on <http://rivers.massey.ac.nz>.

Mike Joy has been working on a predictive fish model assessment for the Ministry for the Environment NEMAR project. Finally the New Zealand fish survey protocols (with Bruno David and Mike Lake) have been finished and published (available by contacting Mike). Mike has also developed a new fish Index of Biotic Integrity (IBI) for New Caledonia streams that includes new abundance and size class metrics made possible by the NC fishers having a strict fishing protocol. The availability of data from the New Zealand protocols will soon allow the addition of these metrics to the NZ IBI. Mike has built another IBI for Tasman/Nelson and is finishing two book chapters as well as giving many public talks on the state of the environment all around New Zealand.

For a postgraduate project, **Andrea Ravenscroft** is sampling a number of sites within the Karamu catchment, Hawkes Bay, that have very low MCI values (< 50). Ten sites have been selected from the catchment to investigate the differing conditions imposed upon each site, and then make comparisons between low MCI and higher MCI value sites. Environmental variables at the sampling site and variables

of the greater catchment area including soil types, land use and vegetation buffering, are to be described in terms of influencing stream water quality and habitat quality for macroinvertebrates.

For **Amy Feck**'s honours project, she is investigating the efficacy of riparian plantings in protecting in-stream values for springs in the Ruataniwha Plains. She also spends two days a week at Aquanet consulting learning how the real world of stream ecology research works.

After many happy years (lol), **Fiona Death** has left Massey to further her career in freshwater ecology consultancy work at Aquanet Consulting.

Sriyan Jayasuriya is continuing his PhD research on fish community structure in Taranaki streams. The main focus of his research is on local scale beta diversity patterns of freshwater fish and macroinvertebrates in stream habitats. Data has been collected from 96 streams in 2012 and from 15 streams in 2013. To date we have identified the most important environmental determinates of fish community structure in Taranaki. Also, an analysis on the impact of land use and presence of brown trout on the fish community structure has recently been completed. Future research will include exploring determinates of 'within stream beta diversity' and temporal changes of the fish communities. We are also interested in finding out the biological interactions (e.g., impact of eels /trout on stream communities and the interactions between fish and stream invertebrates).

Corina Jordan is still struggling with balancing a "full" time Fish and Game job managing national RMA cases (One Plan, Canterbury Land and Water Regional Plan, Ruataniwha irrigation scheme and plan change) and a part time PhD. However, in between PhD suspensions for the RMA cases, she continues to focus on providing effective procedures for facilitating science information transfer into the planning process. ■

GOVERNMENT ORGANISATIONS & CROWN RESEARCH INSTITUTES

Department of Conservation



Hamilton

Natasha Grainger (Technical Advisor, Freshwater) has been working on a variety of freshwater issues. Highlights include co-ordinating the panel to assess the freshwater invertebrate threat ranking in preparation to publish the New Zealand Threat Classification List for freshwater invertebrates, continuing to support the Motueka Area with their invasive fish eradication programme and being part of the wider DOC freshwater team. Natasha is on the organising committee for the upcoming conference and is looking forward to hosting people from the three societies in Hamilton.

Jane Goodman (Technical Advisor) is enjoying working in the newly formed Freshwater Science and Technical Team; particularly owing to having two Freshwater colleagues to collaborate with on a day to day basis. She has been leading the freshwater species work programme, contributing to RMA advice, providing support and advice to Area Offices and inputting to species and ecosystem prioritisation. Jane is currently focused on organising the panel and data for the re-ranking of freshwater fish in the New Zealand Threat Classification System.

Michael Pingram (Technical Advisor) joined the Freshwater Team in October and has been thrown straight into providing advice to other parts of DOC on various resource management issues in Northland, Waikato and the Hawkes Bay. Michael is enjoying working in the Hamilton office with Jane and Natasha. Michael is nearing the completion of his PhD thesis and is looking forward to the rest of 2013.

Gertrude the goldfish has had her best year yet. She is a regular attendee at Freshwater Team meetings. Gertrude is a bit of an introvert so she doesn't say much, but her presence at team meetings is always appreciated.



Taupō-nui-a-tia

Michel Dedual has been collating and formatting more than 50,000 records of angling data (satisfaction, CPUE, etc) collected between 1948 and now. The exploration of this data will allow identifying important traits of the angler's participation dynamics particularly in relation to the fishery state. Michel has also assisted Taranaki Fish and Game in the monitoring of the impacts of hydro-peaking on the trout fisheries in the Patea River. He is also a member of the scientific advisory committee for the next World Recreational Fishing Conference (www.7wrfc.com) and has been organizing a workshop on Southern Hemisphere Recreational Salmonid Fisheries.

WELLINGTON

Rosemary Miller has the honour of managing the Department's Freshwater Science and Technical Team. Rosemary hopes that all her work running around after the team helps them to focus on what will contribute the most to making a difference for freshwater conservation. The challenges for the team involve being stretched pretty thinly in order to provide freshwater support for the Department's advocacy work and how best to work with businesses to advance conservation.

Natasha Petrove joined the Freshwater Team as a Technical Advisor in September, and has spent the past few months getting a crash course in RMA issues. Natasha has been involved in providing input to the draft Taranaki Regional Freshwater Plan Review, and working with the planning team to provide advice on resource consent applications in the lower North Island. She is also working with others in the freshwater team to develop freshwater RMA guidelines – to help standardise the advice DOC staff give on RMA matters. Some non-RMA projects include working with Horizons Regional Council on their inanga spawning project in the lower Manawatu River, and developing some guidance for restoring and enhancing mudfish habitats.

Amber McEwan rejoined the DOC freshwater team on a part-time basis where she has been working on writing guidelines for surveying and monitoring various galaxiid groups and on the use of anaesthetics and tagging techniques

on freshwater fish. Also see the update under 'consultancies' for news of what Amber has been up to under the shade of her consultant hat (Riverscapes Freshwater Ecology).

Nelson

Martin Rutledge is one of the Technical Advisors on the Freshwater Team, based in Nelson. Martin's time has been focussed primarily on freshwater RMA advocacy, but this has been punctuated by some stimulating field and collaborative work including assisting Councils with inanga spawning surveys and techniques. During one set of fieldwork, Horizons Regional Council found a huge new inanga spawning ground on the lower Manawatu River. Another highlight was contributing to the marine and freshwater education wananga at Te Rawhiti Marae, and meeting the Whitebait Connection Team. Survey work, awareness and protection of inanga spawning grounds is progressing nationally. A field trip to a small coastal lake on Durville Island which was retired from farming about 5 years ago shows some excellent regeneration including lake edge habitat for tuna, bullies and smelt.

Christchurch

Sjaan Bowie took up a part-time role as a Technical Advisor on the national Freshwater Team, based in Christchurch, in July 2012 as a result of DOC restructuring. In her new role she has been involved in a wide range of freshwater work including helping Coastal Otago write up their key freshwater work achieved in the last ten years, collating known information on built barriers, providing presentations on fish passage, looking into improvements of the FENZ geodatabase, progressing sorting taxonomic issues for non-migratory galaxiids, collating freshwater monitoring and reporting information and looking into standard reporting, being a DOC representative on a number of groups (e.g. IPENZ Rivers Group and Water Intakes Group) and supporting a number of freshwater fieldwork and programmes happening around the country.

Mary Beech joined the Freshwater team earlier this year to work on the Arawai Kakariki wetland restoration programme. Mary's focus in the programme will be communication of results and findings from science projects and management trials, and to provide technical support for site managers. Mary was formerly working for Canterbury Regional Council

Nicholas Dunn took up a Science Advisor role on the Freshwater Team in September 2012, and is based in Christchurch. For much of the last year he has been involved in Resource Management issues, particularly the Canterbury Regional Council's proposed Land and Water Regional Plan, the Hurunui and Waiau River Regional Plan, a number of consent applications, and the nutrient limit setting processes in the Selwyn and Hinds catchments. He retains his interest in the ecology of non-migratory galaxias and the mudfishes, particularly their hydrological habitat requirements.

Hugh Robertson (Science Advisor, Freshwater) has been coordinating input to the wetlands component of the national limit setting process led by MfE. He co-organised a workshop

exploring wetlands and climate change adaptation in Melbourne during April, and continues his role as science lead for the Arawai Kakariki restoration programme, including recent field trips to the Ashburton Basin and Whangamarino.

Dave West (Science Advisor, Freshwater) managed to get out in the field (well at least twice) with David Moss (Kapiti/Wellington Area Office) to continue documenting the spectacular recovery of koura and banded kokopu following removal of brown trout from upper Karori reservoir and streams. Lucky to have Lan to write up some of the results, more to come! Dave has finally been captured by a secondment to the Water Directorate to work with MfE folk (and many NZFSS members) on science to inform bottom lines and bands for the National Objectives Framework in Water Reforms. He has been trying to contain his secondment to one day a week from the original 3 days/week and still do his day job, Ha! Dave has also been enjoying being on the Invasive Animal CRC's Pest fish steering group and LERNZ External Science Review Committee and is looking to improve FENZ after getting feedback from you guys, so hope you clicked the online survey link.

Philippe Gerbeaux's (Technical Advisor, Freshwater) time has been focussed primarily on wetland RMA advocacy, in particular providing advice and evidence on the proposed Canterbury Land and Water Plan, as well as other regional plans and strategies (Northland/Otago). From his involvement in those he has gained an understanding enabling him to promote (via planners) a revised approach to criteria for the assessment of significance around the country. He has also contributed to coordinate didymo research efforts from science providers in partnership with MPI. In his spare time Philippe continues to survey streams throughout the Pacific and has co-authored (with French Natural History Museum colleagues) a handbook on the taxonomy, ecology, biology and management of freshwater fishes and crustaceans of Polynesia (recently published by the French Ichthyological Society).

Anna Paltridge (Technical Advisor) is enjoying working with the freshwater team in Christchurch. During the past year she has been involved in supporting didymo operational work, providing technical advice on freshwater threats, and assisting with freshwater species project work.

Helen McCaughan has been continuing the fight against pest fish invasion – including helping out with the new rudd incursion on the West Coast (SI). She has also been assisting with Canterbury mudfish work and the increasing demand for grass carp releases. For the past few months Helen has also been on secondment to the national Freshwater Team as a Technical Advisor, and in this role has been setting up a sampling programme for giant kokopu in the Waituna wetland catchment and working on-site with contractors carrying out in-stream bridge maintenance works on Banks Peninsula.

Otago

Murray Neilson retired from the Department after a long and successful career advocating for freshwater conservation both in Otago and nationally.

Coastal Otago Freshwater Team

Pete Ravenscroft, Daniel Jack, Rose Clucas and Ciaran Campbell have been gaining permissions, and undertaking trout removal and barrier installation in streams containing threatened non-migratory galaxiid species – mainly the lowland longjaw galaxias in the upper Waitaki, Clutha flathead galaxias in the upper Clutha River and Taieri flathead galaxias in Akatore Creek. The team has been involved in pursuing habitat enhancement for inanga spawning habitat and giant kokopu habitat in the lower Clutha River catchment on behalf of Contact Energy. There has been an extensive fieldwork effort this summer/autumn working alongside rangers **Craig Wilson** (from Alexandra) and **Florence Gaud** (from Wanaka) to revisit historic NZFFDB records to ascertain the current status of galaxiid species throughout Otago. Unfortunately it appears there is now an absence of galaxiids at many of these old surveyed sites. Data from these surveys will provide up to date information for the latest freshwater fish threat re-ranking.

Invercargill

Emily Funnell took on a part-time role as a Technical Advisor for the national Freshwater Team, based in Invercargill. Emily has been involved in the lamprey biosecurity management, eel management and Waituna wetland restoration before heading off on parental leave. ■



Trout barrier recently installed in Akatore Creek (cost 20k, including consents).



St John's School kids showing early symptoms of galaxiid love for their local species – the Central Otago Roundhead.



The force is strong with Clutha Flathead's. It took just one juvenile clutha flathead to cause this amount of pulling power with Lawrence Area School.

Stephen Moore continued to work for Landcare Research in Auckland, despite his dodgy health situation over the past year. He worked from his home office and lab where he spent most of his time analysing freshwater invertebrate samples for clients.

Stephen continued his interest in photography of freshwater invertebrates and fish – every taxon he found in his NZ or overseas projects was added to the photo collection (now containing several thousand images). Last year Stephen

created a web resource designed to assist community groups carrying out stream invertebrate monitoring (<http://fwinverts.landcareresearch.co.nz>). The website provides a simple identification key to over 200 invertebrate taxa, and new taxa were added to the site as they were found by Stephen during the year, or as they were sent to Stephen by others. The website was funded by the Ministry for the Environment's Community Environment Fund, with contributions also from the Auckland Council and Taranaki Regional Council. ■

NIWA



CHRISTCHURCH

Michelle Greenwood started as a permanent employee with NIWA in October 2012, after finishing a post-doc position. Since then she has been working on submitting her post-doctoral research papers on aquatic and terrestrial invertebrate communities of the upper Waimakariri River. She has also been working with **Doug Booker** as part of the sustainable water allocation program analysing existing large-scale invertebrate data sets with the aim to identify relationships between ecological and hydrological predictors. She is co-author on a paper submitted on this topic. Michelle has also been involved in a range of commercial projects including wetland and river surveys.

Don Jellyman has retired but continues to do some contract work and is involved in the programme tracking adult lampreys in the Okuti Stream, Banks Peninsula. In February, he participated in a 3 week research cruise (Tokyo University) to collect larval freshwater eels in the South Pacific, between New Caledonia and Fiji. His main focus is to complete a backlog of 10 papers.

Doug Booker is continuing work on analysis and prediction of periphyton, invertebrates and fish across New Zealand. With his NIWA colleagues Doug has recently written papers on: habitat and distribution of eels; length-weight relationships for New Zealand's freshwater fish species; quantifying the effects of flood disturbance on stream fish communities; stream classifications; influence of flow regime on freshwater fishes (Ecology of Freshwater Fish);

flow duration curves across New Zealand; dams design and environmental flows; establishment of reference or baseline conditions of chemical indicators and; the role of science in setting limits for sustainable water resource use (Hydrological Sciences): predicting periphyton cover frequency distributions.

Scott Larned ran the third phase of the National Environmental Monitoring and Reporting (NEMaR) programme for MfE. The projects carried out in this phase included an assessment of statistical models for extrapolating water quality and invertebrate metrics to all NZ rivers (with **Martin Unwin**), recommendations for new sites in the river monitoring network (with **Helen Roulston**), assessments of multi-metric indicators for national reporting (with Martin Unwin), a cost analysis and QA procedures for operating monitoring sites (with **Graham McBride, Rob Davies-Colley** and **Mike Bargh**), and an analysis of statistical power and representativeness in the current monitoring network (with Martin Unwin).

When not working on MfE projects, Scott has been preparing reports on the potential ecological effects of the proposed Kapiti Coast Expressway, participating in the MBIE "Freshwater Sandpit" process, and coordinating NIWA's work in the Whakaora Te Waihora restoration programme (with **Richard Measures, Mary de Winton, Mike Stewart, Erica Williams** and **Mandy Home**). On weekends and holidays, Scott has been working on groundwater and hyporheic ecology in NIWA's Sustainable Water Allocation Programme, and

attending science conferences in the US and Germany. For any francophiles – Scott, Thibault Datry and Klement Tockner have been funded by the French Biodiversity Foundation to run a three-year research programme on intermittent rivers. The programme involves biannual workshops in Aix-en-Provence...vive la France!

HAMILTON

Where Do All the Lamprey go?

Cindy Baker and **Michael Stewart** have developed in-stream passive samplers to quantify lamprey migratory pheromones as a population monitoring tool for lamprey (*Geotria australis*) populations that will enable end-users to quickly and cost-effectively determine the distribution of lamprey within an area. This tool has been applied to assess concentrations of lamprey pheromones from three New Zealand streams known to have historic and current populations of *G. australis* ammocoetes. Auckland Council have also utilised the in-stream samplers to investigate lamprey densities within selected Auckland waterways.

Cindy Baker, Don Jellyman and **Shannan Crow** are also tracking close to 100 pre-spawning adult lamprey in order to identify spawning sites. This study is providing essential insights into the habitat requirements of adult lamprey during their freshwater spawning migrations. Field results to date have shown that the upriver spawning migration of adult lamprey is closely linked with increased river flows. The micro-habitats utilised by lamprey during this migration have also been identified. It is hoped that this knowledge will help with rehabilitation and restoration of lamprey populations.

Waikato River Whitebait Habitat Restoration

Cindy Baker and **Paul Franklin** lead a new \$1.5M five-year whitebait restoration programme in the Waikato River, funded by the Waikato River Authority (WRA). The whitebait fishery in the Waikato River has declined over the past century but it is still the largest in the North Island and is highly valued by Waikato River Iwi. NIWA will collaborate with the Waikato Raupatu River Trust (co-leader **Cheri van Schravendiik-Goodman**), hapū and the local community to identify streams where whitebait access is restricted to determine which barriers can be modified to increase adult populations. Spawning and feeding habitat along the river and stream banks will also be restored. This is a significant outcome from the Waikato River Independent Scoping Study (WRISS) which identified a number of restoration options/scenarios to restore the health and wellbeing of the Waikato River. The project will see current best science practice translated directly into restoration outcomes for New Zealand.

Fish Passage Solutions

Paul Franklin and Cindy Baker are taking a new approach to the development of fish passage solutions designed specifically to cater for the unique characteristics of native species, but minimising the passage of exotic species.

Experimental approaches are being used to evaluate the effectiveness of alternative designs, which will increase confidence in solutions. For example, we have determined how the length and angle of baffled ramps influences the upstream movement of three common native fish species. In addition, we have undertaken a project investigating the impacts of tide gates on both fish passage and in-stream habitat.

Seagrass and Freshwater Macrophytes

In between breaks for parental leave, **Fleur Matheson** has continued her research into seagrass habitat requirements and transplantation techniques that will ultimately contribute to a MBIE-funded national seagrass restoration guide. Fleur also continues to be involved in work with Regional Councils towards the development of instream plant and nutrient guidelines and, alongside **John Clayton**, with consultancy work on lagarosiphon management in Lakes Wanaka and Benmore.

Mangrove Management

Carolyn Lundquist has continued to expand on the science available to inform the hot topic of mangrove management in northern New Zealand. Native mangrove forests have expanded in intertidal areas of many northern North Island estuaries in the last 50 years in response to increased sediment and nutrient delivery, resulting in community concern over loss of amenity values associated with open sand and mudflats. One of the mangrove removal methods developed recently and applied in particular in Tauranga Harbour since 2010 involves machine mulching of felled trees with the mulch left in situ on the mudflats to decay/be redistributed. In addition to the Tauranga study, we are working with councils to monitor the status and trends in recovery of other mangrove removals in recent decades, and using a variety of removal methods, in order to develop formal guidelines for low impact methods of managing mangrove expansion.

Aslan Wright-Stow has continued working on the long-term impacts of exotic forestry harvesting on streams in the Coromandel with **John Quinn**. John and Aslan also continue their work the East Cape to determine whether upstream harvest impacts can be detected on downstream unharvested streams in Torere Forest. Aslan, John and Paul Franklin have been adding wood to two agricultural streams in Whatawhata. Their aim, to determine if tree fern additions enhance the complexity of stream morphology, flow paths and increase natural retention of organic matter, thus improving habitat quality for invertebrates and fish. Additionally, Aslan, **David Reid**, **Brian Smith** and **Kerry Costley** re-surveyed nine Waikato riparian buffer zone planting schemes, 11 years after Steph Parkyn's survey to determine whether downstream riparian buffer zones enhance pasture stream restoration within an agricultural landscape. Aslan has also continued to work on a range of marine and lakes projects in his capacity as a scientific diver.

Enhancing Pasture Stream Restoration by Wood Addition

A BACI-design (Before-After Control-Impact) trial undertaken by Aslan Wright-Stow, John Quinn and Paul Franklin at Whatawhata, Waikato indicates that large wood additions to headwater streams (2–3 m wide channels in 300 ha catchments) can provide a relatively low-cost (c. \$5/m stream

length for materials and labour) method to enhance physical habitat diversity in systems impacted by loss of riparian vegetation and channel modification. Addition of treefern logs, in a combination of sill-log dams and angled flow deflectors, produced reach-scale increases in organic particle retention, hydraulic habitat diversity and retention time for nutrient cycling processes. ■



Josh Smith electrofishing below one of the angled wood additions at the upper Keripaka Stream site, Whatawhata.



Sill log with bank armoring modification at the upper Keripaka Stream site, Whatawhata.



Dye addition experiment to determine retention time with, and without wood at the lower Keripaka Stream site.

NON-GOVERNMENTAL ORGANISATIONS

Fish & Game New Zealand



NZ COUNCIL

The National Office of Fish and Game (including **Bryce Johnson** and **Neil Deans**), with particular support from **Corina Jordan** and the RMA regional staff, is very busy supporting freshwater habitat and access issues through RMA matters throughout the country, particularly in Hawke's Bay and the southern North Island, Canterbury and Otago/Southland. Many resource management plans and several water conservation orders are keeping staff busy in those regions particularly. Addressing concerns about proposed dramatic changes to the RMA by the Government also have taken considerable time and effort.

Some of this follows the national development of policy through the Freshwater NPS and Land and Water Forum reports. The second phase resource management plans are being developed throughout the country which requires considerable input and resources from Fish and Game and other parties. This is likely to continue in the immediate future, particularly with a reduced effort from other parties. Accordingly, we have less feedback for this newsletter than in previous years.

EASTERN REGION – by Matt Osborne

During the past twelve months Eastern Region Fish & Game have been actively involved in undertaking angler creel surveys in the region's most heavily fished lakes, as well as conducting a five yearly survey at Lake Waikaremoana. These surveys are designed to measure not only fish statistics but also assess how anglers perceive their recreation and provide a measure of angler satisfaction.

Key research carried out in the past few years into the timing of hatchery liberations and trout growth has led to the implementation of changes to how Eastern Region stock Lakes Tarawera, Rotoiti and Okataina. Replacing one-off seasonal liberations with releases that are spread out over a wider time frame are expected to increase survival and lead to greater benefit by anglers. The first phase of this program began in spring 2012.

Eastern Region Fish & Game, with support from Genesis Energy and HBRC have contracted University of Waikato to produce a report on data from the Lake Waikaremoana Water Quality Monitoring Buoy. The buoy has been in the lake gathering temperature, light, algae and turbidity parameters for 3 years. The report will combine environmental data and lake level records with fishery statistics to examine key drivers for the Waikaremoana fishery.

Eastern Region hatchery staff are investigating overseas research with regard to reducing the proliferation of cotton mould 'saprolegnia' forming on trout eggs stored within hatch stacks (incubator trays). Being able to implement strategies that reduce harmful chemical or lowering labour intensive practices such as egg 'picking' would prove hugely beneficial.

Several key spawning tributaries have been studied using a combination of fish trapping, drift diving and electric-fishing methods. These ongoing projects are being used to provide baseline data to monitor spawning success and investigate whether enhancement of these waterways is required in the future given catchment development or natural erosion.

See the drift diving on <http://vimeo.com/66707060>.



Lloyd Gledhill tagging rainbow trout at the Ngongotaha hatchery and releasing other fish at Lake Tarawera

NELSON MARLBOROUGH – by Neil Deans

A major effort for Fish and Game in Nelson Marlborough has been ongoing willow control in the Para Swamp, just north of Tuamarina on SH1 heading towards Picton. This is the largest lowland wetland in Marlborough, but has been infested with crack and some grey willow since the late 1940s. Aerial spraying has been effective in killing about 95% of willows, with considerable ground control being used to eliminate the remaining live trees. Good re-growth of sedge, flax, cabbage tree and some kahikatea has occurred in many areas, together with wet meadow species in the shallow open waters.

Fish and Game undertook re-examination of some trout spawning streams in the upper Motueka and Buller River catchments, jointly with Tasman District Council staff in February. Many of these streams had not been checked in

recent years and were reputed to have seriously reduced juvenile trout numbers. A relatively benign spring without major floods this year meant there were juvenile trout and native fish species in many sites. One unexpected find was a population of koaro together with trout and eels in Teetotal Creek in the upper Buller. By contrast, detailed investigations using new quantitative sampling of the middle Motupiko River found abundant upland bullies, dwarf galaxias and longfin eels but a surprising lack of brown trout in apparently suitable habitat; possibly due to elevated water temperatures and low flows.

A major new initiative has been the development of junior fish-out ponds in the Waimea River bermlands, which have proven popular with hundreds of kids given the chance to go fishing and catch trout or salmon.



Vaughan Lynn planting kahikatea at Para Swamp.



Kids Fishing at newly created fishing ponds, with adjacent wetlands four years after development, Waimea bermlands.

WEST COAST – by Dean Kelly

Over the summer 2012/13 the West Coast regional Fish & Game staff **Dean Kelly** and **Rhys Adams** participated in the Cawthron cumulative effects program with quantitative electric fishing in the Mawheraiti and Orangipuki Rivers. Fish were caught, anaesthetised and measured with a sample taken for aging and growth analysis. They also performed a Salmoniid survey of Lake Poerua in the Brunner catchment, using a standardised netting procedure to catch and measure size and abundance of trout in the lake. This was then compared to previous surveys to assess the state of the fishery for management purposes.

Salmon spawning surveys were conducted in all the major West Coast fisheries to assess populations for management purposes. The Department of Conservation (DOC) was alerted to a noxious species incursion at Lake Ianthe – so Fish and Game undertook a delimitation survey of Lake Ianthe and Lake Mahinapua in conjunction with DOC.

West Coast Fish & Game are also conducting a long term monitoring project on the Mawheraiti River to assess seasonal and longer term changes in the river. As part of this project they have installed flow and temperature monitoring equipment as well as taking water quality samples. These will be assessed against seasonal drift dive counts and electric fishing results.

The guys also performed trout spawning surveys in catchments where liberations and enhancements have occurred to ascertain the effectiveness of these liberations. Last but not least, there is also the drudgery of the RMA with the West Coast region submitting on the region's 2012 Land and Water Plan. We have also been involved in hearings on a number of consent applications that had the potential to detrimentally affect the aquatic environment.

OTAGO – by Niall Watson

Two new Fish and Game staff in Otago are **Clare Morris** who replaced Rasmus Gabrielsson in the Cromwell position and **Helen Keeling** who has taken on a new science support position based in Dunedin.

The Environment Court hearing of appeals over Otago Fish and Game's application to amend the Kawarau Water Conservation Order were completed in late 2012. The application sought to completely prohibit damming on the Nevis River to protect a range of outstanding values including landscape, backcountry fisheries and rare native fish. A decision is expected at any time. In a separate decision, the whole Nevis valley was reclassified as an 'Outstanding Natural Landscape' in the Central Otago District Plan.

The transition from water allocation by way of mining privileges to RMA consents is underway. Many smaller rivers and streams in Central Otago are over-allocated due to the use of these historic rights to take water, but the RMA phases them out in 2021 so there are opportunities to set minimum and residual flows on those waters concerned. At the same time there is intense competition for water for irrigation so flow setting exercises have to be well supported with good science.

New irrigation scheme proposals in the Manuherikia and the Tarras area are expected to result in further intensification in agriculture and land use and will require careful management to contain off-site impacts.

Otago Regional Council's Water Plan Change 6A on water quality is working its way through the approval's process. The plan change is designed specifically to address impacts of land use on water quality and takes a more effects-based approach than water planning in other regions. Also, Otago Fish and Game is working with Cawthron Institute on a



Lawson Davey, Dean Kelly and Robin Holmes (Cawthron) qualitative sampling in the Mawheraiti River, West Coast.

national research project into land use impacts on waterways and fisheries

Work continues with Contact Energy on mitigation of the sports fishery impacts of their Clutha hydro scheme which is part of their consent requirement. A primary focus of that work is enhancement of the salmon fishery with a target of 5000 returning adult fish. The current run is under a thousand fish.

SOUTHLAND FISHERIES MONITORING 2012

Drift Diving

Trout abundance in the Upper Waiau (between Lakes Te Anau and Manapouri) has been found to be relatively consistent since 2006, with about 400 large (>20 cm) rainbow and brown trout per kilometre being counted each year by drift diving. Rainbow trout are the dominant species. This river receives about 8000 angler days each year. The river is about 20 km long, suggesting that anglers may remove all the fish in a given year, however, the relatively constant abundance estimates indicate that recruitment replaces angler harvest quite nicely!

The Lower Waiau, downstream of the Manapouri Lake Control Structure, has a lower population that appears to have been affected by didymo. Prior to 2004 (when the alga was discovered), there were about 120 large trout per km, but since then the average count has been about 70 per km. In 2012, the count was 30 per km, which is likely to coincide with a dry summer with few flushing flows and a high biomass of didymo. This made visibility poor and possibly contributed to the low count.

Drift dives at two sites in the middle reaches of the Aparima River reveal that there is a relatively high density

of large and medium sized trout there, ranging from 26 to 87 large brown trout per km over the last ten years.

Drift dive monitoring in the Upper Oreti has been occurring annually since 1994, and over this period the abundance of trout has generally been increasing from about 10 per km to 20–25 per km. We believe this is due to the lower bag limits that are in place now, the change to artificial baits and the practise of catch-release.

Trout abundance in the Upper Mataura, has generally increased over the last 18 years of monitoring, from about 10 per km to around 40 per km.

Trout numbers in the Monowai River reduced since 1981 from 70–80 fish per km to 10–20 per km. In 2010, however, a “mouse plague” contributed to a slight increase in numbers to 40 per km. Since then, numbers have dropped to lower levels again, suggesting that food limitation may be important in this river. Most fish occur in the upper third of the river where the flows are slower and the water is deeper. Although large boulders were placed in the last km of the river in 2005 as part of restoration efforts to provide deeper and slower water habitats, the efforts appear to have had little effect on enhancing trout numbers with only 1 or 2 trout ever being recorded amongst them.

Spawning Surveys

Trout spawning counts are conducted annually in 11 tributary streams over the winter. Densities vary from about 3 to 20 trout redds per km, although most lie between 5 and 10 redds per km. The Brightwater Stream, a tributary of the upper Mataura appears to have had a decline in abundance in the last ten years but there is no evidence of this in other streams. Lake tributary streams such as the Waituna and the Upper Waiau have much higher densities however.



Drift Diving in the Upper Oreti River.

Trout spawning in two tributaries of the Matakura appears to be at a slightly higher density than in the past few years. The Meadowburn flows through intensively dairy farmed and irrigated land and the Gow Burn is a hill country stream where significant land development has occurred in recent years.

A sample of about 100 mature spawning brown trout has been collected from the Waituna Stream each year for the past 10 years. There has been no trend in size (mean = 54 cm, range 51–55) over these years although a sample of 240 trout caught in a trap in 1966 had a mean length of 58 cm.

Chinook Salmon spawn in the Oreti River near Lumsden. Counts have been undertaken since 1989. The mean count is approximately 40 redds with a range of 5 to 100. Some variation is due to water level conditions making redds harder to observe in years of high flows. The count in 2012 was 40 redds. Numbers have generally been higher since 2007.

Fyke Netting

A commercial eel fisherman provides data on the number and size of trout he catches in fyke nets over the summer in lowland reaches of our major rivers. He caught 1233 trout in 2012 and provided estimates of sizes as well. Most trout were over 40 cm with the distribution of size classes varying from river to river. The Upper Waiau has the largest fish, while the Oreti has smaller fish. The Aparima also had a high proportion of larger trout. While large numbers of trout were caught the catch rate was only about 1 trout per net per night overall. Highest catch rates occurred during rising waters after a period of rain.

We set 10 fyke nets in the Waimea (Mandeville area) and the Oreti (Dipton area) on four occasions and caught a sample of trout. We measured the length of the trout caught to provide more detailed information. We didn't catch as many trout as the eel fisherman did but our catch rate was favourable when compared to his at 1.7 and 1.3 trout per net night in the Waimea (n = 69) and Oreti, (n = 46) respectively. This suggests that the density of trout in the Waimea is higher than in the Oreti and other observations support this. The size of the trout in the two rivers is not significantly different.

Small Stream Trout Abundance

Juvenile trout (fish about 5–10 cm long and less than a year old) abundance at 30–50 m long sites in 25 small streams in Southland was estimated by repeat pass electrofishing in the summer of 2011–2012. The sites chosen replicated similar surveys undertaken at similar times of the year between 15 and 32 years ago.

No significant difference was found between the abundance of fish overall in the streams now and in the past. However some differences were observed between individual sites. Several streams flowing through intensively farmed dairy land had relatively good populations of trout and native fish. These streams are now fenced to exclude stock and a strip of long grass 2–3 m wide was usually present. Often exotic scrub or trees also grew there.

While the comparison surveys were not conducted in exactly the same manner (due to changes in personnel and

equipment over time), the presence of 0+ trout in reasonable abundance at about or more than the overall average in these streams now suggests that they do provide suitable habitat.

Native fish caught were relatively abundant in many of the streams. The most abundant fish found was the upland bully. There was a negative relationship between the abundance of trout and bullies. This is likely to be caused by a combination of effects such as habitat preferences, competition and predation.

The juvenile trout and native fish other than long finned eels were found primarily in riffles (depth 0.1–0.15 m and current speed about 0.5 m sec⁻¹) associated with overhead cover such as grass or woody debris. Galaxiids (5–12 cm) preferred the fastest water and bullies relatively slower water. Larger eels (30–80 cm) were usually found in deeper slower flowing water where the smaller fish were absent. 1+ trout (15–20 cm in length) were also found in deeper, slower flowing water.

Didymo and Spring Fed Streams

This is a short clip of didymo and filamentous green algae in the Waiau near Whare Creek and of blue green algae in a small groundwater fed seep in the same location. The differences in the composition of the periphyton in the two parts of the same river are interesting and imply some form of chemical control on the abundance of didymo.

<http://youtu.be/FxtTXHVGbbe>.

Fishing Competition Data – by Maurice Rodway

In 2008, 2010 and 2011 we have been recording the lengths and weight of trout caught by anglers in the Labour weekend Stabicraft fishing competition. Approximately 350 fish are weighed in each year. This gives us a good size sample of fish in the lake although the rainbow trout sample includes some fish stocked in ponds so may be smaller than the actual size of wild fish in the lake. However, the brown trout are all wild fish.

The rainbows were smaller in 2011 than in previous years, probably related to the stocked fish caught in ponds around the basin being part of the sample in 2011. The brown trout males were smaller in 2011 than in 2008, however there was no significant difference in females. ■

UNITARY AUTHORITIES

Auckland Council

Great Barrier Island

During March 2012, Auckland Council scientists undertook the first strategic survey of stream ecology on Great Barrier Island since the Ministry of Works' survey in 1986. Led by **Peter Hancock**, a team of five visited six streams to collect invertebrate and fish samples and undertake SEV and fish barrier assessments. The results will primarily be used to underpin SoE reporting for GBI (www.aucklandcouncil.govt.nz/stateofauckland) but has also provided some interesting information about this poorly studied part of Auckland. Given that the majority of great barrier island is in native bush land cover and stream catchments are relatively unimpacted since the old kauri logging days, it was of no surprise that these streams contained some interesting species of macroinvertebrate and scored highly in both SEV and macroinvertebrate results.

Graham Surrey has been working on Council's species prioritisation framework while on secondment to the Biodiversity team. While this work is largely outside of the freshwater realm, Graham, along with Matt Bloxham,

also undertook a comprehensive survey of road culverts on Great Barrier Island assessing their potential impacts on fish passage. Work is also continuing on incorporating the GIS-based inanga spawning model into Council's systems and making it available for wider use.

Stream Biofilms

Martin Neale continues to work with colleagues at University of Auckland (Prof **Gillian Lewis**, Gavin Lear, Vidya Washington, **Kelvin Lau** and **Andrew Dopheide**) and other Councils to develop an indicator of stream health (BCI) based on the biofilm bacterial communities. The current focus of work is assessing the intra and inter-annual variation in the communities. The team recently published a paper in *Global Ecology and Biogeography* entitled 'The biogeography of stream bacteria' (Lear *et al.*, V22, 544-554) and presented at the Society for Freshwater Science Annual Meeting in Jacksonville, Florida (Neale *et al.*, How can we use benthic bacterial communities to identify the mechanisms of urban impacts in stream ecosystems?). ■



Impressions from Great Barrier Island.

Trophic level index targets for the Rotorua Lakes continue to track well in the restoration programme, with the exception of Lake Ōkaro. Lake Rotorua has for the first time in decades being under its target TLI with the lake being almost devoid of cyanobacterial blooms. Lake Ōkaro was the only lake to have a health warning placed on it due to cyanobacterial bloom.

Outbreaks of *Phormidium* occurred early in the season (December) but growth in BoP rivers did not reach alert levels. Although the taste of the Whakatāne drinking water supply was notably affected, a small flood in late December dislodged much of the algae which did not recolonize, even with ensuing long periods of low flow.

Alastair Suren has reviewed the BoP invertebrate data and is reviewing the programme, as well as preparing a SoE report on river health in the region. He has also undertaken a similar review of the many decades of lake phytoplankton data and is currently looking at the viability and usefulness of continued monitoring of lake phytoplankton.

A large scale ecological assessment is being undertaken to document the ecological state of waterways throughout the Rangitāiki Catchment. Results of this work will feed into policy documents being developed as part of the Rangitāiki River Forum, a co-partnership between Iwi and council for improved management of the catchment's freshwaters.

2013 sees the council concentrating on a priority area of water quality management around lake Rotorua. A plan change generating new rules for discharges in early 2013 and for further rules around the other Rotorua lakes starting in late 2013.

NPS Implementation programme

The NPS Implementation programme has ten projects commencing in 2013, especially around collaboration, values and objective setting.

State of the Environment – Groundwater

The State of the Environment Groundwater monitoring report has recently been published for Bay of Plenty Region.

Farm Dairy Effluent Compliance Monitoring Survey – 2012/13 Season

The presentation by Pollution Prevention Manager, **Nick Zaman** revealed the results of the farm dairy effluent compliance monitoring programme for the 2012/13 season. Staff had been pleased to note that, for the first time, there had been an increase in compliance. Of 297 farms visited, 74% were fully compliant. Significant non-compliance decreased from 14% the previous year to 11% for this season.

Rotorua Lakes Restoration Review

The Rotorua Lakes Restoration Review is almost complete and will path the way for projects for the next few years. A new look web site with the Rotorua Lakes joint partners has been launched to provide a uniform information stop for all Rotorua Lakes Restoration projects and information.

Review of Erosion and Sediment Control Guidelines for Forestry Operations

It has been noted that RMA responsibilities included managing the use of land for soil conservation and for water quality purposes, and good practice guidelines were one method used to assist in this process. If not carried out well, forest operations could create significant erosion and forestry covered almost half of the productive land area used in the Bay of Plenty.

Forestry operations guidelines had been in place since 1988 to provide guidance to the industry and to support consent conditions. As new and better practices emerged, it was important to keep these up to date and the 2012 revision of the Guidelines were the fourth update of the Erosion and Sediment Control Guidelines for Forestry Operations.

Te Puke Wetland Restoration

Western BoP Council has land available to undertake a wetland restoration on the banks of the Waiari Stream. Alastair Suren is looking at the feasibility of a restoration project.

Lake Rotoehu Destratification

Two destratification machines have been deployed in Lake Rotoehu since lake last year. Intensive monitoring of the machines took place in March. Results are being analysed by the University of Waikato. ■

Record-breaking Summer

Numerous hydrological records were broken across the Wellington region over the 2012/13 summer. **Mike Thompson**, GWRC senior hydrologist, noted that of most significance was a settled warm spell through February and early March where virtually no rain fell for between 35–40 days. This was the longest dry spell on record at many rain gauge sites, including some long-term ones (with 50+ years of data). Interestingly, overall summer rainfall totals were not significantly below average; although infrequent, the rain came in heavy downpours. River and stream flows were very low and, in some cases (e.g. the Ruamahanga River) the lowest flows on record were measured. As a consequence of the extreme rainfall/flow conditions, irrigators in the Wairarapa were restricted or prohibited from taking water for a substantial length of time compared with an average summer. Agricultural drought was declared in mid-March.

State of the Environment (SoE) Monitoring

Routine SoE monitoring continues, with stream biofilm samples collected for a fourth consecutive year during the summer biomonitoring to support the University of Auckland and Auckland Council-led research into developing a Bacterial Community Index (BCI) for streams.

In March **Mary de Winton** and Aleki Taumoepau from NIWA carried out a second LakeSPI assessment of Lake Kohangatera. This was a follow-up to a baseline survey in 2011 which identified the presence of an introduced weed, *Elodea canadensis*, with the potential to spread and reduce the current high ecological values of the lake (the lake was ranked 10th highest nationally for its native plant values in the initial 2011 survey). While the results from the most recent survey are still pending, the lake's vegetation appears to be in a similar condition to two years ago and *Elodea* still does not appear to be thriving in the lake – potentially due to its brackish nature. Unfortunately, *Egeria densa*, which is present in the swamp and stream upstream of the lake, appears to be doing very well and potential management options are being discussed that will hopefully limit the chance of it spreading downstream into Lake Kohangatera.

Recreational Water Quality Monitoring and Toxic Cyanobacteria

The dry summer meant that cyanobacteria growth was widespread at a number of river monitoring sites. Sites on the Waipoua, Ruamahanga and Hutt rivers exceeded the alert or action threshold of the interim national cyanobacteria guidelines on one or more occasions. In accordance with the “toxic algae response protocol” for the Wellington region, the

subsequent potential risks to river users were communicated via warnings on the GWRC website, health warning signs and media releases. No confirmed toxic algae related dog deaths were reported.

Greater Wellington Regional Council, together with several other regional councils, is continuing to help fund **Mark Heath's** PhD benthic cyanobacteria research. In addition, **Summer Greenfield** has been assessing nutrient sources within the Hutt River catchment, driven by Cawthron Institute research indicating that availability of plant-available nitrogen in low phosphorus conditions may be a key factor driving the occurrence of benthic cyanobacteria blooms. Estimates of nutrient loads within the Hutt River and its main tributaries from Rivers SoE monitoring sites, nutrient data collected under condition of consent by GWRC's Water Supply Department and data from a one-off investigation are being used to identify nutrient sources to the river. A small Expert Panel workshop will be held in June to discuss these results and identify a programme of further work to inform management of cyanobacteria blooms in the Hutt River.

Summer Greenfield coordinated a faecal source tracking investigation which was undertaken at river and coastal recreational water quality monitoring sites with ‘poor’ Suitability for Recreation Grades. Weekly samples for PCR marker and faecal sterol analysis were taken at 14 sites over five weeks and filtered and frozen for further analysis. PCR marker results from samples with high faecal indicator bacteria counts have now been received and some samples are being further analysed for faecal sterols.

Water Quality and Ecological Investigations

Coordinated by **Alton Perrie**, an internal report was completed documenting a year-long pilot investigation in the Pahaoa River catchment in the eastern Wairarapa ended in June 2012; water samples were collected from six sites at two-monthly intervals and tested for a range of physico-chemical and microbiological water quality variables, including nutrients, sediment and faecal indicator bacteria. One-off samples of macroinvertebrates and periphyton were also collected at all six sites in February. The investigation found that water quality was typical of most eastern Wairarapa waterways; relatively low nutrient concentrations but elevated turbidity levels arising from the soft-rock and erosion-prone soils in the catchment.

Together with external scientists such as Russell Death (Massey University), Alton Perrie has been assisting with investigations into the environmental effects associated with a variety of routine flood protection and land management activities. This work, which is contributing to GWRC Flood

Protection Department's applications for resource consents for works in rivers in the western half of the region, included several days surveying of fish and invertebrate communities in the Hutt River. The surveys were carried out to assess the effects of existing flood protection practices on the aquatic ecosystem, in particular, gravel extraction from within the wetted river channel.

Work has continued on developing a water balance for Lake Wairarapa. An acoustic doppler current profiler (ADCP) was installed at the lake outlet to continuously measure flows and has been in operation for more than six months. Lake water balance components such as stream discharge relationships have been refined through repeated concurrent gauging of stream flows. New meteorological stations on each side of the lake are providing project-specific data for estimation of rainfall inputs and evaporation from the lake. The various inputs and outputs have been compiled into a spreadsheet model and the model is currently being tested for various scenarios. Key challenges relate to trying to come up with a sensible logic for allocating water from a lake whose levels are essentially artificially controlled by barrage gates. Alongside the lake water balance investigation has been the assessment of external nutrient inputs to the lake (Lake Wairarapa is classified as supertrophic). Over the past year this work has involved concurrent gaugings and water sample collection from all tributaries to the lake under 'winter' (August) and 'summer' (January) flow conditions, as well as sampling of shallow groundwater adjacent to the lake (a series of piezometers were specially installed for the water and nutrient balance work). Contact Mike Thompson or **Doug Mzila** for more information.

In early May, Alton Perrie led an internal team to carry out two days of fishing of Lake Kohangapiripiri. Lake Kohangapiripiri is a coastal lake which, these days, rarely breaches to the sea. A coastal road and associated culvert are thought to be exacerbating the natural situation and increasing the time between breaching events. A range of survey methods were used (trammel nets, fyke nets, minnow traps, seine netting and spotlighting) at several locations within the lake and confirmed that fish diversity is low and abundance of obligate migratory species (short and longfin eels) is low and limited to larger individuals. Dead shortfin eels that appeared to be in migratory condition were also observed around the southern end of the lake (where it would flow into the sea). Potential management options to improve access and/or breaching of the lake are now being discussed.

Regional Plan 'Limit Setting' Work

Many of the science team, in particular **Summer Greenfield** and **Mike Thompson**, have continued to provide technical input into the development of default numerical objectives for river ecology, water quality and water quantity for GWRC's new Regional Plan. A draft Regional Plan is expected to be released in 2013/14 and will replace GWRC's existing five regional plans. Concurrent with the review of these plans is the establishment of community-based committees (whaitua) that will make recommendations on catchment-specific water quality limits and the timeframes and methods to achieve these limits. There will be five whaitua committees based on the five geographical 'supercatchments' of the Wellington region. The first of the whaitua processes, covering the Wairarapa Valley, is set to kick off later in 2013.



Backpack electro-fishing in the Hutt River post wet gravel extraction. Pictured (L to R) are summer student Samwell Warren and environmental monitoring officers Shyam Morar and Brett Cockeram.

‘Clean-up’ and Restoration Projects

Following a successful application to the Ministry for the Environment’s “Fresh Start for Fresh Water Clean up Fund”, GWRC has been working together with a range of external stakeholders and landowners to progress work towards improving the health and functioning of a selection of wetlands connected with or adjacent to Lake Wairarapa. There are three main arms to the project; the Lake-edge wetland restoration, development of Land Environment Plans and monitoring. A key monitoring focus during 2012/13 has been to establish some baseline information on the nutrient loads entering and exiting Barton’s and Matthew’s lagoons. NIWA scientists, **James Sukias** and **Chris Tanner**, have provided advice on wetland design for created or altered lake edge wetlands. They have completed an initial report on the predicted capacity of the wetlands to remove nutrients coming from the surrounding farmland. Contact **Philippa Crisp** for more details.

Related to the wider Wairarapa Moana area (encompassing both Lakes Wairarapa and Onoke as well as adjacent wetlands) in late December 2012 a Ramsar application was submitted to the Department of Conservation Conservator.

Work continues on the Mangatarere Stream catchment pilot programme (an outcome of a catchment water quality investigation completed in 2010) – with a community group committee established to progress this. Thirteen Land Environment Plans have been completed within the catchment to date, with a further eight to be completed next financial year. A field day for farmers is being held in the catchment in June to discuss the effects of soil compaction amongst other topics. Contact **Tony Faulkner** in GWRC’s Land Management Department for more details.

Continuous turbidity monitoring and automatic water sampling equipment has been installed at the bottom of the three major tributaries to Porirua Harbour (estuary). The equipment will be used to help determine sediment

loads entering the harbour from earthworks, forestry and other development/activities further up the catchment. The installations have taken place in parallel with the updating of a ‘source to sink’ sediment transport model developed by **Mal Green** (NIWA). Identification and management of the major sediment sources into the harbour is a critical part of the Porirua Harbour and Catchment Management Strategy and Action Plan, launched in April 2012. GWRC are partners in the strategy and action plan (together with Porirua City Council, Wellington City Council and Ngati Toa), which has as its vision “A healthy harbour and waterways” and is focussed on addressing three key issues: sedimentation, pollution (both stormwater inputs and eutrophication) and habitat restoration. Greater Wellington’s science input is being coordinated by **Megan Oliver** and **Juliet Milne**.

Staff Changes

A restructure of the Environmental Monitoring & Investigations Department took effect last October, resulting in a change in name (now the Environmental Science Department) and the establishment of five teams:

- Air Quality and Climate – **Tamsin Mitchell** as Team Leader
- Aquatic Ecosystems and Quality – Juliet Milne as Team Leader
- Hydrology – **Nick Boyens** as Team Leader
- Terrestrial Ecosystems and Quality – **Philippa Crisp** as Team Leader
- Science Strategy and Information – **Lian Potter** (formerly of MfE) as Team Leader

After some overseas travel, **Sheree Tidswell** recently returned to GWRC in the role of Environmental Scientist, Groundwater Quality. ■



Environmental Monitoring Officer Shyam Morar checking the installation of a continuous turbidity sensor in Porirua Stream, a tributary of Porirua Harbour .

Freshwater Contact Recreational Programme

Moderate exceedances of E coli action levels were found on occasion at 13 of the sixteen rivers/streams and lakes' sites during the recreational period [Nov–March 2012–2013] coincident with a very wet spring-early summer period. Overall, 72% of samples were within the guidelines for the period. Cyanobacteria levels occasionally exceeded the health standard at Lake Rotokare (Eltham). Six sites were monitored during the season with no cyanobacteria issues. Close liaison was maintained with the Area Health Board and territorial local authorities and the TRC website was well utilised to warn the public where necessary. DNA marker investigations were undertaken in a number of streams/rivers to ascertain potential sources of high bacto counts. In all cases the major source was birdlife or cattle.

SEM Macroinvertebrates

Biological Surveys were performed at 57 sites in 25 rivers and streams. The surveys indicated that generally the proportion of 'sensitive' taxa in the macroinvertebrate communities declined down the length of the waterways which was reflected in the deterioration in generic stream 'health' from 'very good' in the upper reaches through 'good' in mid-reaches to 'fair' to 'good' in the lower reaches. The macroinvertebrate communities at all ringplain sites have also been assessed in terms of predictive relationships recently established for ringplain streams taking into account altitude and/or distance from the National Park. Evaluations of generic and predictive stream 'health' have also been performed and assessments made for all sites in relation to River Environment Classifications (REC) predictions. Fifteen sites have shown very strong improvements and a further ten sites, strong improvement, most of which were of ecological significance, and no statistically significant temporal deterioration in MCI scores has been found at any site. The majority of improved sites are in mid catchment, with to date fewer of the sites in the lower reaches of ringplain catchments, where the macroinvertebrate communities are very 'tolerant' of the cumulative impacts of organic enrichment.

Macroinvertebrate Recolonisation Project

TRC has provided data (macroinvertebrate, water quality, periphyton data and aerial photography) to assist NIWA in a project involving research into stream connectivity and invertebrate recolonisation in Taranaki with regard to riparian planting initiatives in the region.

Biofilm Bacterial Community project

TRC is involved with Auckland University on a study on stream biofilm bacterial community project. 11 sites were sampled (at sites from the existing TRC physicochemical program) and sent to Auckland University.

Stream Habitat Assessment Protocol

The second year for the Stream Habitat Assessment program continued this year. 23 new sites have been visited and data will be compiled together with the 21 sites surveyed in the previous year.

SEM Riparian Management Water Quality Monitoring Programme

The Riparian programme consists of continual monitoring of four catchments in the Taranaki region. A state and trend report is in its first draft form for the Kaupokonui catchment and looks at a range of parameters and their trends such as periphyton, macroinvertebrates, recreational bathing, temperature and SHAP in relation to riparian planting initiatives and agricultural discharge. TRC is aiming to focus on a final draft for peer review and roll out a similar template for three other major catchments in the region, this work currently collates data for the past 12 years.

Fish/Macroinvertebrate Surveys

Contractual fish and macroinvertebrate surveys have been carried out in the lower Patea River to monitor impacts of the Patea Dam (TrustPower Ltd).

Macrophytes

There has been recent Hornwort discovery within Lake Rotorangi when a macrophytes survey was undertaken this year. This development is leading to discussions around a potential SoE programme to be developed for monitoring and control measures of invasive macrophytes in Taranaki's lakes.

Hydraulic Fracturing or 'Fracking'

TRC are currently working with Landcare Research to initiate a laboratory based soil biota study assessing the ecotoxicity of hydrocarbon exploration and production wastes. The new toxicity work complements previous soil toxicity investigations that found land application of drilling wastes caused at most only subtle effects on soil ecosystems. TRC are also in the planning stages of a collaborative project with NIWA to assess the potential impact of these waste materials on freshwater and marine aquatic ecosystems. The outcomes of these research projects will complement existing

physicochemical monitoring results of soil and surface and groundwater. This will serve to improve understanding of the effectiveness of landfarming as a bioremediation process.

There has also been significant work done to improve the flow of information between drilling waste producing sites, disposal sites, transporters and the regulatory authorities. At present, TRC are in the process of requiring all operators to record all movements of drilling waste into an online waste tracking database. This creates a robust and universal system for tracking movements of waste from wellsite to eventual disposal site, rather than relying on individual operators' tracking systems.

Special Project

TRC is running a continuing investigation into the source of faecal contamination in the Te Henui Stream in collaboration with the Taranaki District Health Board, New Plymouth District Council and ESR. This project has taken a dual approach to faecal source tracking, using a combination of PCR markers and faecal sterols. During a dry weather sampling run in November 2013, two human indicative markers were found, with low levels of one of the markers detected at two sites close to the stream mouth. A wet weather survey will now be undertaken.

Regional Freshwater Plan

The Council has commenced a review of the Regional Freshwater Plan for Taranaki. The Plan was made operative in 2001. A number of papers addressing freshwater management issues have been submitted to Council. These papers represent significant progress in the review of the Freshwater and Soil Plans and are being used to inform the development of a draft Plan and or initiate discussions with a focus group of key stakeholders plus others.

Papers prepared to date set out future directions on:

- The management of farm dairy effluent.
- The management of river and stream bed modification.

- The management of gravel extraction in Taranaki rivers and streams.
- Diffuse sources of water contamination, including riparian management.
- The protection of freshwater biodiversity, including wetlands.

Other papers currently being prepared or about to be developed over the next six months will address oil and gas impacts, and the setting of water quantity and quality objectives, limits and targets.

TRC Freshwater Staff

Brooke Thomas is the new scientific officer for Freshwater Biology and **Fiza Hafiz** is currently the Scientific Officer for the State of the Environment. **Alex Connolly** is on maternity leave while the rest of the team is the same as last year...but just to refresh your memories:

Keith Brodie, Monitoring Manager, is responsible for the Scientific Officers and staff. **Alex Connolly**, Scientific Officer for State of the Environment Monitoring programmes and **Chris Fowles**, Scientific Officer Water Resources leads various SEM projects and performs biological macroinvertebrate and other consent monitoring. **Bart Jansma**, Scientific Officer Freshwater Biology, juggles fish pass investigations with periphyton SEM and investigations into effects of riparian restoration and hydroelectric power scheme consent monitoring. **Ray Harris**, Technical Officer, collects the samples for several SEM programmes along with **Amy Cameron** who works between departments. **Fiona Jansma**, Scientific Officer Hydrology, leads the hydro team on a part time basis. **Warrick Johnston**, Hydrology Officer, **Thomas Brackenrig**, Hydrology Officer, **Regan Phipps**, Scientific officer, Surface and Groundwater Resources. **Chris Spurdle**, Planning Manager, involved in the review of the freshwater plan. **Mathew Curran**, Policy Analyst, involved in the review of the freshwater plan. ■



Stream Habitat Assessment Protocol on Timaru Stream (Downstream site) .

Tasman District Council

Over the past 5 years **Trevor James** and his summer students have restored fish passage at over 150 sites around the region opening up hundreds of kilometres of habitat. Over the past 2 years he has lead inanga spawning surveys that have increased the number of known spawning sites in the Tasman District from 8 to 39. He has involved the community in this treasure hunt which has a lot of collateral benefits for the protection of these sites. Over the last 6 months we have had record high black disc river water clarity results which have been a problem at several sites where the pools or runs are not long enough to get the true clarity. So we have started to use mirrors which is working out well. Over the last 6 months we have delineated most of our freshwater wetlands throughout the district and are about to inform landowners of these. Toxic cyanobacteria has been found to be a real issue on the Waimea River near Richmond, Nelson over the past summer with the long periods of base flow. Three dogs died.

Trevor has been working with **Ben Knight** from the Cawthron Institute to develop a predictive model for Enterococci in the popular swimming beaches along the Kaiteriteri coast. Data from another 5–6 floods within the bathing season will be required. This builds on flood-flow sampling that NIWA did in the Motueka River catchment. High and irregular spikes in faecal indicator bacteria continue to be a problem for mussel farmers off the Aorere River mouth. Further studies are in train. In our River Water Quality Monitoring Programme we will be picking up another two sites for monthly monitoring bringing the total sites sampled monthly to eight (including the 3 NWQN sites). These are only on our larger rivers. We may pick up another reference site. The quarterly programme will continue with only a few sites removed from the programme. Trevor is also looking to organise a two-day national workshop on fish passage later in the year. ■

Waikato Regional Council



The 2012/13 field season came to a close at the end of April and was highly successful largely due to the drought most of the country experienced producing stable flows enabling numerous wadeable rivers and streams to be sampled. Because of the drought gauging staff were on overdrive and restrictions under Variation 6 were imposed for the first time in response to drought.

The freshwater team was boosted by the appointment of two new staff this year. **Callum Bourke** (ex DOC Taupo Fishery and Auckland Freshwater Ranger) was appointed as Technical Officer – Freshwater Ecology, and is helping manage the operational side of **Bruno David**'s extensive freshwater fish/State of the Environment monitoring programme as well as supporting the Regional Ecological Monitoring of Streams (REMS) programme. **Jen Iles** and **Kim Roberts**, both of whom have recently completed MSc degrees at Canterbury University, helped the fish and invertebrate monitoring teams along with **Steve Scothern** over the summer.

Mike Lake has taken up a freshwater ecologist position with River Catchment Services. His role will focus on developing monitoring, mitigation and habitat enhancement

plans to establish the potential effects of land drainage and river works, and identify options to avoid, remedy and mitigate these effects. Over the past summer Mike has been involved in carrying out surveys to determine the presence of "Threatened" and "At Risk" species at sites where works were planned. He has also been supporting **Michael Greer** (PhD Student from Otago University) with his studies on the effects of spraying and mechanical clearance on dissolved oxygen concentrations in drains.

Kevin Collier, Mark Hamer and Jen Iles have been undertaking mussel surveys in the Raglan catchment to establish a monitoring protocol and investigate distribution and abundance of the two species present – *Echyridella menziesii* and *Cucumerunio websteri*. Good numbers of both mussel species have been found in some areas significantly expanding the known distribution of these species in the Waikato region, although the latter species appears to be mainly aging populations. Mark has also been co-ordinating the Waikato Regional Council's REMS programme which involves a 3 yearly rotation of randomly sampled sites in addition to the annually sampled reference sites. This is the

second year that fish sampling has been incorporated into this programme (co-ordinated by Callum Bourke), and required use of fyke nets and minnow traps at sites too deep or completely choked with invasive weeds for electric fishing. This is the first season that sites were netted utilising the newly established New Zealand Freshwater Fish Sampling Protocols developed by Mike Joy (Massey University), Bruno David and Mike Lake. This season we rolled out our new electronic data capture system for sampling the freshwater fish (EFM and Spotlighting) component of our SOE monitoring programme. This has proved to be a much more accurate, effective and efficient means of recording our field data and we can now do-away with field sheets and enter data in-situ into our "Toughbook" laptops which is easily downloaded to our internal databases at the end of each day. Those interested in doing fish work following these protocols can apply to Mark Hamer for a login and free access to this data capture platform. Email mark.hamer@waikatoregion.govt.nz

This year Bruno and **Dave Byers** (Biosecurity unit) co-ordinated the installation and running of New Zealand's first invasive fish recycling centre at Lake Waikare using internal and Waikato River Authority funding to build an automated invasive fish capture cage and bacterial digester unit to process captured fish on site. Approximately 14 tonne of invasive fish (koi carp, catfish and goldfish) were captured over a month and a half before drought conditions necessitated the closing of the fish trap for the rest of the summer. Approximately 5–6 tonnes of fish fertiliser rich in NPK was produced in this short period from this single site. Native plants propagated in the carp mix from a small scale trial the year previous were planted around the demonstration site in early spring 2012 and are doing well. A current business case proposal is underway to evaluate the potential for creating additional trap units at up to 6 other key bottle neck areas and whether the selling of this recycled nutrient to other sustainable businesses could enable a self funded invasive species removal programme.

In another project, numerous large scale fish habitat devices have been designed and installed within river banks in an urban Hamilton stream to increase refuge and resting habitat for native fish in these simplified habitats. The kokopu condo comprises a 6 m long 450 mm diameter pipe buried in the bank perpendicular to the stream and joining a large concrete chamber – all underground. This feature should be capable of supporting numerous giant kokopu, eels and bullies that are known to exist in this reach. This project is a collaboration between the Mangakotukutuku Stream Care Group (www.streamcare.org.nz), Waikato Regional Council, Hamilton City Council, Tonkin and Taylor and the Department of Conservation. These designs build on some smaller scale versions developed by the council for small streams which seemed to work quite well. Fish using the devices will be captured and PIT tagged to evaluate 'tenancy period' and number of fish that they can support...no bond will be imposed on the fish. If successful, similar devices could be used as a possible mitigation measure in appropriate instances.

Tracie Dean-Speirs continues to work as a Lake Management Officer in the River & Catchment Services Group. During the year, she has progressed the development

of a Shallow Lakes Management Plan, and has worked with others to progress restoration proposals for Lake Areare and several other Waikato lakes. Through its lake level setting programme, WRC continues to monitor lake levels, and design and install structures to maintain summer lake levels in peat lakes that are vulnerable to drainage and further lowering. As part of this programme, hydrological investigations have been undertaken this year at Lake Maratoto to assess options for setting and maintaining summer lake levels more effectively at this important site. With Waipa Peat Lakes Accord members, Tracie has also been investigating options for reducing sediment and nutrient losses from surrounding farmland to the Serpentine/Rotopiko lakes and Lake Mangakaware. This work has involved monitoring lake inflows (undertaken by the University of Waikato) and the development of whole system farm plans for adjoining dairy farms (undertaken by Headlands). These plans seek to identify options for landowners to reduce sediment and nutrient losses to the lakes. Waikato Regional Council has also continued to support Rebecca Eivers in her study of the effectiveness and design of silt traps (including floating wetlands) to reduce nutrient inputs to peat lakes. ■

RESEARCH & CONSULTANCY COMPANIES

Aspiring Environmental Ltd



Chris Arbuckle has left the Ministry for Primary Industries (where he was working as a Senior Policy Analyst) to go back to environmental consulting. His new company, Aspiring Environmental Ltd (aspiringenvironmental.co.nz), is focused on working with people on challenging environmental issues, primarily the use of land and its interaction with water. The goal of his new venture is to be an active contributor in the ever changing conversations between individuals, community, cultures and their development goals; personal environmental values that affect our natural freshwater environment.

Current projects include science strategy development for Regional Government, working on the national development

programme for OVERSEER® (nutrient management model), workshops on water with various agricultural industries and local environmental survey projects. In addition, finding time to contribute to his son's schools stream field trip and further developing their stream study programme has been very rewarding, along with blogging...<http://sciblogs.co.nz/waiology/2013/03/25/trust-as-much-as-science-is-at-the-heart-of-water-management>.

More "Left field" projects include mapping and videoing Otago's mountain bike trails...yes its hard work! ■

Aquanet Consulting Ltd



Over the past 12 months, Aquanet Consulting has been involved in a wide range of projects, involving project management, field studies, technical reports, peer review and expert witness.

We moved to our new premises at the Land and Water House in Palmy in August last year. New offices, new lab and new team member: we have welcomed **Amy Feck** as a new addition to the Aquanet team. Amy is undertaking her Honours studies at Massey University, and is helping with a number of field studies and the processing of macroinvertebrate samples.

The Tukituki Plan Change 6 was notified in May 2013.

Olivier Ausseil contributed to the technical report, making recommendations on water quality limits and targets for the Tukituki catchment. The final resource consent applications for the other component of the Tukituki Catchment Proposal, the Ruataniwha Water Storage Scheme, were lodged with the Environmental Protection Agency in May this year. Olivier is the Lead Science Advisor for this project, which involves the project management, coordination and review of a number

of land-use, water quality, water quantity and ecological studies. Olivier was also the lead author of the Environmental Flow Optimisation report, which establishes in particular a proposed flushing flow regime for the Ruataniwha Water Storage Scheme. Olivier is also continuing with his role as the Palmerston North Wastewater Monitoring Group facilitator.

Fiona Death has coordinated the delivery a number of field studies and associated reports, including a summer-long monitoring study of periphyton and macroinvertebrates in the Turitea Stream, upstream and downstream of the Palmerston North's water supply reservoirs and water treatment plant. We also undertook annual periphyton and macroinvertebrate surveys of the Whangawehi Stream, Mahia Peninsula and the Rangitikei River at Bulls. We are assisting the Palmerston North City Council with the coordination of a project aiming at reducing algal/cyanobacteria blooms in the city's water reservoirs, with **Max Gibbs** providing key advice and expertise to the project. We have also started monthly water quality and flow monitoring along with recreational surveys of the Waiwiri Stream. This project is expected to

run for 12 to 24 months and aims at assessing the effects on the Waiwiri Stream of land application of treated wastewater from the Levin township.

Fiona and Olivier have been working on a report on the inputs of nutrients and sediments to Pegasus Bay on behalf of Environment Canterbury. We also undertook a peer-review of Greater Wellington Regional Council's 2012 State of the Environment report.

We recently completed the development of a daily time-step model enabling the detailed assessment of the effects of wastewater discharges on water quality. This model is particularly useful when contemplating dual land/water discharge regimes. The model is currently being applied to the Feilding and Shannon wastewater discharges.

With regards to RMA processes, Fiona and **Jeff Cooke** are undertaking compliance assessments on behalf of Horizons. Olivier provided expert advice/evidence in a number of consent applications. ■



Palmerston North City Council water reservoir dam on the Turitea Stream – a study is underway to identify ways to improve water quality within the reservoir.

Boffa Miskell Ltd



Boffa Miskell's Auckland, Wellington, Tauranga and Christchurch ecologists have been involved in a diverse range of freshwater studies over the last 12 months.

In the Wellington office, **Stephen Fuller**, **Vaughan Keesing** and **Barbara Risi** have been busy assisting the NZTA with aquatic ecology assessments, monitoring for the MacKays to Peka Peka (M2PP) Expressway, and baseline monitoring for the Transmisson Gully motorway. The Wellington office also played an integral part in designing a new 790 m reach for Duck Creek near Porirua, which had to be diverted to allow for a residential subdivision. Stephen,

Vaughan, Barbara, **Leigh Bull**, **Tanya Blakely**, and **Rachel Turner** captured and transferred over 700 native fish (including giant and banded kokopu, inanga, lamprey, and longfin and shortfin eels) from 908 m of the affected reach of Duck Creek.

Eddie Sides and Rachel Turner have been busy in the Auckland office working on a large project involving inspecting and mapping over 700 watercourses within five catchments in the Auckland region. They are also developing a series of management plans for the Auckland Council. The Auckland office has also been involved in fish rescue works



Duck Creek under construction.



Duck Creek completed.

for both temporary damming of waterways and for stream diversion projects. A stream diversion as part of a residential development at Riverhead kept Auckland's freshwater team busy during the design phase of the new channel, and fish relocations during the stream works.

Tanya Blakely, **Scott Hooson**, **Marcus Girvan** and **Di Robertson** have been working on a wide range of jobs in Christchurch, Canterbury and on the West Coast. Tanya has been involved in a number of environmental impact assessments, including stormwater discharges, mining, and road crossings, as well as assisting the Wellington Ecologists with the fish relocations for Duck Creek. Tanya and **Mark Lewis** (our Low-Impact-Design specialist in the Auckland office) have been assisting Boffa Miskell's Shanghai Landscape Architectural team to design a new river park in Zhenjiang, China. Tanya continues her research in urban waterways and has recently published a paper on the macroinvertebrate biotic index developed for Singapore's urban waterways. Scott spent much of the summer in the lower Waitaki River conducting wetland surveys for Meridian's North Bank Hydro Project. This continues on from work that Di has been doing for Meridian since 2001. Di and Scott have been working closely with Tipa and Associates and NIWA to integrate cultural and freshwater fish elements into the project. Scott and Di have also been involved in a number of braided river bird surveys throughout Canterbury. Marcus has been managing Land Information New Zealand's biosecurity operations on LINZ-administered land. This has largely involved managing aquatic weeds in Lakes Benmore, Wanaka, Dunstan and the Rotorua lakes, along with terrestrial plant and animal pests in a number of river systems.

Louise Clark, in the Tauranga office, secured funding from the Waikato River Authority (WRA) to develop "the Wheel", a riparian plant selection tool for waterways in the Waikato and Waipa River catchments. This handy tool enables landowners to identify the plants best suited for addressing the site-specific riparian management issues of their waterway. The Wheel was developed using a multi-disciplinary analysis of more than 60 databases, GIS resources, technical publications, as well as the practical experience of nursery staff and riparian management practitioners. An accompanying pamphlet explains use of the Wheel, detail on the issues, and guidance on undertaking and maintaining planting projects. The Wheel has been well received, with over 3,000 copies distributed through a wide range of organisations. Louise is presenting a series of workshops, jointly funded by DairyNZ and WRA, that will demonstrate use of the Wheel as one method of assisting farmers in meeting the new requirements of WRC's Variation 6. DairyNZ is now funding the development of Wheels for two further catchment areas. Louise has also been working with Barbara to trap and transfer fish from drains at Rotokauri (north-west of Hamilton). These drains were to be removed as part of an industrial development in the area. Shortfin eels and black mudfish were trapped over several nights and released into a 78 ha wetland downstream of the same watercourse. ■



Constructed stream reach at Riverhead, showing recycled instream habitats of root bundles and logs.



The same reach (looking upstream) following riparian planting.



A black mudfish, in Barbara's hands prior to release to their new home.

The Catalyst Group (Palmerston North)



It's been an exciting year, and a bit, for The Catalyst Group since a team of five planners and scientists got together to focus on providing support to those who really want to make a difference to their environment. This is the team that largely put together the One Plan – apparently an old-school response now, being replaced by an enlightened age of co-governance, collaborative engagement and accords. It's been a fantastic year for the team. They have led the development of a water quality limits and management objectives framework for the Tukituki River in the Hawkes Bay. This is occurring in a challenging environment where the world of politics, policy and science have been mashed together in order to allow for development aspirations. For **Kate McArthur** and others in the team it's exciting to be involved in the hard discussions around where-to with our water management frameworks.

Again in the Hawkes Bay, on the Ngaruroro River, The Catalyst Group is leading the development of a Water

Conservation Order. This has included a long overdue, extensive data gathering and analysis programme to accurately characterise the state of the trout fishery, led by **Glenn Mclean**. An ambitious otolith assessment programme has also been completed, which has allowed our clients to comprehensively understand what values need to be appropriately protected to provide for the WCO.

The highlight for the team at The Catalyst Group in the water space is to be able to maintain an active role in the strong conversations occurring around water quality management that will define our approach for the next generation. As was the case in 2012, The Catalyst Group continues to spend a great deal of their recreation time on New Zealand's great rivers; with **Alistair Beveridge**, in particular, continuing to refine his technique for inverted white water rafting. ■



Photos from the Ngaruroro Water Conservation Order study: A) Macro-vertebrate sampling, B) Drift diving, C) Invertebrate sampling, D) Electrofishing in Gold Creek.

John Hayes has been involved in the write up of papers and reports for the MBIE funded, NIWA led, sustainable water allocation programme, and Envirolink. Research topics have included: testing a flow related benthic invertebrate habitat time series model (with **Karen Shearer**); assessing the influence of flow variability, temperature and season on juvenile trout emigration and mortality in a tributary of the Motueka River (with **Robin Holmes**); using a bioenergetics foraging model to interpret rainbow trout habitat suitability (for Hawkes Bay Regional Council); and a review of drift foraging models in predicting the distribution, growth and abundance of stream fishes. John presented evidence to two hearings over the past year: a Special Tribunal Hearing relating to proposed amendments to the Water Conservation (Kawarau); and the Hurunui – Waiapu Regional Water Plan Hearing. He also dabbled with water clarity requirements of drift feeding by trout in relation to limits setting. And he contributed to the National Objectives Framework limits setting expert group tasked with identifying knowledge (and gaps) around limit setting for on freshwater fish.

Craig Allen continues to model habitat in New Zealand rivers to help ascertain ecologically relevant minimum flow requirements and assess the impact of proposed hydro-schemes for various species. He has also been retrieving wetland hydrology datasets from various sources with the aim of compiling them into a national database for wetland hydrology.

Karen Shearer has been busy with a mixture of consulting

and research over the last year. She is enjoying working with various members of the Cawthron freshwater team on a variety of projects including: testing of the Benthic Invertebrate Time-series Habitat Simulation Model (BITHABSIM) and presentation of the outcomes at the FSS conference; the development of habitat suitability criteria (curves) for benthic invertebrates from a small river; completion of 10 years of fieldwork collecting data to assess the influence of natural flow variation on juvenile trout population dynamics; aquatic ecology assessment of effects of the Ruataniwha water storage project; and fish salvage fieldwork in the Tekapo canal

Major activities for **Roger Young** over the last few months have been finalising a two-station metabolism calculation model, assessing the effects on aquatic ecology of a water storage scheme in Hawke's Bay, providing expert evidence for several Canterbury regional plan hearings, completing the third year of ecosystem metabolism measurements at sites along the length of the Tukituki River in relation to a broader study on nutrient uptake and processing along the river, involvement in the National Objectives Framework discussions, and helping several councils with regional plans/NPS implementation/limit setting.

After she returned from maternity leave in February 2013, **Kati Doehring** has been working on the redevelopment of the current Land and Water NZ website (LAWNZ) in collaboration with regional councils, Massey University and MfE. This



Cawthron's fish salvage operation in the Tekapo Canal.

exciting project is partly funded by the Tindall Foundation and aims to report on New Zealand's freshwater quality in a way that can be understood by every New Zealander, not just scientists. Kati has also been analysing data she collected in the Waikato area over the last two years as part of the MBIE Aquatic Restoration project, in collaboration with Roger Young and John Quinn (NIWA). This project looks at the effects of riparian planting on stream ecosystem health, and how old, long, high, etc. a riparian buffer would need to be before any stream health improvements can be observed. Preliminary results suggest no improvement in functional indicators with buffer age.

Susie Wood continues to work on toxin producing cyanobacteria in collaboration with Waikato and Victoria Universities. Her research group has recently culture didymo in a synthetic media for the first time and in collaborations with Otago and NIWA staff is working on sequencing the genome of this invasive species.

Annika Wagenhoff is busy with searching for potential ecological thresholds and defining thresholds of harm from stressor-response relationships to inform limit setting (as part of MBIE project 'Management of Cumulative Effects of Stressors on Aquatic Ecosystems'). The data set at hand was collected in the Horizons region and comprises of attributes related to invertebrates, algae (collaboration with **Cathy Kilroy**), bacteria (with **Kelvin Lau** and **Gillian Lewis**), stable isotopes (with **Ada Pastor Oliveras**), metabolism and cotton decomposition. A tool box of statistical methods has been presented in a recent Cawthron report. Annika has also been writing a literature review on the potential effects of willow removal on stream ecosystems (as part of MBIE project 'Maintenance and Rehabilitation of Aquatic Ecosystems').

David Kelly has been predominantly working on lowland lakes and management of nutrient loading and cycling to

achieve regional standards. This includes some predictive modelling of loading rates to achieve TLI thresholds in lakes. For Environment Southland he and **Marc Schallenberg** have been sampling a number of lakes, including some remote Stewart Island and South Westland systems to get a clearer picture of reference conditions in these types of systems. Dave and Kati Doehring are working on scoping a freshwater biodiversity monitoring framework for the Department of Conservation national office. Another interesting project has focused on managing water quality, predominantly dissolved oxygen, in the Tekapo Canal during the time flow has been ceased in the canal for maintenance work by Genesis Energy.

Rasmus Gabrielson together with John Hayes, Robin Holmes and Roger Young are investigating links between trout declines and dairy intensification to better inform future management of cumulative effects of agricultural intensification on sports fisheries. This research is part of the MBI research programme, 'Management of Cumulative Effects of Stressors on Aquatic Ecosystems'. The research contributes to better understanding of the effects of farming and how to farm in an environmentally sustainable manner; an issue that science providers, regional councils, Fish & Game and other environmental organisations have long been involved in on a national level. They have created and are now testing a Fishery Quality Index (FQI) for assessing trout fishery quality, which will be applied to assess >50 rivers nationally over the next three years, to help identify tipping points in sports fishery quality in relation to land use.

Besides this, and vigorously working on finishing his PhD thesis, Rasmus has also contributed to several environmental consulting projects in his first year at Cawthron. Including planning and coordinating a fish salvage operation of near epic proportions in conjunction with Genesis Energy, Fish & Game and Ngai Tahu as a part of the Tekapo Canal remedial works. ■



Cawthron's fish salvage operation in the Tekapo Canal.

Environmental Impact Assessments Ltd (EIA)

– by Brett Stansfield

Training Workshops

I have been holding a series of 1 day water quality and data analysis workshops in Masterton, Auckland and Whangarei. The discussion from these workshops has been most rewarding. A further workshop is to be held in Southland in July this year.

Macroinvertebrate Processing

In the past year I have processed 194 macroinvertebrate samples for taxonomy. Most of these consignments have been subject to 10% QC analysis by Biosortid Ltd. I am continuing to gain more soft bottomed stream samples from the Auckland Region which has strengthened my knowledge in these stream types.

Napier City Council Coastal Sewage Outfall

Napier City Council's coastal sewage outfall continues to show good compliance with its resource consent conditions. Some water quality contaminants are trending down over time which is an encouraging result.

Ngaruroro River Water Conservation Order

We are currently preparing expert evidence for a water conservation order for the Ngaruroro River on behalf of the New Zealand Fish and Game Council. The WCO we seek is for all water upstream of Whanawhana. I have done some comparative analysis of macroinvertebrate taxonomy and biomass with other rivers for which a WCO has been placed. We are hoping to lodge our application in December this year.

Auckland Council Unitary Plan

I was recently asked to review the provisions of the Auckland Council Unitary Plan with respect to protection of freshwater biodiversity. While there is good intent in the plan for protection of 'high value' areas, the rules, objectives and policies are lacking provisions for maintenance and enhancement of lesser value waterbodies. I have requested that the piping of streams become a non complying activity as Auckland currently loses 9 km of stream reach per year to infill developments that involve piping. If you are from Auckland I'd encourage you to submit on this plan.

Carterton District Council Water Supply Renewal

I have just completed a low flow analysis of the Kaipatanga Stream which is used by Carterton District Council for water supply. The WAIORA analysis showed that torrent fish and yearling trout displayed the greatest loss of usable habitat as water levels dropped. I have recommended a 100 l/s low flow limit below which surface water abstraction should cease. This is likely to see an improvement to the fishery of this stream as it did not have a low flow limit in place before.

SEV Surveys

I have completed a number of SEV surveys in the Auckland Region over the past year. One fault I find with the SEV is that it focuses on the study reach only. Often what's upstream of the reach (e.g. native bush remnant) is just as important and should not be overlooked. ■

It's hard to imagine another year has gone by since the last NZFSS newsletter – it must mean we've been busy. The EOS team has seen a few changes, with **Colleen Larsen** stepping in as team assistant for **Vicki Flavall** who is away on parental leave with baby number two.

It must be the time for babies as **Alex James** is also looking forward to imminent parenthood – although he's getting no time to prepare due to the number of projects on his desk. By the time this goes to press, it'll be no time AND no sleep – ah, the bliss of newborns. Needless to say he and **Shelley McMurtrie** were looking forward to our new scientists **Kirsty Brennan** and **Tom Drinan** joining the team. Kirsty is an estuary ecologist who has just shifted to New Zealand, and Tom is a freshwater ecologist who is also a new immigrant, but from Ireland. They have fitted into the team well, and their excellent skills and good humour are greatly appreciated by the rest of the team.

Amber Sinton and **Nick Hempston** were joined by **Josie Crawshaw** who has been helping out with the ever-increasing invertebrate sample processing, and mayfly specialist **Terry Hitching** became an honorary EOS team member during his stint in our lab while the Canterbury Museum was off limits. **Bronwyn Gay** continues to work in the mystical area of science communication, and reckons she has enough work to warrant hiring another designer to help her out. And of course business manager **Erron Henderson** is keeping us all happy with his plans afoot for moving into a larger space.

Our Contribution to the Christchurch Rebuild

The Avon River Precinct, North Frame and East Frame anchor projects are some of the most significant city rebuild anchor projects to the people of Christchurch, and provide an unprecedented opportunity to improve the health of the Avon River and create the green city that so many desire. We're proud to be part of the design consortium, and to have Shelley leading the ecology discipline with the support of the wider EOS team. After years of talking about what needs to be done to improve the health of the river, we've been given the chance to actually do something about it and we're making the most of the opportunity – using a mixture of well-proven methods and novel approaches. With the concept design phase complete we get a short breather before launching into the developed design, detailed design and construction phases. Check out the CERA video here to see what sorts of things we have planned.

Watermark

As the first construction project out of the blocks, 'Watermark' is a small preview of what's to come for the rest of the Avon River Precinct. With a large amount of in-river work, we were kept busy designing the new channel and directing the in-river construction. Thanks to the dedication of Shelley and Alex, who tag-teamed being on site with the



Shelley and Alex onsite at the Watermark project, Avon River Precinct.

contractors every day of the in-river works, we are quietly confident with what we have managed to achieve. Next time you're in Christchurch, swing by the Antigua Boatsheds and wander downstream; hopefully you'll be impressed.

The Ultimate Open-plan Office

Our expanding expertise and capabilities saw us travelling further afield to survey freshwater and estuary habitats. We've had no complaints from the team or our network of casual support staff about being airlifted into remote valleys, or sampling the beautiful streams and estuaries throughout the country...although Nick seems to always draw the short straw with the amount of gear he has to carry in.

Shelley is enjoying the jet-setting life at the moment, spending more time out of the office than in it – the anchor projects' design studio, Wellington, the West Coast, and now a conference planned for Australia. At least she might actually make it to one conference this year. That said, if you choose to swing by our pad, we're confident someone will be here to greet you, and maybe even whip you up a cup of coffee if you're nice (bringing treats will help – just saying).

New and Exciting Species

Our lab has been busy with freshwater and estuary samples from around the country, and the team have been appreciating the assistance of other techs with processing the ever-increasing numbers. This should give Amber and Nick time to head to Aussie for some specialist Oligochaete ID training – meanwhile Amber has been swatting up on adult stage EPT taxa (with the help of the delightful Terry Hitching), and Nick has been delving into the world of Polychaetes and adult Diptera (the latter thanks to the passion of Rod McFarlane – thanks Rod!). We've heard rumours he thinks a scanning electron microscope would really bring them to life (business case presentation time – yeah right). And talking of IDs (yep, bad segue...we know), believe it or not, Shelley can't hide her excitement about having a new species named after her; it's just a tiny worm, get over it!

The crew have been thoroughly enjoying working with Mike Winterbourn on the Campbell Island invertebrate key and other projects – he keeps us honest with our IDs and it's a delight to have him pop out to see us.

What's this about Graphic Design?

Bron has been graphic-designing up a storm, helping an ever-increasing client base communicate their science outcomes, technical projects and marketing messages. As well as working with universities, government departments and various consultants she's been following us around in the field with cameras making us "work it baby" (Zoolander has nothing on us rocking a pair of chest waders). Although until her plea for a thicker wetsuit is answered she's not so keen on underwater shoots till next summer. Look out for some of our design work, video clips and photos popping up in the least expected places near you. ■



As the saying goes, a picture is worth a thousand words, so here's an overview of a selection of projects and locations we've been working on: A & B) West Coast work, C) Bay of Plenty sample processing, D) Christchurch estuary work, E & F) Banks Peninsula work & G) science communications design examples.

All photos © EOS Ecology



Kessels Ecology



Kessels Ecology staff have been busy writing up results from the summer field season monitoring the effects of water takes, water and wastewater treatment plants on freshwater and estuarine ecosystems throughout the Waikato. At the moment we are also involved with assessments of ecological effects of building and infrastructure projects, and are working with regional and local authorities to identify significant natural areas.

Mahuru Robb is taking a year off to complete her MSc thesis at the University of Waikato. She is currently working with a group from Mōtakotako marae to develop cultural

indicators to use alongside scientific monitoring methods to assess wetland ecosystem health.

Jennifer Blair joined Kessels Ecology last year after finishing a PhD at the University of Waikato, which focussed on the drivers of population dynamics of common smelt and rainbow trout in the Rotorua Lakes. Jennifer, Mahuru and **Gerry Kessels** have recently begun a research project investigating the effects of dairy farm conversion on freshwater biodiversity and cultural values. This project is being carried out in partnership with Ngāti Tahinga and farm managers and is being supported by the C. Elmer Baker Trust. ■

River Lake Ltd

Keith Hamill established River Lake Ltd late last year and has been involved with a number of interesting projects from micro-hydro power schemes in the east coast hill country to Waituna Lagoon in Southland. A couple of interesting projects are described below.

Keith has led investigations to better understand the effects of the Palmerston North waste water treatment plant on the Manawatu River and, importantly, what can be done to reduce them. The work highlighted dynamics in nitrogen and phosphorus limitation, and identified processes whereby periphyton is deriving phosphorus from sediment trapped within their mat. Using artificial substrates (i.e. concrete blocks) has proven to be a particularly useful method over the long dry summer (although it is not without its limitations). Many thanks to Logan Brown from Horizons Regional Council for doing much of the field work.

Keith, **Peter Ellery** and **Kelly Hughes** from ATS-Environmental have assessed barriers to fish passage in the lower Kaituna Makatu catchment. They developed a generic field sheet to provide sufficient information about structures to assess their impact on fish passage and methods that might be used to retrofit fish passage. Their hope is that the field sheet will be adopted more widely around the country to better document fish passage barriers. ■



Periphyton succession on concrete tiles placed in the Manawatu River and sub-sampled every 3 to 4 days in the order: top left, bottom left, top right, bottom right, top middle, bottom middle.

Riverscapes Freshwater Ecology



Amber McEwan has been teaching the GWRC education staff how to set up community kakahi monitoring programs, completing fish surveys in Wairarapa Moana wetland remnants and writing a couple of children's books on whitebait (to be published in August 2013). Amber has also

been writing a monthly freshwater fish article series for newspapers and various blogs, contributing to a book on the ecology of the Wairarapa Lakes complex and publishing a further two papers from her masters thesis. ■

Ryder Consulting



Ben Ludgate has had a very busy summer/autumn managing the laboratory processing of invertebrate and algae samples. With low river flows throughout the country, samples have arrived from as far and wide as Auckland, Bay of Plenty, Central North Island, Wellington, Nelson/Marlborough, Canterbury, Otago, and Southland. Ben has also been undertaking ecological surveys in Otago and Southland for municipal discharges, including several surveys throughout the Mataura River catchment.

Jarred Arthur had an enjoyable summer investigating the impacts of stormwater and wastewater treatment discharges around Otago and Southland. His work associated with mining projects has continued and he has assisted with a variety of intertidal and estuarine surveys. Having been with the company for over two years, Jarred has become an integral member of the laboratory team, processing many invertebrate and algae samples after a busy field season.

Katie Blakemore joined the laboratory team in April 2013 after completing her BSc (Hons) at the University of Otago in 2012 and spending her summer working for Environment Canterbury as a water quality officer. Katie has fitted in well to the team, and has been processing samples from throughout the country.

Ruth Goldsmith made the most of the fine weather over the summer to complete low flow assessments for rivers in the Bay of Plenty and West Coast. She also worked with Jarred to carry out baseline aquatic assessments on several new ecological reserve areas, which involved some exciting four wheel driving. Additionally, she has spent plenty of time in the office and has recently been completing fish passage monitoring reports associated with TrustPower's Patea hydroelectric power scheme.

Greg Ryder has been working with Environment Southland staff on various aspects of their science and investigation programme. He has also been working on a range of consent-related projects throughout the country and even managed to fit in some field work. ■

Stark Environmental Ltd



John and **Yvonne Stark** established Stark Environmental Limited in June 2007 and have been offering specialist freshwater ecological research and consulting services (primarily concerned with macroinvertebrates, biotic indices, and biomonitoring) and undertaking macroinvertebrate sample processing for six years. SEL employs two experienced part-time staff to assist Yvonne with sample processing when the work load demands.

In the last year we processed over 750 macroinvertebrate samples for 15 different clients from throughout New Zealand and prepared 11 client reports and two briefs of evidence.

Projects have included the freshwater ecological aspects of Buller Coal Ltd's (BCL) proposed Escarpment Mine Project, Horizons Regional Council SoE monitoring and reporting, and consent biomonitoring for discharges from petrochemical industries, meatworks, and a salmon farm. John prepared evidence for BCL's Environment Court hearing but submitters in opposition did not challenge it so he was not required to attend the hearing. John is currently developing ecological limits and objectives for Taranaki Regional Council's Freshwater Plan. ■

Tonkin & Taylor Ltd



T&T's Environmental Biology team has been busy over the last year with a wide range of projects including mines, state highways, water supply, irrigation and hydropower schemes, and ongoing environmental monitoring for consent compliance. **Brett Ogilvie** continues to lead the team, which has ten staff with aquatic and terrestrial expertise, and a range of staff other casual/contract staff.

We have continued to be involved in the implementation of the Waterview Connection motorway project in Auckland with Brett as the ecology team leader. **Liza Inglis, Caleb Sjardin, Sara McMillan** (née Howarth), **Dean Miller, Duncan Law** and **Kieran Miller** have been assisting with the development of management plans and implementation of the environmental monitoring programme associated with works now underway. **Graham Ussher** and **Matt Baber** have been looking after terrestrial aspects such as rare plants and lizards. Others who have been involved in this project on a contract basis include **Katherine de Silva, Nathan Watson** (Waikato Uni MSc student) and **Quentin O'Brien** (Mahurangi Technical Institute).

The team has continued its ongoing monitoring of residual flows for a number of water supply dams and hydro lakes. Over the past three years Liza, Dean, Caleb, Duncan and Kieran have been carrying out consent monitoring for the Tongariro Power Scheme. This has involved monthly excursions to the central volcanic plateau to carry out periphyton and macroinvertebrate monitoring at a range of sites.

In Hamilton, Dean is continuing to work with the Mangakōtukutuku Stream Care Group (MSCG), Hamilton City Council and Waikato Regional Council staff on a stream restoration project funded by the Waikato River Cleanup Trust. Work undertaken over the summer has included the construction of a new wetland where it is hoped that black mudfish can eventually be introduced (a "mudfish motel"). Stream erosion control and fish habitat enhancement structures have also been installed with the latter comprising embedded pipes in the stream bank works to create off-line refuges (a kokopu condo and a tuna townhouse) and placement of stable wood cover as in-stream weirs and overhangs. Monitoring is proposed, to assess the use of habitat enhancements by native fish.

Other work in Hamilton has included a major stormwater monitoring project for Hamilton City Council covering the impacts of stormwater on stream habitat and sediment contamination levels and looking at fish passage issues associated with stormwater infrastructure.

The team has been involved in all levels of the consenting process for various projects. We have continued to undertake Stream Ecological Valuation assessments in the Auckland Region and beyond. Brett continues to assist **Ian Hogg** and **David Hamilton** by presenting post-graduate seminars at Waikato University.

On the International front, Brett and Liza (along with **David Leong** – T&T hydrologist) have commenced work on

a large “greenfield” hydropower project in the Tanzanian highlands, which is seeking finance from the World Bank Group, and therefore must meet its environmental performance standards. Potential issues there include IUCN Red List species, and assessment and management of effects on a Ramsar wetland downstream of the site, and requirements for biodiversity offsets. Liza has also

been involved in impact assessment for a port project in the Solomon Islands (potentially financed by the Japanese Government), and Matt is currently stationed on Pitcairn Island, looking at a proposed new wharf and associated infrastructure e.g. access roads, quarry, on behalf of the British Government. ■



John Carter Constructors installing a woody weir in the Mangakotukutuku Stream, Hamilton..



Liza Inglis and Brett Ogilvie electric fishing in the Tanzanian highlands.



Xenopus petersii caught in a fyke net in Tanzania.

IWI ORGANISATIONS

Ngāti Rangi Trust



Hannah Rainforth is working as the environmental manager at Ngāti Rangi Trust. This involves a mix of RMA matters and iwi-based research. Projects include population surveys throughout the region, culvert assessments, cultural flow assessments, monitoring the pH dynamics in the volcanically-influenced Whangaehu River and, lately, work on parasites in local eel populations. Hannah has also been involved in work on the National Objectives Framework from an iwi perspective. ■



OTHERS

John McIntosh, Environmental Consultant, Whakatane has been contracting to the Bay of Plenty Regional Council on remediation projects for the Rotorua Lakes and the Rotorua District Council with advice on water quality effects relating to resource consent applications for sewage disposal schemes. ■

Stella McQueen has finished writing her second book, 'A Photographic Guide to the Freshwater Fishes of New Zealand' (see Page 13), in collaboration with photographer Rod Morris, and eagerly awaits its publication in November. Book writing is addictive and she is now toying with ideas for her third book – a beautifully illustrated discussion of the biology and ecology of the native fish fauna. She worked over summer on native and pest fish surveys for the Department of Conservation in Taranaki and Whanganui areas. Stella is keen to keep exploring the country and is currently available for work. ■

RECENT PUBLICATIONS

- Abell, J.M.; Hamilton D.P. in press: Bioavailability of phosphorus transported during storm flow to a eutrophic, polymictic lake. *New Zealand Journal of Marine and Freshwater Research*.
- Abell, J.; McBride, C.; Hamilton, D.P. 2013: Lake Tutira: historic water quality, monitoring recommendations and management options. Environmental Research Institute, University of Waikato, Hamilton.
- Ashraf, S.; Brabyn, L.; Hicks, B. in press: Introducing contrast and luminance normalisation to improve the quality of subtractive resolution merge technique. *International Journal of Image and Data Fusion*.
- Atwood, T.B.; Hammill, E.; Greig, H.S.; Kratina, P.; Shurin, J.B.; Srivastava, D.S.; Richardson, J.S. 2013: Predators reduce CO2 emissions from freshwater ecosystems. *Nature Geoscience* 6: 191–194.
- Baillie, B.; Hicks, B.; van den Heuvel, M.R.; Kimberley, M.; Hogg, I. in press: The effects of wood on stream habitat and native fish assemblages in New Zealand. *Ecology of Freshwater Fish*.
- Bayer, T.K.; Burns, C.W.; Schallenberg, M. in press: Application of a numerical model to predict impacts of climate change on water temperatures in two deep, oligotrophic lakes in New Zealand. *Hydrobiologia*.
- Blair, J. M.; Hicks, B. J. 2012: Otolith microchemistry of koi carp in the Waikato region, New Zealand: a tool for identifying recruitment locations? *Inland Waters* 2: 109–118. doi: 10.5268/IW-2.3.480.
- Blair, J.M.; Hicks, B.J.; Pitkethley, R.; Ling, N. 2012: Diet of rainbow trout in Lake Rotoiti: an energetic perspective. *New Zealand Journal of Marine and Freshwater Research* 46: 557–565.
- Blair, J.M.; Hicks, B.J.; Pitkethley, R.; Ling, N.; Ostrovsky, I.; Rowe, D.K. 2013: A bioenergetic assessment of the influence of stocking practices on rainbow trout (*Oncorhynchus mykiss*) growth and consumption in a New Zealand lake. *Freshwater Biology* 58: 967–985.
- Blair, J.M.; Hicks, B.J.; Pitkethley, R.; Rowe, D.; Ostrovsky, I.; Ling, N. 2013: How do stocking practices influence rainbow trout growth in a New Zealand lake? A bioenergetic assessment. *Freshwater Biology* 58(5): 967–985. doi: 10.1111/fwb.12100
- Blair, J.M.; Ostrovsky, I.; Hicks, B.J.; Pitkethley, R.; Scholes, P. 2013: Growth of rainbow trout (*Oncorhynchus mykiss*) in warm-temperate lakes: implications for environmental change. *Canadian Journal of Fisheries and Aquatic Sciences* 70: 815–823. doi: 10.1139/cjfas-2012-0409
- Booker, D.J.; Graynoth, E. 2013: The relative influence of regional and meso-scale habitat features influencing the density and daytime habitat preferences of longfin and shortfin eels. *New Zealand Journal of Marine and Freshwater Research* 47: 1–20.
- Booker, D.J.; Snelder, T.H. 2012: Comparing methods for estimating flow duration curves at ungauged sites. *Journal of Hydrology* 434–435: 78–94.
- Budy, P.; Thiede, G.P.; Lobóon-Cerviá, J.; Fernandez, G.G.; McHugh, P.; McIntosh, A.R.; Asbjørn Vøllestad, L.; Becares, E.; Jellyman, P.G. 2013: Limitation and facilitation of one of the world's most invasive fish: an intercontinental comparison. *Ecology* 94(2): 356–367.
- Burdon, F. J.; McIntosh, A.R.; Harding, J.S. in press: Habitat loss drives threshold response of benthic invertebrate communities to deposited sediment in agricultural streams. *Ecological Applications* doi:10.1890/12-1190.1.
- Burns, C.W. 2013: Predictors of invasion success by *Daphnia* species: influence of food, temperature and species identity. *Biological Invasions* 15: 859–869.
- Closs, G.P.; Hicks, A.S.; Jellyman, P.G. 2013: Life histories of closely related amphidromous and non-migratory fish species: A trade-off between egg size and fecundity. *Freshwater Biology* 58: 1162–1177.
- Collier, K.J.; Clapcott, J.E.; David, B.O.; Death, R.G.; Kelly, D.; Leathwick, J.L.; Young, R.G. in press: Macroinvertebrate-pressure relationships in boatable New Zealand rivers: influence of underlying environment and sampling substrate. *River Research and Applications*.
- Collier, K.J.; Clapcott, J.E.; Duggan, I.C.; Hamilton, D.P.; Hamer, M.; Young, R.G. in press: Spatial variation of structural and functional indicators in a large New Zealand river. *River Research and Applications*.
- Collier, K.J.; Clapcott, J.E.; Hamer, M.; Young, R.G. 2013: Extent estimates and land cover relationships for functional indicators in non-wadeable rivers. *Ecological Indicators* 34: 53–59.
- Collier, K.J.; Hamer, M. 2012: The ecological condition of Waikato wadeable streams based on the Regional Ecological Monitoring of Streams (REMS) Programme. Waikato Regional Council technical report 2012/27. Waikato Regional Council, Hamilton.
- Collier, K.J.; Hamer, M. 2013: Ecological response differentials as an alternative benchmark for stream and river monitoring. *Freshwater Biology* doi:10.1111/fwb.12145.
- Collier, K.J.; Olsen, A.R. 2013: Network design influence on assessment of ecological condition in wadeable streams. *Marine and Freshwater Research* 64: 146–156.

- Corti, R.; Larned, S.T.; Datry, T. in press: A comparison of pitfall-trap and quadrat methods for sampling ground-dwelling invertebrates in dry riverbeds. *Hydrobiologia*.
- Crow, S.K.; Booker, D.J.; Snelder, T.H. 2012: Contrasting influence of flow regime on freshwater fishes displaying diadromous and non-diadromous life-histories. *Ecology of Freshwater Fish* 22: 82–94.
- Datry, T.; Larned, S.; Fritz, K.; Bogan, M.; Wood, P.; Meyer, E.; Santos, A. accepted: Broad-scale patterns of invertebrate richness and community composition in temporary rivers: effects of flow intermittence. *Global Ecology and Biogeography*.
- David, B.O.; Hamer, M.P. 2012: Remediation of a perched stream culvert with ropes improves fish passage. *Marine and Freshwater Research* 63: 440–449.
- Duggan, I.C.; Eastwood, K.R. 2012: Detection and distribution of *Craspedacusta sowerbii*: Observations of medusa are not enough. *Aquatic Invasions* 7: 271–275.
- Duggan, I.C.; Robinson, K.V.; Burns, C.W.; Banks, J.C.; Hogg, I.D. 2012: Identifying invertebrate invasions using morphological and molecular analyses: North American *Daphnia 'pulex'* in New Zealand fresh waters. *Aquatic Invasions* 7: 585–590
- Gabrielsson, R.M.; Kim, J.; Reid, M.R.; Stirling, C.H.; Numata, M.; Closs, G.P. 2012: Does the trace element composition of brown trout *Salmo trutta* eggs remain unchanged in spawning redds? *Journal of Fish Biology* 81: 1871–1879.
- Górski, K.; Collier, K.J.; Duggan, I.C.; Taylor, C.M.; Hamilton, D.P. in press: Connectivity and complexity of floodplain habitats govern zooplankton dynamics in a large temperate river system. *Freshwater Biology* doi:10.1111/fwb.12145.
- Górski, K.; Collier, K.J.; Hamilton, D.P.; Hicks, B.J. in press: Effects of flow on lateral interactions of fish and shrimps with off-channel. *Hydrobiologia*
- Greig, H.S.; Wissinger, S.A.; McIntosh, A.R. 2013: Top-down control of prey biomass increases with drying disturbance: an unexpected consequence of non-consumptive interactions? *Journal of Animal Ecology* 82: 598–607.
- Hamilton, D.P.; McBride, C.G.; Özkundakci, D.; Schallenberg, M.; Verburg, P.; de Winton, M.; Kelly, D.; Hendy, C.; Ye, W. 2013: Effects of climate change on New Zealand Lakes. In: *Climate Change and Inland Waters: Impacts and Mitigation for Ecosystems and Societies*, Goldman, C.R.; Kumagai, M.; Robarts, R.D. (eds.), pp. 337–366. John Wiley & Sons.
- Herrmann, P.B.; Townsend, C.R.; Matthaei, C.D. 2012: Individual and combined effects of fish predation and bed disturbance on stream benthic communities: a streamside channel experiment. *Freshwater Biology* 57: 2487–2503.
- Hicks, B.J.; Stichbury, G.A.; Brabyn, L.K.; Allan, M.G.; Ashraf, S. in press: Hindcasting water clarity from Landsat satellite images of unmonitored shallow lakes in the Waikato region, New Zealand. *Environmental Monitoring and Assessment*
- Hogsden, K.L.; Harding, J.S. 2013: Leaf breakdown, detrital resources, and food webs in streams affected by mine drainage. *Hydrobiologia* DOI: 10.1007/s10750-013-1544-3.
- Hogsden, K.L.; Winterbourn, M.J.; Harding, J.S. in press: Do food quantity and quality affect food webs in streams polluted by acid mine drainage? *Marine and Freshwater Research*.
- Jellyman, D. 2012: The current status of New Zealand longfin eel (*Anguilla dieffenbachii*). Pp 102–103 in Gough, P.; Philipsen, P.; Schollema, P.P.; Wanningen, H. (eds). “From Sea to Source. International guidance for the restoration of fish migration highways”. Regional Water Authority Hunze en Aa’s, Netherlands.
- Joy, M.K.; David, B.O.; Lake, M. 2013: New Zealand freshwater fish sampling protocols – Part 1 Wadeable rivers and streams. 56pp
- Kilroy, C.; Booker, D.J.; Drumond, L.; Wech, J.; Snelder, T.H. 2013: Variability in estimates of benthic algal standing crop in streams: a comparison of chlorophyll a measurements and visual estimates of cover. *New Zealand Journal of Marine and Freshwater Research*. DOI:10.1080/00288330.2013.772526.
- Klemmer, A.J.; Richardson, J.S. in press: Quantitative gradient of subsidies reveals a threshold in community-level trophic cascades. *Ecology* DOI: 10.1890/12-1444.1.
- Larned, S.T. 2013: Phreatic groundwater ecosystems: a research frontier for freshwater ecology. *Freshwater Biology* 57: 895–906.
- Larned, S.T.; Datry, T. accepted: Effects of river–flow variability on water chemistry, aquatic invertebrates and microbial activity in parafluvial zones. *Freshwater Biology*.
- Lessard J.L.; Arscott, D.A.; Booker, D.J.; Larned, S.T.; Snelder, T.H.; Suren, A. 2013: Why dams must be designed to provide both high and low flows, a case study from the Opuha Dam, South Island New Zealand. *Environmental Management* 51: 459–473.
- Li, W.; Zhang, C.; Li, Z.; Liu, J.; Hicks, B.J.; Zhang, T. in press: Effects of turbidity and light intensity on foraging success of juvenile mandarin fish *Siniperca chuatsi* (Basilewsky). *Environmental Biology of Fishes*.
- Liess, A.; LeGros, A.; Wagenhoff, A.; Townsend, C.R.; Matthaei, C.D. 2012: Anthropogenic nutrient enrichment in streams: consequences for periphyton nutrient content and invertebrate community composition. *Freshwater Science* 31: 813–824.
- Magbanua, F.S.; Townsend, C.R.; Hageman, K.J.; Lange, K.; Lear, G.; Lewis, G.D.; Matthaei, C.D. 2013: Understanding the combined influence of fine sediment and glyphosate herbicide on stream periphyton communities. *Water Research*: online first.
- Magbanua, F.S.; Townsend, C.R.; Hageman, K.J.; Matthaei, C.D. 2013: Individual and combined effects of fine sediment and the herbicide glyphosate on benthic macroinvertebrates and stream ecosystem function. *Freshwater Biology*: DOI: 10.1111/fwb.12163.

- Marinov, M. 2013: Contribution to the Odonata of the Kingdom of Tonga. Faunistic Studies in South-East Asian and Pacific Islands. *Odonata* 1: 1–18.
- Marinov, M.; Donnelly, T. 2013: *Teinobasis fatakula* sp. nov. (Zygoptera: Coenagrionidae), found on 'Eua Island, Kingdom of Tonga. *Zootaxa* 3609(6): 589–592.
- Marinov, M.; Richards, S. 2013: Notes on the female colour forms of *Synthemis miranda* Selys, 1871 (Odonata: Synthemistidae) in New Caledonia. *Australian Entomologist* 40(2): 57–64.
- McDowell, R.W.; Snelder, T.H.; Cox, N.; Booker, D.J.; Wilcock, R.J. 2013: Establishment of reference or baseline conditions of chemical indicators in New Zealand streams and rivers relative to present conditions. *Marine and Freshwater Research* 64: 387–400.
- Morgan, D.K.J.; Hicks, B.J. 2012: A metabolic theory of ecology applied to temperature and mass dependence of N and P excretion by common carp. *Hydrobiologia* 705: 135–145.
- Oliver, R.; Hamilton, D.P.; Brookes, J.; Ganf, G.G. 2012: Physiology, blooms and prediction of planktonic cyanobacteria. In: Ecology of Cyanobacteria II: Their Diversity in Space and Time. Whitton, Brian A. (ed.), pp. 155–194, Springer.
- Olsen, D.A.; Hayes, J.W.; Booker, D.J.; Barter, P.J. 2013: A model incorporating disturbance and recovery processes in benthic invertebrate habitat – flow time series. *River Research and Applications*. DOI: 10.1002/rra.2649
- Özkundakci, D.; McBride, C.G.; Hamilton, D.P. 2012: Parameterisation of sediment geochemistry for simulating water quality responses to long-term catchment and climate changes in polymictic, eutrophic Lake Rotorua, New Zealand. In: Water Pollution XI, C.A. Brebbia (ed.), pp. 171–183. WIT Press, Wessex, UK.
- Parkes, S.M.; Duggan, I.C. 2012: Are zooplankton invasions in constructed waters facilitated by simple communities? *Diversity & Distributions* 18: 1199–1210.
- Paul, S.; Krkosek, M.; Keith Probert, P.; Closs, G.P. 2013: Osmoregulation and survival of two mysid species of *Tenagomysis* in southern estuaries of New Zealand. *Marine and Freshwater Research* 64: 340–347.
- Pham, L.; West, D.; Closs, G.P. 2013: Reintroduction of a native galaxiid (*Galaxias fasciatus*) following piscicide treatment in two streams: response and recovery of the fish population. *Ecology of Freshwater Fish* 22: 361–373.
- Piggott, J.J.; Lange, K.; Townsend, C.R.; Matthaei, C.D. 2012: Multiple stressors in agricultural streams: a mesocosm study of interactions among raised water temperature, sediment addition and nutrient enrichment. *PLoS ONE* 7 (11): e49873. doi:10.1371/journal.pone.0049873.
- Pingram, M.A.; Collier, K.J.; Hamilton, D.P.; David, B.O.; Hicks, B.J. 2013: Carbon sources supporting large river food webs: a review of ecological theories and evidence from stable isotopes. *Freshwater Reviews* 5: 85–103.
- Pingram, M.A.; Collier, K.J.; Hicks, B.J.; Hamilton, D.P.; David, B.O. in press: Spatial and temporal patterns of carbon flow in a temperate, large river food web. *Hydrobiologia*.
- Purcell, K.M.; Ling, N.; Stockwell, C.A. 2012: Evaluation of the introduction history and genetic diversity of a serially introduced fish population in New Zealand. *Biological Invasions* 14: 2057–2065.
- Righton, D.; Aarestrup, K. Jellyman, D.; Sébert, P.; van den Thillart, G.; Tsukamoto, K. 2012: The *Anguilla* spp. migration problem: 40 million years of evolution and two millennia of speculation. *Journal of Fish Biology* 81: 365–386.
- Schowe, K.A.; Harding, J.S.; Broady, P.A. 2013: Diatom community response to an acid mine drainage gradient. *Hydrobiologia* 705: 147–158.
- Snelder, T.H.; Barquín Ortiz, J.; Booker, D.J.; Lamouroux, N.; Pella, H.; Shankar, U. 2012: Can bottom-up procedures improve the performance of stream classifications? *Aquatic Sciences* 74: 45–59.
- Snelder, T.H.; Booker, D.J. 2012: Natural flow regime classifications are sensitive to definition procedures. *River Research and Applications*. DOI: 10.1002/rra.2581.
- Snelder, T.; Detry, T.; Larned, S.; Sauquet, E.; Lamouroux, N. in press: Regionalization of patterns of flow intermittence from gauging station records. *Hydrology and Earth System Sciences*.
- Snelder, T.H.; Rouse, H.L.; Franklin, P.A.; Booker, D.J.; Norton, N.; Diettrich J. 2013: The role of science in setting water resource use limits: a case study from New Zealand. *Hydrological Sciences*. DOI:10.1080/02626667.2013.793799
- Tana, R.; Hicks, B.J. 2012: Influence of an open and closed river system on the migration patterns of two northern New Zealand populations of banded kokopu (*Galaxias fasciatus*). *NZ Natural Sciences* 37: 25–36.
- Uytendaal A.; Ausseil O. 2013: *Recommended Water Quality limits and targets for the Tukituki Plan change 6*. Hawke's Bay Regional Council Resource management Group. HBRC Plan Number 4463.
- Vanderpham, J.P.; Nakagawa, S.; Closs, G.P. in press: Feeding ability of a fluvial habitat specialist and habitat-generalist fish in turbulent and still conditions. *Ecology of Freshwater Fish*.
- Vanderpham, J.P.; Nakagawa, S.; Closs, G.P. 2013: Habitat-related patterns in phenotypic variation in a New Zealand freshwater generalist fish, and comparisons with a closely related specialist. *Freshwater Biology* 58: 396–408.
- Wagenhoff A.; Lange K.; Townsend C.R.; Matthaei C.D. 2013: Patterns of benthic algae and cyanobacteria along twin-stressor gradients of nutrients and fine sediment: a stream mesocosm experiment. *Freshwater Biology*: online first.
- Wagenhoff, A.; Townsend, C.R.; Matthaei, C.D. 2012: Macroinvertebrate responses along broad stressor gradients of deposited fine sediment and dissolved nutrients: a stream mesocosm experiment. *Journal of Applied Ecology* 49: 892–902.

- Wang, L.; Yang, T.; Zhu, D.; Hamilton, D.P.; Nie, Z.; Liu, L.; Wan, X.; Zhu, C. 2012: Growth and turion formation of *Potamogeton crispus* in response to different phosphorus concentrations in water. *Aquatic Ecology* DOI 10.1007/s10452-012-9427-7.
- Winterbourn, M.J.; Pohe, S.R. 2012: A new record of the enigmatic burrower bug *Microporus thoreyi* (Signoret) (Heteroptera: Cydnidae). *The Weta* 43: 21–24.
- Winterbourn, M.J.; Pohe, S.R. 2012: Life histories of four dragonfly species (Odonata: Anisoptera) in northern New Zealand. *New Zealand Entomologist* 36: 8–14.
- Woodford, D.J.; McIntosh, A.R. 2013: *Effects of introduced trout predation on non-diadromous galaxiid fish populations across invaded riverscapes*. Science for Conservation. Department of Conservation, Wellington: 23p.
- Wu, N.; Daniel, A.; Tempero, G. 2013: *Rotopiko (Serpentine) lakes pest fish biomass estimate and gonad survey*. Centre for Biodiversity and Ecology Research, School of Science and Engineering, The University of Waikato, Hamilton.

Theses

- Blair, J. M. 2012. Factors controlling common smelt abundance and rainbow trout growth in the Rotorua lakes, New Zealand. (PhD thesis). University of Waikato, Hamilton.
- Clarke, D. 2013. Do detainment bunds attenuate phosphorus and sediment loss from pastoral farms during intense rainfall and run-off events? MSc Thesis (2013)
- de Villiers, J.E. 2013. Assessment of injury to New Zealand native fish by boat electrofishing. MSc Thesis (2013)
- Valler, T.L. 2013. Sources and effects of catchment-derived bioavailable contaminants in Hamilton urban streams. MSc Thesis (2013). ■



Electrofishing in the Otukaikino River. See article on page 51.

Photo © EoS Ecology

CONFERENCE 2014

The 2014 NZFSS Conference will be held in Blenheim, 25–28 November 2014. More information will be available on our website and on Facebook closer to the time. ■

V.H. JOLLY STUDENT TRAVEL AWARDS

NZFSS encourages student attendance at its conferences by supporting student travel through the V.H. Jolly Awards. The Awards are named in honour of the late Violet Hilary Jolly, a founder member of the Society and one of New Zealand's foremost pioneering limnologists, who was instrumental in encouraging and supporting student involvement in New Zealand limnology.

The criteria for the Awards are as follows:

1. The Awards are solely for the purpose of supporting the travel expenses of students attending the annual conference of NZFSS.
2. The Awards are restricted to full-time students who are financial members of the NZFSS, as defined in the Society constitution.
3. Only those students who present either an oral paper or a poster paper at the conference for which an Award is sought are eligible.
4. Students who are residents of the town where the conference is being held are not eligible.
5. Students who are in receipt of other forms of travel support to attend the conference are not eligible.
6. Students may apply for an Award in person by identifying themselves to the Secretary-Treasurer during the conference.
7. The sum awarded shall be up to \$100.00 per student, and the funds available for Awards shall be half of the interest earned in the previous financial year on the Society's bank accounts.
8. In the event of the number of applications exceeding the available funds, the Secretary-Treasurer shall distribute the available Awards on the basis of the distance travelled to the conference. ■

NZ FRESHWATER SCIENCES SOCIETY MEDAL & HONORARY MEMBERSHIP



Bob Wilcock, recipient of the NZFSS Medal, 2012.

New Zealand Freshwater Sciences Society Medal Recipient 2012

Bob Wilcock

For His Services to Understanding & Managing Freshwaters

Bob has maintained and promoted excellence in science over many years – from solution chemistry to catchment studies. He has been a great mentor to many and is widely trusted in the agricultural community. Bob gained his BSc (Hons) in chemistry and his PhD in physical chemistry from the University of Canterbury (NZ) before working as a postdoctoral research associate at Wright State University, Ohio, where studies included gas solubility in liquids and related thermodynamic properties. He joined the water section of the Chemistry Division, DSIR, in 1975 and then moved to the Ministry of Works Water and Soil Science Centre in Hamilton, in 1980. The Centre (renamed the Hamilton Science Centre) became one of the principal components of NIWA. Bob's early work focused on dissolved oxygen and reaeration in rivers, colour and optical properties of waters, pesticide threats to aquatic ecosystems, effects of macrophytes on water chemistry, and catchment science. Since the mid-1990s his research has mainly concerned land-water interactions, with special emphasis on dairy farming and the development of mitigation methods. A major project was the Best Practice Catchments for Sustainable Dairying

(2001–2011) that has been very influential in informing key groups about dairy impacts, possible mitigation measures and their likely effectiveness. Recently, Bob has been studying gas transfer across the air-water interface again, but this time focusing on nitrous oxide emissions and the importance of denitrification in lowering nitrate concentrations. At NIWA, Bob is Programme Leader – Causes and Effects of Water Quality Degradation in the Freshwater & Estuaries National Science Centre. His career has been characterised by a range of fundamental through to more applied activities in more recent times. He has co-supervised postgraduate students, has written around 100 peer-reviewed papers, most of which are first-authored, and has written around 90 technical reports. Notable papers which he first-authored range from the fundamental (and notorious): "Solubility of oxygen-nitrogen mixture in water" which was published in *Nature* in 1974; to more recent applied papers such as "Inputs of nutrients and faecal bacteria to freshwaters from irrigated agriculture: Case studies in Australia and New Zealand" published in *Environmental Management* in 2011. ■

Awarded Honorary Life Membership of the New Zealand Freshwater Sciences Society Brian Sorrell

Brian Sorrell was awarded Honorary Life Membership of the New Zealand Freshwater Sciences Society after his nomination was unanimously and strongly endorsed by members present at the 2012 AGM in Dunedin. Brian joined the society in 1984. He has since served the society, first as an Executive Committee Officer for two years from November 1998, then as Secretary-Treasurer from November 2000 to 2012. Over this time, he has made a huge contribution in leadership, finances and general function to the society. Although he is now living on the other side of the world, he continues to be generous with his time, and is always very happy to provide excellent advice and share his knowledge with the present committee members. ■

Brian Sorrell at MacKenzie Wetland, South Island (2005). ▶



Photo © Alastair Suren

RULES FOR AWARDS

1. The New Zealand Freshwater Sciences Society Medal is for an outstanding contribution to our understanding and management of freshwaters by a member of the Society, with criteria for consideration of nominations as set out below.
2. Nominations for Medals are considered by the Awards Committee (currently comprising the President, Secretary-Treasurer, a SIL Trustee and two members elected at an AGM).
3. Honorary membership of the Society can be voted at a General Meeting of the Society, for those members who have performed significant service to the Society usually over a long period, on the recommendation of the Executive Committee as set out in the Society rules.

Criteria for the Medal:

Matters for consideration by the Awards Committee (not all need apply in any particular case and not in priority order):

- National or international recognition of research or management output
- Leadership in particular fresh or brackish water science field
- Quantum and quality of research or management output
- Contribution to education or public knowledge of freshwater science
- Contribution towards sustainable management of freshwater environments
- Contribution towards the conservation of one or more species, habitats or freshwater ecosystems

There would be an expectation that any members nominated and considered worthy of this elevated status would be recognised in an appropriate fashion, such as in an award ceremony at the annual conference, to which the person awarded would be invited at the Society's cost and expected to provide a presentation. Nominations would include relevant biographic information, a statement of the nominated person's specific outstanding contributions to freshwater science in New Zealand and letters of support from at least two additional members of the Society at least one of whom is not employed by the same organisation. The closing date for nominations is 15 September 2012. There would be no expectation that any Award need be presented in any given year. It is recommended that nominations are made without prior knowledge of the nominee.

Criteria for Honorary Membership of the Society:

As is set out in the Constitution, persons considered eligible for honorary membership are recommended to a General Meeting of the Society by the Executive Committee. Criteria for the award would usually involve significant service to freshwater science and/or to the Society, usually over a lengthy period. It is recommended that any nominations for honorary membership could be received by the Executive committee from members at least two months prior to any General Meeting of the Society, to provide time for the Committee to consider these and make a recommendation to the General Meeting with adequate notice as required in the Society Rules. ■

BUDGET FOR THE YEAR ENDED 30 JUNE 2012

NZ Limnological Society (Inc.) t/a NZ Freshwater Sciences Society

Statement of Financial Performance for the year ended 30 June 2012

	<i>Sch</i>	<i>This Year</i> \$	<i>Last Year</i> \$
Income			
Book Sales		2,652	755
Cost of Sales			
Opening Stock		919	950
Closing Stock		<u>9,735</u>	<u>919</u>
		(8,816)	31
Gross Profit			
Interest Received	1	11,468	724
Sundry Income	1	2,395	2,896
		<u>6,959</u>	<u>9,760</u>
		20,822	13,380
Expenses			
Cash Expenses	1	34,324	15,468
Net Income /Loss for Year			
		<u>(13,502)</u>	<u>(2,088)</u>
Income Reserved			
		(13,502)	(2,088)
		<u>(13,502)</u>	<u>(2,088)</u>

**Statement of Movements in Members Funds
for the year ended 30 June 2012**

	<i>This Year</i> \$	<i>Last Year</i> \$
Debits for Year:		
Deficit of Income over Expenses for Year	13,502	2,088
Debit for Year	<u>(13,502)</u>	<u>(2,088)</u>
Opening Credit Balance	81,102	83,189
Closing Credit Balance	<u><u>67,600</u></u>	<u><u>81,101</u></u>

**Statement of Financial Position
as at 30 June 2012**

	<i>This Year</i> \$	<i>Last Year</i> \$
ASSETS		
Current Assets		
Bank of New Zealand Ltd	5,459	20,508
GST Refund	1,694	142
Accounts Receivable	3,050	-
Interest Accrued	643	227
Stock on Hand	9,735	919
	<u>20,581</u>	<u>21,796</u>
Investments		
Bank of New Zealand Ltd		
Term Deposit Due 18/8/12 at 4.40%	52,827	64,941
Total Assets	<u>73,408</u>	<u>86,737</u>
LIABILITIES		
Current Liabilities		
Accounts Payable	5,625	5,625
Subscriptions in Advance	183	10
Total Liabilities	<u>5,808</u>	<u>5,635</u>
EXCESS ASSETS OVER LIABILITIES	<u><u>67,600</u></u>	<u><u>81,102</u></u>
EQUITY		
Members Funds	67,600	81,102
	<u><u>67,600</u></u>	<u><u>81,102</u></u>
Approved by Trustees		

Notes to the Financial Statements
for the year ended 30 June 2012

1. STATEMENT OF ACCOUNTING POLICIES

A. Reporting Entity

NZ Limnological Society (Inc.) is an Incorporated Society and these Financial Statements have been prepared in accordance with the New Zealand Institute of Chartered Accountants Statement of Concepts for Special Purpose Reporting modified by the framework for Differential Reporting.

B. Measurement Base

The accounting principles recognised as appropriate for the measurement and reporting of earnings and financial position on an historical cost basis have been used, with the exception of certain items for which specific accounting policies have been identified.

C. Specific Accounting Policies

(i) Differential Reporting

NZ Limnological Society (Inc.) qualifies for Differential Reporting as it is not publicly accountable and is not large as defined under the Framework for differential reporting. All differential reporting exemptions have been applied.

(ii) Goods & Services Tax

These financial statements have been prepared on a GST exclusive basis with the exception of Accounts Receivable and Accounts Payable balances which are stated inclusive of GST.

(iii) Income Tax

No provision for Income Tax has been made as N Z Limnological Society (Inc.) has exempt status.

(iv) Inventories

Inventories are recognised at the lower of cost, determined on a first in first out basis, and net realisable value.

(v) Investments

Investments are carried at the lower of cost and net realisable value.

(vi) Receivables

Receivables are stated at their estimated realisable value. Bad debts are written off in the year in which they are identified.

D. Changes in Accounting Policies

There have been no changes in accounting policies. All policies have been applied on bases consistent with those used in previous years.

2. CONTINGENT LIABILITIES

At balance date there are no known contingent liabilities (2011:\$0). NZ Limnological Society (Inc.) has not granted any securities in respect of liabilities payable by any other party whatsoever.

3. SECURITIES AND GUARANTEES

There was no overdraft as at balance date nor was any facility arranged.

Financial Performance Schedule
for the year ended 30 June 2012

	<i>This Year</i>	<i>Last Year</i>
	\$	\$
Cash Expenses		
Awards		
DOC Prizes	-	650
VH Jolly Memorial Fund/ Student Travel	11,550	800
SIL Trust Prizes	1,000	1,500
Fish & Game Prize	-	250
	12,550	3,200
Bank Charges	545	578
Book Publishing Costs	11,249	-
Conference 2012 - Seeding Fund	5,000	-
Conference Costs	3,097	-
Donations	-	10,000
Emblems	-	21
Membership Fee - Royal Society of NZ	1,200	-
Postage	146	241
Printing Costs		
Newsletter	537	797
Subscriptions	-	631
	<u>34,324</u>	<u>15,468</u>
Interest Received		
Bank of New Zealand Ltd	<u>2,395</u>	<u>2,896</u>
Sundry Income		
Subscriptions	5,209	8,854
Conference Income	835	417
SIL Trust Donations	165	183
DOC Student Prize	500	-
Fish & Game Student Prize	250	-
Entomological Society Bulletin	-	306
	<u>6,959</u>	<u>9,760</u>

**AUDIT REPORT TO THE MEMBERS OF THE
NEW ZEALAND LIMNOLOGICAL SOCIETY (INC.)
T/A NEW ZEALAND FRESHWATER SCIENCES SOCIETY**

We have audited the attached Financial Report. The Financial Report provides information about the past financial performance of the Society and its financial position as at 30 June 2012.

Committee Responsibilities

The Committee is responsible for the preparation of a Financial Report which fairly reflects the financial position of the Society as at 30 June 2012 and of the results of operations for the year ended 30 June 2012.

Auditors Responsibilities

It is our responsibility to express an independent opinion on the Financial Report presented by the Committee and report our opinion to you.

Basis of Opinion

An audit includes examining, on a test basis, evidence relevant to the amounts and disclosures in the Financial Report. It also includes assessing:

- the significant estimates and judgements made by the Committee in the preparation of the Financial Report, and
- whether the accounting policies are appropriate to the Society's circumstances, consistently applied and adequately disclosed.

We conducted our audit in accordance with generally accepted auditing standards in New Zealand except that our work was limited as explained below. 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 Report is free from material mis-statements, whether caused by fraud or error. In forming our opinion we also evaluated the overall adequacy of the presentation of information in the Financial Report.

Other than in our capacity as auditors we have no relationship with or interests in the New Zealand Limnological Society Inc.

Qualified Opinion

Control over revenue prior to being recorded is limited and there are no practical audit procedures to determine the effect of this limited control. In this regard we have not obtained all the information and explanations that we have required.

In our opinion, except for adjustments that might have been found to be necessary had we been able to obtain sufficient evidence concerning the above-mentioned income, the attached Financial Report fairly reflects the results of operations for the year ended 30 June 2012 and the financial position of the Society as at 30 June 2012.

Our Audit Report was completed on 20 November 2012 and our qualified opinion is expressed as at that date.

Brown Webb Richardson Ltd.

BROWN WEBB RICHARDSON LIMITED
Hastings

Directors: Stephen M Dow, Felicity D Laughton, Craig W Riddiford,
Roger P Sinclair, S M (George) Speedy, John F Springford
Associates: Mark D Coombe, Regan J Leach


CHARTERED
ACCOUNTANTS

MINUTES OF THE 45TH ANNUAL GENERAL MEETING OF THE NEW ZEALAND LIMNOLOGICAL SOCIETY INC.

(Trading as the New Zealand Freshwater Sciences Society)

The AGM was held at the University of Otago on Wednesday 5th December, 2012. The meeting opened at 5:20 pm.

Present: David Hamilton, President; Janine Wech, Assistant Secretary-Treasurer; and 95 members.

1. Apologies

Brian Sorrell, Vivienne Cassie Cooper, Philippe Gerbeaux.

2. NZFSS Medal

NZFSS Medal – presented to Bob Wilcox. [Janine/David to add to this]

3. Minutes of the 44th AGM

Matters arising from minutes: Dealt with under general business.

Motion: That the minutes be accepted as a true and correct record of the 44th AGM (Janine Wech / Neil Deans – carried)

4. President's Report

Perhaps we should mark down 2012 as something of a landmark year for water. A year when the Land and Water Forum released its third and final report, when one of our members, Mike Joy, has raised the profile of the state and trends in water quality in NZ widely within NZ and indeed to the rest of the world, and when we are now fully aware of just how passionate New Zealanders are about their environment.

The New Zealand Freshwater Sciences Society (NZFSS) has made a number of submissions, most of which follow on from its original feedback on the National Policy Statement in Freshwater Management. Many of these statements, including media releases and letters to Ministers, are available on our web site. I hope members take the time to go to the web site where they can also learn more about the Society in general. NZFSS has commented on previous reports of the Land and Water Forum and urged government to act with urgency to make the necessary regulatory and policy reforms that are consistent with the recommendations of the Land and Water Forum. The Society will again write to the Minister for the Environment to urge her to take up the recommendations of the third and final Land and Water Forum report. Our meeting today will no doubt discuss the methods, extent

of involvement and effectiveness of the Society in raising awareness of the value of science for the management of water in New Zealand. Any society is only as strong as its members, however, and what we do must be coordinated and driven by a large volume of activity from within the Society including between meetings.

In November I attended the Presidents' meeting for constituent organisations of the Royal Society of New Zealand. My message was why the Royal Society is not consistently the first 'port of call' for ministers and politicians to derive sound scientific information. The second point was around the extent to which the Royal Society itself is politically active. This theme seems somewhat pervasive: how can we make New Zealanders better informed scientifically using the extensive knowledge and expertise that is resident within our societies.

Last year's conference was held in Brisbane and was attended by a relatively small group from New Zealand. NZFSS and the Australian Society for Limnology hold a combined conference every four years; in other words every eight years there is a conference in Australia. Travelling costs for the conference in Australia were modest compared with registration and accommodation costs. Costs for attending the conference in Australia will likely continue to be an issue for our NZ members. Without the support of the SIL Trust and the Society, we would have had very few students at the Brisbane meeting; John Harding has more to follow on this issue.

With regard to this year's annual meeting, I would especially like to thank Gerry Closs and his organising committee for their efforts in making this meeting a great success. From careful selection of keynote speakers to good food, a well organised scientific programme and some excellent workshops, I think we would all agree that this has been an excellent conference.

I would especially like to thank a few people who have assisted me and the Society over the past year.

- Kevin Collier, the immediate Past President and current Vice-President, continues to be a wealth of knowledge for me and an excellent confidante.
- Brian Sorrell (from afar in Denmark) and Janine Wech have been the administrative engine of the society and I thank them for taking on this administrative burden.
- I would also like to mention Jay Piggott who, even though he is now in Singapore, has been fantastic in conveying information to members through email and the web site.

Looking ahead to next year's conference, we are fortunate to have Kevin Collier already working hard to make sure that our 2013 conference in Hamilton will be a success. Our 2013 conference will take place from 19th to 23rd August 2013 and will be a joint conference with the New Zealand Marine Sciences Society and the Australian Society for Fish Biology. I look forward to seeing you there.

I move from the chair that this report be accepted (*Chris Arbuckle – carried*).

5. Secretary-Treasurer's Report:

MEMBERSHIP

Total membership at 30 November 2012 was 473. Membership figures for the last four years are shown in Table 1 & 2. Total membership continues to increase, reflecting a healthy number of new members joining over the past 12 months.

Table 1: Financial status of membership

	2012	2011	2010	2009	2008
Members – Current:					
Paid	221	268	148	172	89 [†]
Unpaid	120	140	240	163	202
Members – in arrears:					
1 year	103	-	-	36	37
2 year	-	-	-	39	36
3 year	-	-	-	-	2
Other:					
Honorary	10	11	11	11	11
Life	4	4	4	3	3
Legal*	1	1	1	1	1
Societies	5	5	5	5	5
Libraries	9	9	9	9	9
TOTAL	473	438	418	439	395

* Not a member; a legal requirement

[†] Not comparable with other years due to Visa processing problems in 2007/08.

Table 2: Type of membership

	2012	2011	2010	2009	2008
Ordinary	329	304	288	294	263
Corporate	13	15	15	28	31
Honorary	10	11	11	11	11
Life	4	4	4	3	3
Unwaged/Student	112	99	95	98	82
Other (Societies)	5	5	5	5	5

There have been 41 new members joining since 1 December 2011 (20 student/unwaged and 21 ordinary members).

FINANCES

The accounts were audited by Brown Web Richardson Ltd, Hastings.

Our total assets (including equity in stock of unsold books) at 30 June 2011 were \$67,600, down from \$81,101 at 30 June 2011. Income was exceeded by expenditure by \$13502 in 2011/12.

Income: Our subscriptions income was \$5209, which was our greatest single income item this year. Interest was \$2395.

Unusually, conference income and expenditure was a small contributor to our expenses in 2011/12, due to the Brisbane conference with which the Society was not financially involved.

The large excess of expenditure over income was due to two big items: student support for travel to the Brisbane conference (\$11,550), and the publishing of the Crustacean book (\$11,249). RSNZ fees were \$1200; note that RSNZ is basing its fees on numbers of waged members, at \$4 per member (their fee last year was based on a membership of 300). As our number of members increases, their fee increases. In other words, \$4 of each of the \$34.78 subs fee paid by a waged member goes to RSNZ.

We have one term deposit, the combined Jolly Fund, with \$52,827 at 30 June 2012. The Current Account at 30 June 2012 was at \$5,459.

I request that the Secretary-Treasurer's report be accepted.

Motion: That the Society accounts for 2011/12 be accepted. (*Janine Wech / David Hamilton – carried*).

6. SIL 1987 Trust Fund:

Jon Harding presented the (unaudited) 2011/12 financial summary for the S.I.L Trust. Funds of \$10,225 have been awarded over the last year; with income from interest (\$1,021) earned. The SIL accounts balance has reduced over the last year from:

- Ready money account:
\$1,527 (Oct 2011) to \$153 (Sept 2012)
- Unit Trust:
\$20,443.90 (Oct 2011) to \$12,563.28 (Sept 2012)

Two options available for building the Trust up again:

- Request further funds from NZFSS (last request was approved in 2010 for \$10,000)
- Increase subs by \$5 to \$15 for students/unwaged members; and by \$15 to \$55 for waged members (the larger increase for waged members incorporates increased expenses in NZFSS, such as RSNZ membership)

Motion: That the Society increases membership fees by \$15 for waged members and \$5 for unwaged/student members. (*Unanimous Ayes from members at meeting; no dissenters – carried*).

Motion: That the S.I.L Trust Fund report be accepted. (*Jon Harding / Neil Deans – carried*).

7. Publications:

- **Website:** Jay Piggott would like to retire from his co-opted member role as Website Manager, so if any other member is happy to take this on, please let the Exec know.
- **Newsletter:** Hannah Rainforth proposes that the society publishes its newsletter in two issues per year. The content would be split between member updates on one, and articles of interest in the other, and therefore make each newsletter smaller.
 - Majority of members present expressed favour in this recommendation.
- **Freshwaters of New Zealand:** Jon Harding advises that plans for the replacement book to this (working title: “Advances on Freshwater Science”) are underway.
 - FoNZ will be converted to pdf and made freely available on the internet.
 - The new book will focus on freshwater issues since 2004.
 - It is a joint HydroSoc/NZFSS project with two editors from each society.
 - The aim is to publish at the end of 2014.
 - Currently, 37 chapters have been identified for inclusion (~750 pages).
 - The budget at present is for 1000 books costing approx. \$51,600 (\$44,000 + gst). If each is sold for \$87 (incl. gst), then 607 copies is the break even target (membership is ~ 800 for both societies combined).
 - Further discussion is required on book content, title, target audience etc. This could be held on the NZFSS forum.

8. Election of Society Officers

The following officers were nominated and duly elected:

- **PRESIDENT:** Nominations – David Hamilton (Neil Deans / Carolyn Burns).

Motion: Nominations close (Jon Harding / Janine Wech – carried)

David Hamilton elected President unopposed.

- **SECRETARY-TREASURER:** Nominations – Janine Wech (David Hamilton / JoAnna Lessard).

Motion: Nominations close (Jon Harding / Phil Jellyman – carried)

Janine Wech elected Secretary-Treasurer unopposed.

- **COMMITTEE OFFICERS:** Nominations – Susie Wood (David Hamilton / Carolyn Burns); Phil Jellyman (Helen Warburton / Jon Harding)

Motion: Nominations close (David Hamilton / Jon Harding – carried)

Susie Wood and Phil Jellyman elected Committee Officers unopposed.

- **NEWSLETTER EDITOR:** Nominations – Kati Doebling (David Hamilton / Hannah Rainforth)

Motion: Nominations close (David Hamilton / Jon Harding – carried)

Kati Doebling elected Newsletter editor unopposed.

- **S.I.L. TRUST FUND AWARDS COMMITTEE:** Nominations – Mary de Winton (Clive Howard-Williams / Neil Deans); Natasha Grainger (Kevin Collier / Carolyn Burns)

Motion: Nominations close (Kevin Collier / Janine Wech – carried)

Mary de Winton and Natasha Grainger elected S.I.L. Trust Fund Awards Committee unopposed.

The following members have kindly offered their time to assist as co-opted executive members for specific tasks:

- Assistant Newsletter Editor – Natasha Petrove
- Web-site Manager – Jay Piggott
- Māori Representative – Jane Kitson
- Māori Representative – Mahuru Robb
- Student Representative – Helen Warburton
- Media Monitor – Mike Patrick
- Community Outreach – Justine Coop
- Advocacy/Submissions Manager – Kate McArthur

David Hamilton thanked out-going newsletter editor, Hannah Rainforth, for her work over the last four years in preparing the NZFSS newsletter, and thanked out-going Committee Officer Deniz Özkundakci for his work on the executive since 2010.

9. Future Conferences

- 2013 – Hamilton. Kevin Collier to present at Conference Close
- 2014 – South Island venue; possibly Blenheim with HydroSoc.

10. Royal Society of NZ Biological and Life Sciences Advisory Panel

Jon Harding is a member of the Biological and Life Sciences Advisory Panel, which provides advice to the RSNZ on matters of concern. Jon proposed that this position could be made better use of by writing a position paper presenting the facts relating to land intensification and water quality, as a reference for politicians. Further discussion followed. There was agreement that a media statement could be released in the short-term, following the close of the conference, with contributions by members; with support by all members; that the statement expresses concern about declining water quality and biodiversity; that the statement include urgency for the government to act and recommendations to act upon (e.g. endorse the Land & Water Forum recommendations). David Hamilton proposed that he draft a statement after the AGM to this effect and circulate by email to all members for their contributions.

11. Proposals for Web Hosting: Land-use Practices Photos; Biomanipulation Case Studies

Marc Schallenberg proposed that a project be initiated whereby photos of examples of good and bad land use, taken by members, could be hosted on the website. The photos would be geo-referenced with captions to include date, impact of land-use practice, aspect, etc. A brief discussion followed with members for and against: for example, a similar site already exists in Wellington; Facebook is another host option. A second proposal for documentation on biomanipulation case studies in lakes to be hosted on the website. A brief discussion also followed with no resolution. A recommendation was made that further discussion on both proposals be continued after the conference.

12. Proposal for a Nationwide Approach to Planning Management for Large Rivers

Dave West proposed that NZFSS (possibly in association with HydroSoc and the IPENZ River Group) initiate a nationwide approach to planning whole-of-river river use/plan, particularly for large rivers. The aim is to request the government to initiate a formal process so that a holistic approach and schedule to manage development of our rivers is followed. There was limited time for discussion on this topic. A recommendation was made that further discussion be continued after the conference.

13. Professional Code of Ethics

Russell Death raised the issue that he has noticed poor science is increasingly being used in resource consents and AEE's, and whether a professional code of ethics is required. Discussion followed including the review process of the consents and the environment court, and the use of NZFSS membership as a way to give higher station. Russell will draft a memo and circulate to members to determine if further discussion and action is warranted.

14. Honorary Membership

Jon Harding nominated Brian Sorrell for the award of Honorary Membership of the NZFSS. Brian has served on the executive for more than 10 years. As he is now living in Denmark, the Society felt that a NZ-based member would be better to continue in the Secretary-Treasurer role. However, this award would appropriately acknowledge Brian's contribution to the Society.

Motion: that an Honorary Membership be awarded to Brian Sorrell (*Jon Harding / Neil Deans – carried*)

The meeting closed at 7:20 p.m. ■

NEW ZEALAND FRESHWATER SCIENCES SOCIETY CONSTITUTION

1. **The name of the Society** shall be the New Zealand Limnological Society Incorporated.
2. **Objectives:** To establish effective liaison between all persons interested in any aspect of fresh and brackish water research in New Zealand, and to encourage and promote these interests.
3. **Means of Attaining Objectives:**
 - (a) The establishment and maintenance of a register of all persons working in the appropriate fields in New Zealand, giving details of their current interests.
 - (b) The holding of meetings and conferences to deliver scientific papers, and to discuss scientific topics.
 - (c) Co-operation and affiliation with other scientific bodies when appropriate.
 - (d) The production of a newsletter including information about the current interests of freshwater workers, and listing relevant new publications and other items of interest.
 - (e) The distribution of the Newsletter to appropriate organisations in New Zealand and overseas.
4. **Membership:**
 - (a) **The members** of the Society shall be:
 - 1 Ordinary members who shall be persons admitted to membership by the committee, and whose annual subscription as fixed from time to time shall be accepted by the Committee.
 - 2 Unwaged Members who shall be any full-time student of a secondary or tertiary educational institution, and who shall pay such annual subscription as shall be fixed from time to time.
 - 3 Honorary Members who may be elected at a general meeting on the recommendation of the Committee.
 - 4 Life Members who shall be persons admitted to membership by the committee, and whose lifetime subscription shall be paid in advance as a single fee as fixed from time to time.
 - (b) Newly elected members shall be **notified** by the Secretary of their election and sent a copy of the constitution.
 - (c) Any member may **resign** by giving notice in writing to the Secretary, and paying all subscriptions due.
 - (d) Any member shall notify the Secretary in writing of a **change of address**.
 - (e) The Committee shall have the power to **cancel membership** in the case of conduct considered prejudicial to the Society.
 - (f) All members are entitled to receive the Society's **Newsletter** free of charge.
5. **Executive and Meetings:**
 - (a) There shall be an **Executive Committee** consisting of the President, the immediate Past President (ex officio), the Secretary-Treasurer, the Editor, and two (2) other members,
 - (b) The Committee shall implement the Society's general business, and a simple majority shall decide all questions at Committee Meetings. If voting is equal, a motion is lost. A quorum at a Committee Meeting shall be three (3).
 - (c) The officers shall be **elected** every two years, either at a General Meeting or by postal ballot as the existing Committee determine. The postal ballot shall be held before the end of the financial year, and if a General Meeting is not held, the committee shall have the power to scrutinize and count the votes, and declare the results.
 - (d) The newly elected officers shall take office one (1) month after their election.
 - (e) **Candidates** for positions as officers shall be nominated at the General Meeting, or in writing signed by two other members, received by the Secretary before the time of such meetings, or by the 31st of August if a meeting is not held. Every candidate shall signify personally, or in writing his or her acceptance of nomination. The Committee shall have the power to co-opt members of the Society to fill any casual vacancies on the Committee.
 - (f) The Executive Committee may summon a **General Meeting** or a General Meeting shall be summoned on receipt of a request signed by no fewer than ten (10) members entitled to vote. General Meetings shall be summoned by notice in writing, specifying the business to be considered, and notices shall be posted not less than fourteen (14) days prior to the proposed date.
 - (g) At all General Meetings, ten (10) members entitled to vote shall constitute a **quorum**, and a simple majority shall carry a motion. Voting shall be on the voices, or by show of hands or by ballot at the discretion of the chairman, provided that, if any member so demand,

voting shall be by ballot. The Chairman shall have a deliberative and a casting vote.

- (h) **Votes of members:** Each Member shall have one (1) vote at a General Meeting, and each Affiliated Body shall have the right to appoint a delegate who shall have one vote at a General Meeting.

6. Finance:

- (a) **Annual Subscription:** shall be due on the 1st of July in each year and the amount shall be fixed at a General Meeting. Members whose subscriptions are not paid by the succeeding 30th of June shall be unfinancial and shall be liable to forfeit all benefits of membership. The financial year shall conclude on the 30th of June.
- (b) **The funds** of the Society shall be controlled by the Executive Committee and shall be banked in the name of the Society. Cheques and bills shall be signed by any one of the President or Secretary-Treasurer, and must be approved in writing by other members of the Executive Committee. The Society shall not have the power to borrow money.
- (c) Any income, benefit or advantage shall be applied to the **charitable purposes** of the Society as described in Sections 2 and 3 above.
- (d) No member of the Society, or any person associated with a member, shall participate in or materially influence any decision made by the Society in respect of the payment to or on behalf of that member or associated person of any income, benefit or advantage whatsoever.
- (e) Any such income paid shall be reasonable and relative to that which would be paid in an arm's length transaction (being the open market value).
- (f) The provisions and effect of clauses 6(c), 6(d) and 6(e) shall not be removed from this document and shall be included and implied into any document replacing this document.
- (g) **Payment of accounts** must first be approved by the Executive Committee. This may be done at a meeting or by mail, and items may be approved in advance for one financial year.
- (h) **An Annual Report and Financial Statement** shall be prepared and posted to members. The Financial Statement shall be audited by a person appointed at the previous General Meeting.

7. Organisation:

- (a) The Secretary-Treasurer shall keep (i) a **Minute Book** containing full minutes of all meetings, and (ii) a **Register** with the names, addresses, professional interests and date of joining of all members.
- (b) **Affiliated Bodies:** Incorporated or unincorporated bodies, and other organisations approved by the Committee, may become affiliated with the Society on acceptance by the Committee, and on payment of such annual subscription as may be fixed from time to time.
- (c) **Changes in the Constitution** may be made only on a two-thirds majority of the votes polled, and this vote shall be conducted by letter.
- (d) No addition to or alteration or recession of the rules shall be approved if it affects the **charitable objects**, the **personal benefit clauses**, or the **winding up clause**, except as specified under clause 7(g) below.
- (e) **The Common Seal** of the Society shall be in the custody of the Secretary, who shall in pursuance of a resolution of the Committee to that effect, affix the same to all instruments requiring the same.
- (f) The Society shall not be wound up except on a two-thirds majority of a postal vote, but shall be dissolved in the event of the membership being fewer than five (5) persons. In the event of **dissolution** of the Society, its assets shall become the property of the Royal Society of New Zealand which shall dispose of the assets in accordance with the aims of the Society.
- (g) The provisions and effects of this clause 7(f) shall not be removed from this document and shall be included and implied into any document replacing this document, except that another organisation, which must be an **Inland Revenue Department approved charitable organisation**, may be named in place of the Royal Society of New Zealand. ■

The crystal clear water of the Routeburn River in Mt Aspiring National Park. See article on page 18.

Photo © Angus McIntosh



NEW ZEALAND
Freshwater Sciences Society
MEMBERSHIP APPLICATION



How do I Join?

Print/pull out this page, fill in your details, then post to:

Janine Wech, NZFSS Secretary-Treasurer, c/- NIWA, PO Box 8602, Riccarton, Christchurch 8440

or email to: Janine.Wech@niwa.co.nz.

DETAILS:

Title..... First Name..... Middle Initial/s..... Last Name.....

Postal Address.....

.....

Email.....

Telephone: (main)..... (alternate).....

Membership Type: (select one) Waged Student Unwaged

Brief list of your professional interests:.....

.....

.....

PERMISSIONS: (Please select your preferred option for the following and sign to authorise)

I agree to the NZ Freshwater Sciences Society **publishing my membership details**:

Yes No Signature.....

I give permission for my **email address to be added to the NZFSS email mailing group**:

Yes No Signature.....

My preferred format for **receiving the NZFSS newsletters** is:

Hardcopy PDF – via email Signature.....

PAYMENT: (Please select appropriate boxes)

Waged/Corporate \$55 per annum Unwaged/Student \$15 per annum Life Membership \$1375

Donation to the SIL Trust* (optional) \$4

Total Amount \$.....

Payment by Cheque – Make payable to “NZ Freshwater Sciences Society”

Payment by Direct Credit – Acct: BNZ 02-0700-0354213-00 (include your last name in the Reference/Details field)

Date paid.....

Payment by Credit Card (please tick one) Visa Mastercard

Name on Card..... Card Number.....

Card Expiry Date..... Signature of Cardholder.....

Please send completed form to: NZFSS Secretary-Treasurer (details at the top of this form).

* The SIL 1987 Trust supports overseas travel awards for beginning NZ scientists and guest lecturer visits to NZ by eminent international freshwater scientists. See www.freshwater.science.org.nz for more details.



NEW ZEALAND
Freshwater Sciences Society

www.freshwater.science.org.nz

.....

Find us on:
facebook 

ISSN 1177-2026 (print)

ISBN 1178-6906 (online)

© 2013, New Zealand Freshwater Sciences Society