New Zealand Freshwater Sciences Society Newsletter



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Contents

Introduction to the Society Editorial President's Piece He Maimai Aroha – Farewells		2 4 5 6
Feature articles and invited opinions	5	
If the answer is "restoration"	' then have we recognised the	
importance of the question?		10
Fish Passes of Dreams A call for a ban or moratoriu	m on commercial harvesting of longfin	12
eels in New Zealand Ensuring the sustainable use	of longfin eel – Response from the	15
Ministry of Fisheries		21
The last word? A rebuttal		24
Bug of the month. New Gyra	ulus species in New Zealand?	26
Calling all student members		20
An ever-growing freshwater	bio-microscope image collection	28
Research News		29
Awards		62
Minutes and reports		66
Conference details		73
NZFSS membership form		74
NZFSS constitution		76
Contacts		79

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

The current committee members are:

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Mr R. Hoetjes Fish & Game NZ, Northland PO Box 1099 Whangarei <u>rhoetjes@clear.net.nz</u> 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 2009 subscription is \$40.00 per annum, or \$10 for students, the unwaged or retired persons.

Honorary life members

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

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With green as the new black, there has been an increase in community and private conservation efforts, many of which focus on 'restoration'. These efforts have ranged from the extensive and well publicised, such as Karori Wildlife Sanctuary and Maungatautari, to the localised and under-the-radar efforts of passionate landowners, such as one Taranaki farmer I met in recent travels.

Mick, with no outside funding, has been quietly fencing off, retiring and replanting not only the streams on his own Pātea property, but reaching over and fencing his neighbour's streams too. With his land still very much in the reach of the saltwater wedge, Mick wanders down to the estuary to collect and propagate *Plagianthus* seeds, ecosourcing this and other local species, and drags his children home every year to help him plant out the seedlings he's carefully cultivated. "This," he tells me wryly, "is to atone for their extravagant lifestyles."

His efforts are obvious when you compare the overhanging grasses on his side of the stream – perfect for inanga spawning – with the short-cropped pasture on a side where he hasn't yet convinced the neighbour to let him intervene. Or when you wander down to the main stem and trip over last year's plantings poking through the ubiquitous fescue. Or when you try to survey the lower tributary and have to fight your way through the native vegetation. Mick, like many others around the country, is also planning a fish pass installation.

In the freshwater context, restoration projects seem well justified. There are numerous papers attesting to the benefits of vegetated over cleared stream margins, of which Society members will be more than au fait – the lowered temperatures, the reduction in nutrients and sediment, right through to the increased inputs of terrestriallysourced food. And the benefits of opening up upstream habitat through fish pass installation are obvious.

But questions remain. Is a revegetated riparian strip the same as a margin that has never been cleared? How well are restoration efforts backed up by scientific study? Do they need to be? Does it even matter whether restoration is effective, or is it enough that humans are interacting with their environment in a caring way? Or is this just another expression of our hubris?

In this newsletter, I have asked Dr Murray Williams, Senior Lecturer in Ecological Restoration & Conservation at Victoria University to comment on his experience. Alex James also provides us with insights into the effectiveness of fish passes, and Dr Mike Joy and Amber McEwen remind us that restoration efforts need to be combined with vocal advocacy and species protection. You can also catch up on who is up to what in the Research News, remember colleagues past with He Maimai Aroha, and check out how the Society is placed financially in the reports section. Many thanks to everyone who contributed - I hope you all enjoy the newsletter.

Hannah Rainforth, Editor



It was really gratifying to see Society members working together, unencumbered organisational by constraints, to provide some candid input into our submission on the Proposed National Policy Statement on Freshwater Management (NPS). Hopefully our submission will carry some weight amongst the 148 others received. Public hearings are running from July to September this year, and the Society has indicated its desire to be heard. Where the NPS goes to from there is a bit unclear, but we can only hope that it doesn't fall victim to political and economic forces. While we wait for this to unfold, your Executive Committee remains active progressing other fronts.

We were pleased to welcome Kristy Hogsden from Canterbury University as a co-opted member to represent student matters. Thanks Kristy for putting your hand up and enlightening us to the possibilities that increased student participation can offer; after all, students are the future of our Society. Wendy Paul has made significant headway advancing the new web site and we now have a more engaging and dynamic site up and running, with more features planned in the near future.

Plans remain on track for the Whangarei conference in November in association with the New Zealand Hydrological Society with the theme "Waters for the Future: Balancing its values". Rudi Hoeites and his organising committee have а stimulating programme planned with exciting field trips to some of Northland's sub-tropical highlights. We saw at the New Plymouth conference last year just how good these regional venues can be. Freshwater issues don't take a holiday in hard economic times, so I urge you to make the effort to get to Whangarei and support this year's conference. I look forward to seeing you there.



Kevin Collier, President

He Maimai Aroha – Farewells

Dr M.A. (Ann) Chapman (1937-2009)

by Dr Ian Hogg

It is with great sadness that we note the passing of our friend and colleague Dr Ann Chapman on May 23, 2009. Ann was a central figure in New Zealand limnological circles and in 1967 was a founding member of the New Zealand Limnological Society, precursor to the present New Zealand Freshwater Sciences Society (NZFSS).

Ann was born in Dunedin and began her university training at Otago, completing her MSc in 1959. She worked in Australia for the Sydney Water Board before heading to Scotland in 1962 to complete her PhD (1965) from the University of Glasgow. Ann

was appointed Senior Lecturer in Biological Sciences at the University of Waikato in 1970 and promoted to Reader in 1975.

Ann retired in 1996, although she remained verv active, maintaining an office and lab space at the University of Waikato. She continued to supervise graduate students as well as undertaking her own research on the taxonomy of amphipod crustaceans. She was always receptive to new ideas and embraced emerging genetic techniques as a useful tool for providing insights into taxonomic anomalies. She supervised several graduate students who have gone on to careers in the freshwater sciences, and authored over 50 journal publications. She was the first woman to lead a scientific expedition to Antarctica (1970) and has a lake near the Granite Harbour in Ross Dependency named in her honour. Perhaps one of Ann's best known contributions was her book An Introduction the Freshwater to Crustacea of New Zealand, co-authored with Maureen Lewis.

Ann was always a tremendous amount of fun on the many field trips she was part of. Her enthusiastic knowledge of New Zealand history, natural history and literature was extensive, and numerous students and colleagues benefitted from her experience. An added bonus on her field



trips was the requisite visits to some of New Zealand's finest wineries and breweries.

The last few years were not particularly kind to Ann as she battled various illnesses and eventually moved into a nursing home. At one point she was even hit by a car while crossing the street in her wheel chair. Her wheel chair was destroyed, but Ann escaped with only a few minor scratches. Ann was relatively unfazed by any of this and converted her room into an office so that she could continue to write. She regularly entertained guests, although it was usually necessary to rearrange the many stacks of reprints and papers that occupied chairs and other flat surfaces. She managed to get out on various excursions and on one memorable occasion was even extracted from the home by a group of NZFSS members to visit a local pub. She and Maureen Lewis had recently finished a draft for their second edition of the Crustacea book which is to be published by the NZFSS.

Ann is survived by her sister Judith Devaliant, brother-in-law Lionel, her much adored nieces, great nieces and cat Gus. If desired, donations in Ann's honour can be made to the Royal Forest and Bird Society, PO Box 631, Wellington, 6140.

Professor George Knox (1919-2008)

by Mike Winterbourn

Professor George Knox was primarily a marine and estuarine ecologist but he strongly supported the establishment of the New Zealand Limnological Society in 1968, and was instrumental in expanding and strengthening teaching and research in freshwater biology at

the University of Canterbury in the 1970s. Both Colin McLay and I were recruited to the staff by George from postdoctoral positions in North America and joined Vida Stout as the core of an expanding



presence in limnology and stream ecology in Christchurch.

George was concerned with the continuing degradation of streams in the lower Waimakariri catchment by freezing works and fellmongery wastes, and my first venture into Canterbury stream ecology was to carry out, with two summer students, a biological survey of the Kaiapoi River and tributaries at his behest. Some years

> later he became involved in the environmental effects of gold mining on West Coast rivers and acted as а consultant on the of the effects massive gold dredge on the Grev River upstream from

Greymouth. Not content with being a front-man for this project George participated in fieldwork on the river before making his case.

George had a wide range of research interests including the taxonomy of bristle worms (Polychaeta), Antarctic biology and estuarine ecology. He wrote and edited numerous books on New Zealand and marine ecology and had a flair for distilling and drawing together information into a digestible form. His lecturing style became the stuff of legend, based as it was on the reading of marked passages in an armload of text books. He established and helped build the Edward Percival Field Station at Kaikoura, and was a strong proponent of field studies for undergraduate students. George was an international biologist who travelled widely to conferences and meetings, had valuable contacts throughout the world, and played significant roles in the administration of the Scientific

Ian McLellan (1924-2008)

by Mike Winterbourn

McLellan is best known by lan freshwater scientists for his exhaustive studies on the New Zealand stoneflies (Plecoptera). He taught at Buller High School for 30 years, retiring as Head of Science in 1981 to devote himself fulltime to taxonomic studies. He worked from his home in Westport and was a research associate of Landcare Research. I first met Ian in 1967 after we had both fortuitously, and unknown to each other, submitted manuscripts

Committee on Antarctic Research (SCAR) and the International Association for Ecology (INTECOL). He received the MBE, CNZM and Hutton Medal for his contributions to science and was a Fellow of the Royal Society of New Zealand.

George was also an avid supporter of university and Canterbury rugby and a presence known to all and sundry on the old bank at Lancaster Park. I'm sure few realised he was a venerable professor of zoology as he watched the games with two transistors plugged into his ears, one giving the commentary and the other tuned to Radio Sport or its predecessors. He also revelled in the interdepartmental cricket matches played on the llam fields in the 1970s. He bowled with his cap on and inevitably secured a wicket caught at long on, thanks to astute captaincy. George lived a full life and, despite ample provocation, never seemed to get angry.

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describing the same new stonefly species, to separate New Zealand journals. We refereed each others papers (!) and Dick Dell, then editor of the Transactions of the Royal Society, suggested we get together and sort things out. I travelled to Westport by DC3 from Wellington and the result was our jointly-authored work describing Halticoperla viridans. In total, Ian described 72 stonefly species from New Zealand, establishing as he did so the remarkable nature of our plecopteran fauna with its winged, wingless and short-winged species, tendencies toward terrestrialism by larvae in

several lines of Gripopterygidae, the occurrence of several notonemourid species with hyporheic larvae, and the many Zelandobius species with very limited distributions. His two large works on Notonemouridae and Antarctoperlinae in the New Zealand Fauna Series, and his 1977 paper (NZ J Zool. 4: 119-147), in which he established a higher classification for our stoneflies, are among his most important works.

Ian also undertook taxonomic studies on Australian and South American stoneflies and published papers on New Zealand Thaumaleidae and Blephariceridae (Diptera). He received a lifetime achievement award from the International Plecoptera Society in 1995 and was made a Fellow of the Entomological Society of New Zealand in 2004. Ian was a keen outdoor man, sociable and generous. He had a wide network of colleagues who collected material for him and he identified many specimens for anyone who asked. For those wanting to undertake molecular phylogenetic studies his detailed descriptive studies will represent а remarkably comprehensive starting point. A full listing of lan's publications has been published in New Zealand Entomologist 32:92-94 (2009).

Moe mai rā koutou e ngā tōtara haemata. Hoea ō koutou waka i ngā wai rērere o Tangaroa, rere atu rā kia tae atu ki te rua o Puanga, ki reira okioki ai i te okiokinga tangata, moe mai e.

Feature articles and invited opinions

If the answer is "restoration" then have we recognised the importance of the question?

by Dr Murray Williams

"These'll bring a smile to your face John." Murray read the note accompanying two photos arriving in my mail. One showed Lake Whangape resplendent with hundreds of black swans, heads down mowing the Egeria meadow below. The other was a shot of a (much) younger self cradling a swan cygnet on the edge of Lake Wairarapa. Ha! Yet half a minute's contemplation was all it took before moisture welled in my eyes.

Lake Whangape, 1978 – a truly fabulous site for waterfowl. Ducks and swans galore! Summer swans nesting in colonies producing 2500 cygnets 10-12.000 annually. Home to macrophyte-munching adults for the rest of the year. Today ... you'd do well to find 100 swans feeding on that lake, or on nearby Waahi, or Waikare for that matter.

Lake Wairarapa, 1980 – equally impressive as a breeding and feeding site (along with Marlborough's Vernon Lagoon) for the approximately 12,000 swans then distributed either side of Cook Strait. Nests in scattered colonies along the lake's flooded eastern margins added 1500-2500 new recruits annually. What now? A scattered pair nesting here and there in Boggy Pond or Matthew's Lagoon perhaps, but no colonies, no crèches of cygnets, no feeding flocks.

Some achievement isn't it - to enter my last working year knowing that these two lakes, like all other lowland lakes and wetlands on which I caught, banded and inquired into waterfowl for the final third of last century and the first decade of this. are now phytoplankton-dominated, NP-enriched, grass-margined, waterbirdimpoverished, partially-drained, levelcontrolled impoundments. I feel an immense shame that this has all happened on my watch.

Aaah redemption! An opportunity to teach a postgraduate course on restoration ecology. Well, if redemption was truly what I sought



Photo: J.L.Kendrick

Murray Williams, Lake Wairarapa, 1980

then after four years teaching I haven't found it. Just who am I trying to fool? What folly am I trying to dispense? The belief, and the assertion, that we have the ecological knowledge and the technology to "repair" our desecrated waters is surely hubris in the extreme.

Let's be realistic and honest about freshwater restoration. Despite our best intentions, we're attempting to halt a plague with a paracetemol. Which of my "lost" lakes do we realistically expect to change back to a macrophytedominated, mildly eutrophic, ecotonewaterfowl-abundant. margined, seasonally-fluctuating wetland resplendent with natural character? What waterway of any size or consequence can we possibly return to potable quality and to a biodiversity index matching that of a mere 50 years ago while the agents of degradation land use and discharge - remain so widely unchallenged?

Photo: Murray Williams



Lake Whangape, 1978

Don't get me wrong. I applaud the well-intentioned efforts of community groups to beautify streambanks, and those of landowners seeking to "re-wild" their wetland's margins. I admire Muaūpoko's sterling efforts at Lake Horowhenua, Ngāti Tūkorehe's in swamps at Kuku Beach, and I applaud Tainui's funding gain for the Waikato River. Full marks to Auckland and Christchurch for trying to bring natural character back to edges of some urban waterways. Some people do care! Social gardening and landscaping is indeed alive and well. But hasn't our focus been well and truly diverted?

Restoration, as we presently extol it, is simply a falsehood – the "big lie" as Eric Katz famously described it. To argue, as we do, that we can restore the destroyed or degraded back to an admirable resemblance of its former state is to be complicit in the destruction. The falsehood simply provides moral justification for ongoing desecration, and even worse, our abandonment of the very purpose for which we accrue our scientific knowledge. It shifts the emphasis from retention of natural character to the acceptance of human exploitation and imprint. Whatever happened to the conservation and environmental awakening that defined the 1970s? The descent to the restoration and mitigation philosophies that now so define our present l see as а consequence of the RMA's administration, increased political control of technical expertise, and, sadly, the loss of our individual and collective willingness to stand up and tell it as we really see it.

Now, the only voices regularly heard in opposition to the sewerisation of our waterways and wetlands seem to be those of Fish & Game and Mike Joy. Full credit to both! But why are they so lonely? Every reader of this newsletter will have measured or monitored a change – a difference between time t and time t+1. What part of a sloping line have we somehow come to recognise as comfortingly horizontal?

I'd like to think we, as a scientific fraternity, could regain a lost collective resolve. It's the resolve that once viewed our science as a service, not as an end in itself and for itself. Society funds our indulgence and has a right to expect a benefit in return. Is promoting the application of our knowledge for the benefit of human and environmental welfare too much of a collective ambition? We all know our freshwaters are going to hell down a drainpipe, so why don't we, individually and/or collectively as professional societies, say so – often and loudly! For a start we could stop peddling the snake oil of restoration and tell it like it really is, like Fish & Game and Mike are.

Pretty soon I will have to face my son, look him in the eyes, and say, "Yes Tane, I watched your wetlands and waterways become places in which you cannot play, become what you cannot drink, and lose a nature that cannot be replaced. Did I raise my voice in response? Did I act in response? No – seemingly I didn't care enough." Now that really **is** shame!

Murray Williams is about to retire as Senior Lecturer in Ecological Restoration & Conservation at Victoria University of Wellington and previously worked for 40 years for the Wildlife Service and the Department of Conservation. He is an inspiring and passionate teacher, and a wise old codger.



by Dr Alex James

If you are ever bored, I suggest you grab a topo map and go visit a bunch of road culverts. I reckon you will find at least a few problematic structures – perched culverts, weirs, tide gates – you know the deal. As for myself, over the last 18 months I have had the opportunity of driving round the lower North Island, visiting numerous instream structures to assess fish passage. What I found was concerning.

As I'm sure you all know, a good portion of New Zealand's native

freshwater fish fauna require access to the ocean to complete their lifecycle.

Thus I will not go into this in detail except to say that instream structures be they natural or artificial can restrict fish distribution if fish cannot traverse them. Ideally then, all artificial structures would have been designed and constructed to allow the free passage of fish, as is legally

required. Obviously this is not the case as there are numerous perched and undercut culverts and weir structures



An insurmountable barrier

out there that restrict fish movements. There are also many weir structures built many years ago for small scale water supplies for small towns and settlements. These are typically off the beaten track and because they are water supplies, have high quality instream and riparian habitat, yet migration barriers mean our fish are missing out on this habitat.



A dry, unmaintained 'fish pass'

Photo: Alex James

There is a lot of enthusiasm around retro-fitting artificial stream structures with fish passes. At the 2008 NZFSS conference in New Plymouth a good crowd turned up to tour some of the fish passes in the Taranaki. Some of these were magnificent and complex constructions. Installing fish passes has a certain feel good factor and can be used as positive PR, and to appease lobby groups. Fish pass structures are expensive and often need to be designed on a case-by-case basis. Unfortunately, from what I have observed, once the initial enthusiasm wears off, fish passes are often left to their own devices. Anyone who is involved with running water knows its power to shunt around sediment and

destroy things which we put in its way. I have seen several fish pass structures that have become defunct. Some of these no longer had water flowing down them and others had eroded underneath to the extent that they were more highly perched than the original problem structure. I have also seen a fish pass deliberately blocked with sandbags because too much water was escaping a water supply intake.

Another issue is their efficacy. We can trap fish in the actual pass to see what species are using it but this does not indicate a viable population upstream. I am not aware of any beforeafter studies of the effectiveness of fish pass installations. These would need to be long-term to determine if the pass in question is allowing a viable population to persist upstream. I am keen to hear of any such studies in New Zealand. It seems to me that great effort and expense goes into building fish passes that are based on a Field of Dreams approach, not science.

I am all for the retro-fitting of

fish passes on instream structures that are deemed to be barriers to fish movements, but to ensure money is well spent in the future two things must be done. Firstly, every fish pass structure built have must а maintenance regime and all



A severely perched and undercut culvert

structures need to have a plan and budget to achieve this. Someone needs to be responsible for checking structures regularly, especially after large flood events. Secondly, the future design of successful structures depends on learning from what has already been built. The efficacy of fish passes needs to be measured somehow. I am not saying it is necessary (or viable) to





A fish pass blocked by sandbags

perform a significant monitoring programme on every fish pass structure but surely representative structures could be selected for intensive monitoring.

Another issue is who is responsible for building, maintaining and monitoring fish passes. But that is a whole other story. I would be happy to hear from anyone who has any data on the efficacy of any New Zealand fish passes. I can be contacted at <u>alex.james@ihug.co.nz</u>.

Editor's note

Mark Hamer and Bruno David have initiated a study of one stream soon to be retrofitted with a fish pass (see the research news for Environment Waikato). Perhaps there are other studies underway which may be useful to share? Mike Joy and Amber McEwan have long been advocating for increased protection for our freshwater species. Some of you may already be familiar with their paper calling for a ban or moratorium on commercial harvesting of longfins. This call has to date met with opposition from the Ministry of Fisheries. The call for a ban is reproduced below, along with a response from the Ministry of Fisheries, and a rebuttal by the Tuna Management Group.

A call for a ban or moratorium on commercial harvesting of longfin eels in New Zealand

by Amber McEwan and Dr Mike Joy, Massey University

What we want from you

It is our intention to start a petition calling on the Ministry of Fisheries to place a ban or moratorium on the commercial harvesting of the threatened endemic longfin eel (*Anguilla dieffenbachii*). If a moratorium is deemed the most appropriate scenario, it must stand until it has been conclusively shown that x level of commercial fishing is **not** going to have significant negative effects on eel populations (i.e. the onus is on those who wish to make a profit out of a resource).

We need to know first if we have support from NGOs and iwi. We are sending out this brief outline – if anything needs clarification please contact Mike Joy <u>M.K.Joy@massey.ac.nz</u>. If you are in favour or not please let us know one way or the other at that email address with <u>Eel Moratorium</u> in the subject line.

Our motivation to call for this action

Over the last 10 years, we have become increasingly alarmed at the declining numbers of longfin elvers which we and others have observed during fish surveys in many North Island rivers, for example in 2007 and again in 2008, during many days of intensive sampling of the Hutt River, despite catching more than 1000 native fish specimens, less than 10 longfin elvers were seen. (There would have been at least 1 elver to every other native fish caught in these habitats 5-10 years ago).



Eel reproductive strategy

Eels are very slow growing (15 to 25 mm a year depending on food availability and temperature) and breed only once, at the very end of their lives, after undertaking a long spawning migration to an unknown destination in the South West Pacific Ocean. Longfin female eels can grow to almost 2000 mm and to over 50 kg in weight, reaching ages from 30 to 100 years before maturing sexually. Males reach maturity at 15 – 45 years. The extreme longevity, particularly of the female longfins, makes them particularly vulnerable to capture before they can spawn. After spawning, larvae drift on currents to New Zealand, change into glass eels and migrate up rivers, darkening into elvers as they swim upstream.

The indicators of trouble

Elver Recruitment Trends

- Research of available scientific literature has confirmed our observations. Trap and transfer operations at some hydro dam sites¹ in recent years have revealed that the number of longfin elvers nowadays is very low at least a 75% reduction in stark contrast to the huge elver runs that were witnessed prior to the 1960s.
- The data collected show that numbers vary from year to year (though with no obvious recent trends apparent). However, issues exist with sampling methodology (e.g. the recent discovery that many elvers at a particular site that were previously assumed to be longfins (and counted as such) were actually shortfins.) The data collection at these sites has been inconsistent, as the level of effort and types of traps used have changed many times over the last few years.

Reduction in eel size

- Commercial catch records reveal a trend of decreasing size of all eels caught, with most now being in the lowest size category (220 500 g). In 2007, 50% of eels caught were in this size range, and in the heavily fished Waikato River figures were even worse, at 96% of all catch falling in the smallest size bracket. Very few large longfin eels are now seen anywhere.
- Our concern is that very few mature eels are now making it to reproductive maturity with the result that there are now fewer elver "recruits".

Eel sex ratios

• Regularly fished rivers now show longfin eel ratios of up to 100 males to 1 or 2 females. This has obvious implications on the number of females present in future spawning populations.

The cause: anthropogenic impacts on eel habitat

Commercial eel fishing is adding pressure to a population which is already reduced because of lost or degraded habitat. Eel habitat has approximately halved since European settlement, with more than 90% of wetlands drained, migration blocked due to the installation of dams, weirs and overhanging culverts, and the channelisation of streams through flood control activities. In addition, many lowland rivers are polluted by farm runoff. It takes many years for the young eels to make their way upstream: a journey which must nowadays be made through polluted waters.

¹Principal Dams: Matahina, Karapiro, Arnold Dam, Waitaki Dam.

Traditional eel fishing

Tuna are a valued food source for Māori. Traditionally, overfishing of the resource was controlled by rāhui. Now, eel numbers are much reduced by commercial overexploitation and this has drastically reduced a valued wild food resource (in times of economic hardship) and impacted on Māori traditional practice. Thus a very few people (commercial fishers, quota holders) are gaining a short term monetary benefit at the expense of the long-term benefit to a large number of people.

History of commercial eel exploitation in New Zealand

Commercial fishing of both the shortfin eel (*A. australis*) and the endemic longfin eel began in the 1960s, with the first exports in 1965. Catch levels peaked in 1975 at 2,434 tonnes (both species) and thereafter declined (Fig. 1 & 2, Appendix 1). Initially the only requirement was for commercial fishers to have a license. The declining numbers eventually prompted the Ministry of Fisheries to institute measures to attempt sustainable use of the resource (Table 1).

Year	Measure imposed	Rationale for implementation
1960s	License required	Reporting and data collection
1978	Minimum size of 150 g	To increase the average size of eels before
		they are susceptible to fishing, hence increase
		yield
1980s	Progressive limits on permit holders	Restrict fishing effort
1986	Ban on use of spears; various net	Prevent wastage
	restrictions	
1989	No commercial eeling within national	Allow for some eels to mature for spawning
	parks without a permit	purposes
1993	Further net regulations; escape tubes in	Prevent wastage; increase the size of the eel
	nets for smaller eels; fishing time	before it is susceptible to fishing, thus
	restrictions	improving economic yield
1995	Upper size limit of 4 kg (South Island only)	Improve number of female migrants
2000	Quota Management System (QMS) for	Limit number of eels taken by setting quota
	South Island eels (shortfin and longfin	for different quota areas
	together)	
2003	QMS for North Island longfin and shortfin	Limit number of eels taken
2004	QMS for Chathams eel fishery	Limit number of eels taken
2005	Designate some rivers as off limits to	Allow for some eels to mature for spawning
	commercial fishers: Motu, Mohaka, lower	purposes
	Whanganui, Pelorus, Waihau	
2005	Designate some lakes and lagoons as	Provision for customary fishing
	reserves.	
2007	Sustainability Review:	Limit number of eels taken to more realistic
	Reduction on quota in all North Island	levels. Improve number of female migrants
	QMAs. Upper size limit of 4 kg (North	
	Island and Chatham Islands)	

Table 1: Measures attempted to manage the commercial eel harvest in New Zealand

Our comments on commercial eel fisheries management

The inclusion of eels into the QMS between 2000 and 2004 was a belated attempt by the Ministry of Fisheries to rectify a situation brought about by inadequate governance for over 35 years: too little, too late. In The Plenary Report 2007², Ministry of Fisheries officials said:

- "The status of longfin eel stocks are not known but are believed to be in decline."
- "Estimates of current and reference biomass [for longfin eel] are not available."
- "There is a high risk that the current exploitation levels for longfin eels, coupled with past and present anthropogenic impacts, <u>are not sustainable.</u>"

Because eels do not spawn until the end of their lives they cannot be modelled using existing fisheries models which are based on species spawning every year. Total Allowable Catches (TAC) for eels are therefore set under section 14 of the Freshwater Fisheries Act 1996, which allows for quotas to be determined for species for which "there is insufficient information available in order to determine Maximum Sustainable Yield (MSY)".

Eel quotas are therefore set using averages of past catch levels – a system that borders on nonsensical within a declining fishery. Under this system, eel catch will always undershoot quota. Proof of this is evident in that commercial eel fishers are unable to reach quota: the numbers simply are not in existence. Not a single longfin eel quota – in any area, in any year, including following drastic quota cuts in 2007 – has ever been met. (Fig. 1 & 2, Appendix 1). There is no data on catch levels within the recreational and customary fisheries.

There are no size limits applied to the recreational and customary fishery, thus large females are unprotected within reserves. As the 4 kg maximum size limit is a very recent measure (2007) it will take many decades for surviving eels to attain sexual maturity.



Export dollars or conservation of a threatened endemic species?

Almost all of our commercial eel products are exported. This market exists at least in part because eel stocks worldwide are in decline. There are major concerns for the sustainability of fisheries for the American eel (*A. rostrata*), the European eel (*A. anguilla*) and the Japanese eel (*A. japonica*; Fig. 3, Appendix 1).

In 2006, NZ export earnings from the shortfin and longfin eel fishery totalled \$6,133,352. Of that, longfin eels comprised around 25%. Thus,

² Ministry of Fisheries (2007) Report from the Fishery Assessment Plenary, May 2007: stock assessments and yield estimates. Ministry of Fisheries, Wellington, New Zealand.

earnings from export of longfin eels constitute around \$1,533,338. This equates to 0.0009% of GDP, which was NZ\$155.672 billion for that year. In recent years the Ministry of Fisheries has spent hundreds of thousands of dollars on managing and researching this problematic fishery – effort not in keeping with the low value of the fishery itself (Fig. 4, Appendix 1).

It is difficult to obtain exact numbers for people involved in the commercial eel fishery, but best estimates give this number to be less than 100, many of whom work only on a part time basis. Thus a very few people and a very small export revenue are responsible for depleting, to the point of collapse, this iconic endemic fish species – a species which has the same risk classification as the Great Spotted Kiwi.

Acknowledgements

Thanks to the many people helped with preparing this and those who have offered support, especially Mary Campbell.



Fig. 1. North Island longfin eel commercial catch 1992 to 2008. ACC: Actual Commercial Catch; TACC: Total Allowable Commercial Catch; LFE: longfin eel. Data from Ministry of Fisheries.



Fig. 2. South Island eel commercial catch 1992 to 2006. ACC: Actual Commercial Catch; TACC: Total Allowable Commercial Catch; LFE: longfin eel; SFE: short fin eel. Data from Ministry of Fisheries.



Fig. 3. Trends in juvenile abundance for European, American and Asian eel. Reproduced from Fig. 1 in Anonymous. 2003. Worldwide decline of eel resources necessitates immediate action. Quebec declaration of concern. Fisheries 28:28-30.



Fig. 4. Eel export earnings 1990 - 2004 (Graph from Statistics NZ).

Editor's note

Many iwi, out of concern over declining eel numbers, have already decided not to lease their eel quota out or allow it to be fished. Those known to the editor include: Whanganui, Ngāti Hauiti, Ngāti Apa, Ngā Rauru, Ngāti Ruanui, Te Āti Awa, and Muaūpoko. There may be others throughout the country.

Ensuring the sustainable use of longfin eel – Response from the Ministry of Fisheries (abridged)

Overview

The article written by Amber McEwan and Mike Joy (Massey University) on longfin eels is causing understandable concern among fishery interests of the lower North Island. However, there is a shared desire to improve longfin eel populations, and positive actions have already been taken to ensure sustainable use of the resource. A call for a moratorium on the commercial harvest of longfin eels:

- a) would have had more relevance 20 years ago, as a moratorium on the issue of fishing permits to new entrants was then being used by MFish as a means to prevent further commercial fishing effort in the absence of catch limits;
- b) does not recognise the implications of the significant changes implemented to fishery management since then, particularly over the last decade when catch limits have been applied to reduce harvest levels.

Progressive improvements have been made to the way that eels are managed. The effect of these changes will show through in the national monitoring programme established for the eel fishery.

Filling in the knowledge gaps

MFish has a range of science and management information that can help explain why longfin commercial catches have reduced in recent years, particularly in the North Island. These factors are important aspects to consider, and largely revolve around management interventions to better sustain the use of the resource.

The MFish Plenary Report 2007 concluded that MFish held concerns about the state of the longfin resource for the longer term. The Plenary report is updated annually following a review of any new science information. The more recent 2009 Plenary Report has recently been added to the MFish website, and fishery interests should read the latest version. The current thinking is that the fisheries management measures taken since 2007 are a further step in the right direction to improving the longer term status of the resource.

In the MFish Plenary Report 2007, management adjustments were recommended to provide further confidence that the longfin resource would be sustained over the longer term. As a result of that scientific assessment, significant reductions in the Total Allowable Catch (TAC) and Total Allowable Commercial Catch (TACC) for North Island eel stocks were made in October 2007. In the case of longfin stocks, a reduction of between 49-78% from initial commercial catch limits set in 2004 were made.

QMS introduction of eel stocks enabled a major rationalisation of commercial participants (~ 75% reduction in South Island from 2000; ~ 50% in North Island from 2004). Remaining participants could not or did not want to harvest the commercial catch limits available (fuel cost increases, lack of international market with recession, or reduction in processing capacity). Similarly, new participants since 2004, mainly Māori asset holding companies, have not always wanted to or been in a position to undertake harvest. The recent trends in commercial participant levels are documented in the fisheries plan information briefs on the MFish website.

The current commercial catch for longfin is not at the level of the catch limit for each stock, but it does not automatically follow that this reflects a lack of longfin in the water available to catch. It would similarly be unwise to suggest that just because a catch limit is reached, then a fish stock is being fished sustainably. The MFish website shows accurate commercial catch graphs by quota management area, which better reflect the changes in regional catch over a longer time period. Initial and adjusted commercial catch limits for longfin stocks are set at levels well below historic levels of commercial catch. However, simple trends in the level of commercial catch are not a suitable index for accurately showing relative changes in a fishery's well-being.

There are a number of factors that may affect whether the commercial catch limit has been caught and this is illustrated in other fisheries in New Zealand (eg, red gurnard). These reasons do not simply relate to a lack of the particular species in the water. Other factors such as vessel limitations, harvesting, transport and processing costs, availability of markets, weather conditions (eg, drought), bycatch of other species that limits potential catch of the species of interest etc may affect catch for a given fishing year. Fishery interests need to consider these other influences.

MFish has commissioned a range of eel research that better assesses whether the use of a fishery resource is sustainable over a longer time period. This research includes commercial catch size grade sampling, commercial catch-per-unit-effort analyses, local eel population characterisations, GIS modelling, and assessing elver recruitment levels at hydro power stations in association with tangata whenua and industry members. For example, some catch-per-unit-effort indices are showing signs of improvement, while others may yet take time to respond to recent management interventions.

How a sustainable catch limit is divided amongst the full range of fishery interests (customary, recreational, or commercial) within a fish stock is a separate and subsequent decision for the Minister of Fisheries. In 2007, consistent with advice from MFish, the then Minister of Fisheries did not reduce longfin catch allowances for the non-commercial sector, even though they are substantial in the North Island – and in several cases, larger than commercial catch limits.

As a matter of clarification, it should be noted that the maximum size limit for longfin eels taken commercially was introduced in 1995 in the South Island, and this was eventually extended to cover all of the country in April 2007. MFish has suggested application of this measure to the recreational sector previously, but there has been insufficient feedback from this sector. A MFish code of practice was published in October 2008 that encourages the return of recreationally caught large eels that are not taken for food. This is available online, and from MFish offices as a brochure.

Information on the sex ratio of variously sampled longfin (and shortfin) populations has been collected under MFish contract. It is important not to view one study in isolation, as it may not represent sex ratios in the wider context of the biological stock. The following table provides a broader coverage of MFish information on longfin sex ratios from across the country.

Region	Male (%)	Female (%)	Sample Size (N)
North Island			
Waikato	33	67	67
Wellington	48	52	150
South Island			
Nelson	56	44	153
Marlborough	49	51	115
West Coast	48	52	412
North Canterbury	37	63	257
South Canterbury	53	47	158
Waitaki	52	48	619
Otago	65	35	1833
Southland	83	17	4368

Table reproduced from Jellyman, DJ (2009). Forty years on – the impact of commercial fishing on stocks of New Zealand freshwater eels. American Fisheries Society Symposium 58: 37-56.

Conclusion

MFish and other fishery interests continue to work towards the shared goal of sustaining the longfin eel resource for the future. MFish is committed to ensuring that the eel fishery is improved. This is best achieved where there is a common understanding about management initiatives to date, the supporting information available, and the need to direct our limited resources to this task in a constructive way.

Further information

MFish contracts NIWA Research Ltd for much of the science information that contributes to subsequent management actions. Research documents and other information are available publicly on the MFish website <u>www.fish.govt.nz</u> (subject to re-arrangement after August 2009). Resources of interest include:

MFish 2009 Plenary Report: http://fpcs.fish.govt.nz/Science/Plenary.aspx

MFish Longfin eel Fact Sheet, June 2009: <u>http://www.fish.govt.nz/en-</u> nz/info/contactus/Media+Centre/New+Zealand+longfin+eel.htm

MFish Fisheries Plan Information Brief May 2009: http://fpcs.fish.govt.nz/FishPlanComplex.aspx?ID=29

MFish Science Research Documents (search under 'Species' tab for 'EEL'): http://fpcs.fish.govt.nz/Science/ResearchDocuments.aspx

Annual meetings

People interested in attending Science Working Groups to share information and assess the status of this fishery can register their interest with MFish Science staff at the following website link: <u>http://cs.fish.govt.nz/user/CreateUser.aspx</u>. They will be notified of the upcoming meetings.

References

Todd, PR (2009). Management, research, and stock assessment of anguillids in New Zealand. American Fisheries Society Symposium 58: 391-404.

The last word? A rebuttal

by the Tuna Management Group

This response from the Ministry of Fisheries to our call for a moratorium or rāhui was appreciated, but unfortunately the content gives us no reassurance. We have now read many very similar responses from two Fisheries Ministers over the last few years. In reply to the Ministry we would like to reiterate the following facts consistently not addressed by them. It should be noted that these facts are also absent from the recently released Ministry of Fisheries Longfin eel "factsheet³".

³ <u>http://www.fish.govt.nz/en-nz/info/contactus/Media+Centre/New+Zealand+longfin+eel.htm</u>

The facts

- 1. Longfin eels are endemic and listed by the Department of Conservation as a threatened species.
- 2. There has been a consistent decline in the number and size of eels caught commercially over the last 40 years.
- 3. In rivers fished commercially there is a significant male dominance because females are larger and thus taken first, given the minimum size limit. McCleave and Jellyman (2004) state, "The endemic New Zealand longfin eel Anguilla dieffenbachii is overfished, and in southern South Island, New Zealand, rivers have recently become predominated by males"⁴. The supplementary evidence given in Mr Allen's response does little to appease these concerns. The facts not given in his table but derived from it are that there were a total of 5751 males, and 2380 females, giving a 71% male dominance.
- 4. The Quota Management System (QMS) has had no direct influence on protecting stocks, because at no time and in no fishing area has the quota been reached. The Ministry's suggestion that the QMS is indirectly influencing the take of eels is irrelevant. The shelving of quota by Māori (which is increasing in occurrence) due to worries about the sustainability of the fishery is one reason for reduction in fishing effort. But this is surely an indictment of the Ministry's lack of action, rather than something to be touted by them as one of their solutions.
- 5. Both long and shortfin eels in the South Island are treated as one species under the QMS. This is a poor management decision how can one species be protected when the quota is set for two species with very different life histories?
- 6. Almost all New Zealand freshwater fish species are in decline⁵, and more than half of all species are on the threatened species list. There are a multitude of reasons for this decline, and longfins are as susceptible as most other native species, probably more so. What the Ministry of Fisheries must understand is that even with a total ban on commercial fishing we will likely still have much more work to do in order to save longfin eels.

In conclusion, the only action from Minfish to protect longfin eels that we think is likely to have had any real effect is the closing of a small number of areas to commercial fishing; the rest is likely to have achieved very little and continues to do so. If any gains have been made it has been through voluntary reductions in effort due to a lack of faith in the Ministry's ability to protect the fishery.

⁴ McCleave, J. D., and D. J. Jellyman. 2004. Male dominance in the New Zealand longfin eel population of a New Zealand river: Probable causes and implications for management. North American Journal of Fisheries Management **24**:490-505

⁵ Joy, M. K. 2009. Temporal and land-cover trends in freshwater fish communities in New Zealand's rivers: an analysis of data from the New Zealand Freshwater Database - 1970 - 2007 A report to the Ministry for the Ministry for the Environment. Massey University http://www.mfe.govt.nz/publications/water/temporal-land-cover-freshwater-fish/index.html

New Gyraulus species in New Zealand?

by Stephen Moore

A strange new planorbid snail has been cropping up in the Waikato and Auckland regions. At first glance it has similar shape and proportions to our common NZ *Gyraulus corinna*, but this new beast has a distinct keel around the outer rim of the shell (see images). It's been found in large numbers in the



Waikato River and in small Auckland streams, so presumably it's been here for a



while. Images and specimens were sent to the incredibly helpful Siong Kiat from the National University of Singapore, who provided the following in response:

"I have provisionally identified these snails as *Gyraulus spirillus* (Gould, 1859), after examining the specimens and doing some investigative studies based on available literature. The species was described from Japan, but is also found in China, Korea and Taiwan. However, as morphological variations occur, even within populations, *G. spirillus* is also treated as a geographical race or subspecies of the *Gyraulus chinensis* (Dunker, 1848) group that may consist of four or more named species (including *G. spirillus*) due to the lack of distinct anatomical differences."

So look out for this new species if you're sampling slow-flowing or weedy sites.

Bug of the month

Calling all student members

by Kristy Hogsden

What would you like to get from the NZFSS? Are you interested in participating in workshops or panel discussions? How about a chance to get to know other students in the society?

I've taken on the role of student representative on the NZFSS executive – we didn't have one before but there are lots of great reasons why we should. As young scientists, we can bring energy, enthusiasm, and new ideas to the NZFSS and to freshwater research in New Zealand. By having student representation on the executive, we will be able to communicate our ideas, input, and concerns to the society and be more involved.

I would like to organize some workshops or discussion panels on topics that matter to students, to be held at the annual NZFSS conference. Some topics that might be of interest are how to be a successful scientist, communicating your research to the media, how to apply for post-doctoral positions, identifying invertebrates, or how to design an effective poster. Along with these events, we could have a social gathering for students at the beginning of the conference. Think beer at a pub and the chance to meet and get to know students from other universities. We also need to discuss how we would like to manage the role of student representation on the NZFSS

in the future. What do you think of these ideas? I am sure you have some of your own and I look forward to hearing them.

Send me your ideas, input, or concerns about student activities and involvement with the NZFSS. I'll be happy to hear from you. You can reach me by email at <u>kristy.hogsden@pg.canterbury.ac.nz</u> or by phoning 03 364 2987 ext. 7033.

A little bit about me: I am a PhD student with the Freshwater Ecology Research Group at the University of Canterbury. I am interested in the impacts of anthropogenic stresses on ecosystem properties and processes. My current research focuses on food web structure and energy flow in streams impacted by acid mine drainage. I moved to Christchurch from the east coast of Canada last year and am happy to be living close to the mountains in New Zealand.



Photo: Ian Reeve:

An ever-growing freshwater bio-microscope image collection

Stephen Moore analyses hundreds of freshwater biological samples for clients every year. He also has access to a very nice photo-microscope set-up at Landcare Research, so he's always putting interesting specimens aside for the next photo session. The imaging system photographs the subject at many focal layers, and then montaging software compiles the areas of best focus from each shot into a single image.

At last count there were around 3,200 images in the collection, including several hundred images of tropical Asian specimens from Brunei, Papua New Guinea and Singapore. The best of the NZ images are used to update a Landcare Research CD resource designed to help both novices and professionals carrying out freshwater invertebrate monitoring. Recent example images are shown below, and a larger collection can be seen on the web site: http://www.landcareresearch.co.nz/research/biosystematics/invertebrates/freshwater_invertsCD/



Recent microscope images produced with the Landcare Research Automontage system. Top row: *Hyphyrdus* beetle, *Onchohydrus* beetle, *Adversaeschna* dragonfly. Middle row: tanytarsini midge pupa, simuliid black fly pupae, *Triplectides* caddisfly. Bottom row: *Corophium* amphipod, *Paracalliope* amphipod, bully eggs.

Research news

Environment Waikato

Who's living in the little streams?

Bruno David and **Mark Hamer** have been busy testing and developing a standardised protocol for monitoring fish communities in wadeable streams. The protocols are based on US EPA methods but have been modified slightly to be applicable to New Zealand conditions. The protocols have been demonstrated on site to numerous regional council staff across the country. It is hoped that these methods will be adopted by regional councils nationwide for undertaking State of the Environment-type monitoring of native fish communities in 1st-3rd order streams. Mark and Bruno have also been using these protocols in a case study to assess the variability in diversity and relative abundance of fish communities above a perched culvert prior to its retrofitting with mussel spat ropes. By comparing between a control stream and the treatment stream, changes in biodiversity and relative abundance as well as population size structure will be quantified through time.

Keeping an eye on the shallow lakes

Bruno has also been collating the results of Environment Waikato's shallow lakes indicator project for 08/09. This programme, conducted across 17 shallow lakes (comprising various typologies) in the Waikato region, uses three primary indicators to assess lake health. The indicators, which include an assessment of zooplankton (Rotifer TLI), aquatic macrophytes (Lake SPI) and water quality parameters (Burns TLI), are collected three times annually. Other than reporting on the current health of shallow lakes in the region, it is hoped that these indicators can be used to assess lentic responses to management actions such as biomanipulation of exotic fish, removal of exotic aquatic vegetation, and reductions in external nutrient loading.

Keri Neilson has been working with iwi and other stakeholders such as the Department of Conservation (DoC), district councils and Fish & Game towards the development of a Memorandum of Understanding for the management of the Lower Waikato shallow lakes. It is hoped that such an agreement will help focus and co-ordinate effort to improve these very degraded systems. Keri and **Michelle Hodges** have also been working on implementing management recommendations at high priority peat lakes in the region. The past year has focused on weed control, in particular gorse and grey willow, and the upcoming year will involve planting several thousand native plants in managed sites. There are also plans to work towards increasing minimum lake levels at some of these sites to restore surrounding wetlands and assist in the long-term goal of improved water quality.

Monitoring the State of the Environment

Kevin Collier has been involved with **John Leathwick** and **Bruno David** in developing tools to assess the biodiversity conservation value of streams on private land. A number of GIS layers have been assembled and these will be integrated (somehow) to derive a list of highly ranked sites for the Waikato Region. The last three years of stream State of the Environment (SOE) monitoring data is currently being analysed to evaluate any changes in patterns or trends observed since the last report in 2006.

This year as part of our SOE monitoring **Mark Hamer** sampled a set of randomly selected wadeable sites so that we can infer the state of the region's streams with a known level of statistical precision. In association with this we also trialled a probabilistic design for a non-wadeable river network in which we collected macroinvertebrates and measured functional indicators at ten 5th-7th order sites.

Landcare Research

A picture paints a thousand words

Stephen Moore is part of the Built Environments team based at the Tamaki office of Landcare Research. His main areas of work are:

- assessing the effects of urban development on freshwater faunas
- analysing freshwater invertebrate samples sent by clients from all over NZ
- overseas freshwater biological contracts (Brunei, Papua New Guinea and Singapore in recent years).

Stephen continues his interest in photography of freshwater invertebrates and fish – every taxon he finds in his NZ or overseas projects is added to the photo collection, which now contains several thousand images. Example images from the NZ, Brunei and PNG invertebrate work can be seen on the Landcare Research web site:

http://www.landcareresearch.co.nz/research/biosystematics/invertebrates/freshwater_invertsCD/ A summary presentation of some of Stephen's urban development case studies can be seen on the web site:

http://www.landcareresearch.co.nz/publications/researchpubs/Moore_NZFSS_2008.pdf

Horizons Regional Council

The One Plan

Hearings are due to begin in November for the water chapter of the Proposed One Plan, with Land, Biodiversity, and Coast already heard. The Horizons evidence on water will be made public in late August. The Science and Policy Teams are flat-out preparing evidence and coordinating the provision of expert evidence from a number of external providers. This is the culmination of a number of years of combined science and policy work, bringing together Horizons' knowledge on groundwater, surface water allocation and quality, and aquatic biodiversity resources.

Water allocation

Horizons have continued to refine the water allocation framework with **Raelene Hurndell** and **Jon Roygard** working hard with external providers from Cawthron to complete this for One Plan evidence. The "Watermatters" website (http://www.horizons.govt.nz/watermatters/), which automatically reports on water abstraction and consent compliance, recently won an ALGIM innovation award. More importantly, however, is that this site has been very useful in communicating with key stakeholders. Watch out for the impending release of WaterQuality Matters on the Horizons website in the coming month. This will have historic and near-real-time SOE and discharge monitoring data publicly available via the web and will see the completion of a long-term monitoring and reporting project.

Nutrient management, water quality and land use

Two water quality projects were undertaken with external providers and reports are near completion. The first was an update of water quality trend analysis, focusing particularly on nutrients, undertaken by **Rob Davies-Colley** and **Deborah Ballantine** (NIWA). The second project, via an Envirolink advice grant and undertaken by **Roger Young** and **Joanne Clapcott** from Cawthron, explored the use of continuous dissolved oxygen data to assess ecosystem metabolism at five sites.

Maree Clark is working on writing up the data collected from the first 18 months of the monitoring of all significant point source discharges in the region, known as the discharge monitoring programme. This project is closely related to the outputs from the WaterQuality Matters website and expands on the data collected and processed through that system.

Work is ongoing around the FARM strategy approach to managing land-use inputs to water quality in a number of priority catchments. Several tools to aid in the management of farm dairy effluent and nutrient losses from farms are near completion.

31

Aquatic biodiversity

Monthly periphyton monitoring has been ongoing since December 2008, keeping **Carol Nicholson** in the field almost year-round. We expect this monitoring to yield some good results to determine maximum annual biomass at a number of sites throughout the region, enabling us to build a robust, region-specific periphyton model, built on relationships with measured nutrient concentrations, flow and invertebrate communities.

Invertebrate SOE sampling is complete for the year and native fish monitoring is well underway. Horizons have changed invertebrate



View of Mt Ruapehu from the Raetihi Sewage Treatment ponds

biomonitoring methods this year and as a result a larger number of sites are being monitored through a more efficient use of resources. The customisation of the Cawthron-designed CADDIS database for storing freshwater bio-data is progressing well. State of the Environment and Sites of Significance – Aquatic fish monitoring is continuing for the second year running. Testing of the



Fiona Cameron, Mike Joy and Amber McEwan electric-fish the Mangaore Stream

USEPA based method was undertaken on the Mangaore Stream with Horizons staff, Bruno David (Environment Waikato), Fiona Cameron (Hawke's Bay Regional Council), Alton Perrie (GW), Mike Joy and Amber McEwen (Massey). We saw some great native fish and the model has a lot of potential for creating a quantitative dataset for national fish monitoring.

Fish barriers

Following on from the Manawatū River Fish Barrier report by James and Joy (2008), coastal lake outlets, fish habitats and barriers have recently been assessed by Alex James. This project examined about 20 outlet streams running from Manawatū-Whanganui coastal dune lakes within the Foxton Ecological district, and lists priorities for restoration.

Cyanobacteria

We were plagued again with Phormidium sp. growth over the summer low flow in the upper Manawatū and tributaries and some rivers and streams in the Horowhenua. This was the first year that Horizons placed signage at recreational spots, advertised on local radio and alerted the media on a number of occasions. Horizons continues to work with the Cawthron Institute and other Regional Councils to study these organisms and manage the health risk of benthic cyanobacterial blooms.



Phormidium sp. cover in the upper Manawatū River

Environment Bay of Plenty

Janine Barber has taken over the role of Senior Environmental Scientist – groundwater with the departure of **Dougall Gordon**, who is now working for the Hawke's Bay Regional Council.

Where will the waters run dry?

Our planners have been working on the Water Sustainability Strategy for the Western Bay of Plenty, identifying expected water-short areas in the Western Bay of Plenty district over the next 50 years. We have also been considering whether to set ecological flows instead of environmental flows due to the challenge (i.e. time and resourcing) of assigning a flow that caters for recreational, landscape and cultural values.

Staff are looking at methods of tracking water allocated via resource consent through a Water Allocation Database. We are considering (1) constructing a GIS-based database in-house; (2) purchasing an existing database from another council; or (3) amending the consents database. We welcome any advice or suggestions about the database project.

Restoring the Rotorua Lakes

A steady stream of work continues with regards to restoration and research around the Rotorua Lakes. The advocacy of a single sediment capping agent for lake Rotorua is being investigated with research from NIWA and Waikato University on several capping agents and their application.

Monitoring continues on capping agents already deployed in Lake Okaro (Z2 Zeolite) and Lake Okareka (Phoslock). Some trial work and investigation into use of bacteria/enzyme concentrates from waterway restoration has been undertaken. Further investigation into the use of aeration/oxygenation in lake restoration has been undertaken with a PhD candidate interested in studying this further.

Initial signs are that the Ohau Diversion wall is successfully diverting Rotorua water and Lake Rotoiti shows positive signs, although it is early days yet. A trial nitrification-denitrification plant will be built to remove high ammonium levels from a geothermal source to Lake Rotorua. Further potential for alum dosing of inflow to Rotorua is being studied and more dosing is likely in the Puarenga Stream to further remove phosphorus input to the lake. Research by student **Dennis Trolle** shows that climate change is likely to increase eutrophication due to nutrient sediment cycling with increased temperatures.

The Rotorua Lakes kōaro habitat restoration project is gathering momentum. Concerned at the plight of kōaro, Te Arawa recently contracted NIWA to carry out an extensive kōaro survey of the Rotorua Lakes. Since the introduction of trout, smelt and gambusia, kōaro have declined dramatically and in some lake catchments are now extinct. While no longer present in Lake Rotorua, kōaro survive in a handful of its tributaries. These populations are however still subject to predation pressure from trout. Environment Bay of Plenty (EBoP), together with NIWA, the Department of Conservation, Fish and Game, and Te Arawa recently agreed on a proposal in which trout would be excluded permanently from a handful of streams containing outstanding kōaro habitat. Recent surveys have identified two stream populations that may respond well to restoration.

That pesky algae

The monitoring programme for *Phormidium* and cyanobacteria is winding down. The new rapid assessment method for quantifying percentage cover – developed in conjunction with Cawthron (**Susie Wood**) and NIWA (**Cathy Kilroy** and **Karl Safi**) – is easy to use and very effective.

Weeds, weeds, weeds

A find by NIWA scientists of beach-cast hornwort fragments in late March has sparked a major delimitation survey to try to locate the offending plant before it spreads. Although the plant has not been located, an extensive survey already carried out suggests that hornwort isn't yet widespread. The survey is set to continue.

Routine lakeweed surveillance of other weed-free lakes and a LakeSPI survey continues. Also, work is being undertaking to update trend analyses of SOE rivers sites. There have been some worrying trends in nitrate increases and bacterial loading. And lastly, research is being undertaken to delineate the impact of weather events on sediment loading to estuaries.

Taranaki Regional Council

State of the Environment report

The Taranaki Regional Council (TRC) launched its third state of the environment report earlier this year. Entitled *Taranaki. Where We Stand. Report on the State of the Environment 2009*, the report draws together all the state of the environment monitoring undertaken over the past 12 years to provide information on the current state of the environment, environmental trends, pressures on those resources, reasons for the trends observed and the responses made by TRC and the community. The report is available on our website, <u>www.trc.govt.nz</u>, or can be made available by e-mailing <u>publications@trc.govt.nz</u>.

From a freshwater quality perspective the report showed that measures of ecological health, such as the communities of macroinvertebrates living in streams, are good to excellent in the upper catchments where there is more stream bank vegetation cover but only fair further down the catchment where land use is more intense. Over the past 12 years, the ecological health has demonstrably improved at a number of sites, including a number in the middle and lower reaches of catchments, and has not significantly deteriorated at any sites. The region's freshwater usually meets the bacterial guidelines for swimming, although at certain times of the summer (immediately after a flood event) or in certain catchments (such as the small intensively farmed catchments) water quality may not meet national recreational guidelines. In terms of nutrients, Taranaki rivers are naturally high in phosphorus and so do not meet national guidelines, but phosphorus levels are generally on the increase. While nitrogen levels meet guidelines in the upper reaches of catchments, those guidelines are not met further down catchments where impacts of agriculture are more intense.

In terms of freshwater management, the report highlights that over the past five years there has been a decline in the number of point source discharges to surface water from 1,612 in 2003 to 1,413 in 2008, and a high rate of compliance with consent conditions with an average of 96% of farm dairy discharges complying with consent conditions and 93% of consent holders showing high or good levels of performance. There has been a significant growth in the Council's riparian management programme — 2,009 riparian plans have now been prepared (treble the number of plans that had been prepared by 2003, covering a total of 10,818 km of stream bank, and 1.3 million riparian plants have been provided at low cost to riparian plan holders since 1997. This has resulted in landowners fencing 504 km of stream bank through implementing riparian plans, which, added to existing fencing means that 60% of stream bank, on the ring plain under a riparian plan, is fenced.

The cumulative effects of dairy contaminants

TRC has completed an investigation into the rate of assimilation and dilution of the contaminants discharged into a stream from a dairy effluent treatment pond. The study found that the more reactive of contaminants (ammonia and dissolved reactive phosphate) are stabilised within 120 metres of their point of discharge, biochemical oxygen demand and bacteriological contaminants within 450 metres, and the more persistent contaminants such as nitrate and total phosphate within 1500 metres. This indicates that consideration should be given to cumulative effects where there are multiple discharges within a distance of up to 120-450 metres. The study found that rainfall events contribute mass loadings of several contaminants that can be much higher than the mass loadings from individual point sources (dairy effluent treatment ponds) and that riparian planting provides significant additional benefit for water quality, even when pre-existing quality is already high.

Piping small streams

Increasingly in Taranaki, landowners are opting to pipe small streams in a desire to increase pasture availability and decrease the need to fence and plant riparian margins. TRC is undertaking an investigation into this practice in order to better understand the ecological effects and possible cumulative impact of this farming practice. An analysis of aerial photos was undertaken last summer comparing aerial photos of 2001 with those taken in 2007. This indicated that the amount of stream piping is considerably more than that being consented, although a significant proportion of this is historical piping. Utilising this data and recording any new stream loss through the consenting process is currently being investigated, particularly through the use of GIS. The appropriateness of the Regional Freshwater Plan rules in relation to stream modification and effects on biodiversity are also being assessed.

How high, how far — MCI relationships in ringplain streams

TRC in conjunction with Stark Environmental has just completed an evaluation of its extensive macroinvertebrate database in terms of the relationship between MCI and altitude and distance from the stream source on the ringplain. Two generic relationships have been recommended for predicting MCI in ringplain streams based upon altitude and distance from stream source.
TRC freshwater staff

Kimberley Hope, Scientific Officer, co-ordinates the State of Environment Programme and runs a number of resource investigations. **Chris Fowles**, Scientific Officer Water Resources, leads various SEM projects **Bart Jansma**, Scientific Officer Freshwater Biology, juggles fish pass investigations with periphyton SEM and investigations into effects of riparian restoration. **Ray Harris**, Technical Officer, gathers the samples for several SEM programmes. **Fiona Jansma**, Scientific Officer Hydrology, leads the hydro team, although she is heading off on maternity leave soon [Bart's fault!]. **Rosemary Miller**, Policy Analyst, keeps a watchful eye on the freshwater plan, although she is currently embarking on a review of the coastal plan for a time.

Centre for Biodiversity and Ecology Research (CBER), The University of Waikato

Fish, fish and more fish (and a little bit of woody debris)

Brendan Hicks and **Mark Stevens** recently published research on the phylogeny of the New Zealand's bullies (Stevens and Hicks 2009). Brendan's work with **Peter Ellery** on the restoration of floodplain habitats for inanga will appear in the forthcoming issue of NZ Natural Sciences (Ellery and Hicks in press). Brendan's students have been active. **Adam Daniel** has submitted his PhD thesis on movements of koi carp in the Waikato River (Daniel 2009). **Jennifer Blair**, after completing her MSc on identification of koi carp natal areas by otolith microchemistry (Blair 2008), has begun her EBoP-funded PhD on trout and smelt production in Lake Rotoiti. **Ray Tana** has submitted his MSc on torrentfish (Tana 2009). **Brenda Baillie** is continuing her Foundation for Research and Technology (FRST)- and Scion-funded PhD studies on woody debris on streams.

Out on the lakes

David Hamilton hosted two workshops held at the University of Waikato: a water quality modelling workshop from 8-10 December 2008 and a Global Lake Ecological Observatory Network (GLEON) meeting from 1-5 February 2009. Both workshops included a large number of international participants and the GLEON workshop included 55 participants from 17 different countries. **Chris McBride** has been busy with GLEON-related monitoring buoy installations, including lakes Rotoiti, Ngāroto, Tarawera and Tūtira; together with Lake Rotorua these sites provide live monitoring data to the internet. See <u>www.gleon.org</u> for more information about GLEON. **Dennis Trolle** has recently submitted his PhD thesis and is now in the process of publishing the third and fourth paper derived from his research. He is also working with NIWA on setting up a three-dimensional ecological model of Lake Benmore, with the aim of evaluating the potential effects of various degrees of land-use intensification in the catchment of this lake. **Deniz Özkundakci** is now in the final stage of his PhD research and is currently modelling the effects of sediment capping on the ecosystem of Lake Okaro.

Busy writing ...

Kevin Collier has been involved with other co-editors at CBER (**David Hamilton**), Environment Waikato (**Bill Vant**) and NIWA (**Clive Howard-Williams**) in editing a book on the ecology of the Waikato River, and has written a chapter for this on macroinvertebrates in association with **Ian Hogg**. Kevin has also been writing up work on the ecological values of urban streams around Hamilton City, and analysing macroinvertebrate data collected from a survey large rivers in different parts of New Zealand. **Michael Pingram** recently enrolled as a PhD candidate and will be working with Kevin on trophic pathways and energy flows in the Waikato River.

Bugs in the built waters

Ian Duggan is continuing his Marsden-funded research examining invasions in constructed waters (e.g., reservoirs, constructed ponds, retired quarries, etc). MSc students **Claire Taylor** and **Samantha**



The Garwood Valley, Ross Dependency, Antarctica

Parkes are currently working with Ian on this project, exploring factors that lead to preferential invasion of constructed waterbodies. Ian has contributed to the Waikato River ecology book, with sections on zooplankton and geothermal invertebrates. Papers on the effects of the North American cladoceran invader *Daphnia dentifera* in NZ, and a genetic examination of invasion pathways of the Japanese copepod invader *Sinodiaptomus valkanovi* into NZ, will be published

IanHogghasbeencollaborating withIanDuggan

soon.

the genetics of zooplankton species, including analysis of invasion pathways of calanoid copepods into New Zealand's constructed waterbodies. Hogg is also continuing research on the population genetics of Antarctic fauna.



The Shangri La pass, Garwood Valley, Antarctica



Jet setting

Russell Death seems to have spent much of 2008 completing publications that arose from invitations to conferences in Italy and Scotland in 2007. Many of the pressures from consultancy work have reduced during 2008/2009 and this has allowed him more time for work on his own research priorities. Principally this has involved examining nutrient invertebrate relationships in tributaries of the Manawatū River and the interactions with disturbance from flood events. However

he has also continued work on improving RIVPACs predictive models of water quality for the Manawatū/Whanganui region and Bayesian Belief Networks to model fish and invertebrate communities for rivers of the lower North Island. **Fiona Death** continues to manage some of the ongoing projects and oversee sample processing.

Keeping us honest

Mike Joy continues to push the limits of environmental advocacy with countless public talks to an ever increasing range of audiences from one end of New Zealand to another. He is also continuing research on the declining state of our freshwater fish communities and artificial intelligence models to explain the observed patterns.

Primary production, hydrology and inverts in urban streams

Jonathan Tonkin has refocused his PhD from work on the Tongariro Power Development scheme to looking at the interaction between flow and primary productivity on stream food webs in Tongariro and the Hawke's Bay. He has also sampled a similar cross-section of streams in Spain to address similar questions in Northern Hemisphere streams.

Arved Schwendel is progressing well with his PhD on reach scale hydrological determinants of invertebrate diversity. After extensive measurement of a variety of geomorphological and hydrological characteristics from his study streams including some dataintensive GIS modelling he has submitted two manuscripts. He is now progressing on to exploring the biological implications of these measurements.

Kasey Gordon has almost completed his Master's on the linkages between stream invertebrates and urban development in Wellington. Most of the sample sorting and a disturbance experiment have been completed with just the easy write-up stage remaining.

Manas Chakraborty has completed his Master's and is now working for Horizons Regional Council. **Logan Brown** has at last handed in his Master's thesis and can now concentrate full time on his job in the Department of Conservation where he is working with **Hannah Rainforth**, who has also completed her Master's thesis. **Amber McEwen** recently handed in her completed thesis and is working on publishing a paper, as well as continuing her freshwater advocacy work with Mike Joy.

Cawthron Institute Coastal & Freshwater Group

Hellos, farewells, and algal bloom aerosols

A celebration of life this autumn as we welcome the arrival of **Leah Olsen** (**Dean Olsen**'s second daughter), and mourn the loss of friend and colleague **Nick Hughes** (University of Alaska Fairbanks). Nick's association with Cawthron began in 1998 through a common angling interest with **John Hayes** that led to work on salmonid energetic modelling. Over the years many of the CF group had worked with Nick, here and in Alaska, and we will miss him dearly.

On the visitor front, we have had the pleasure of hosting **Professor Dan Dietrich** from the University of Konstanz who is working with **Suzie Wood** on developing tools to identify DNA

signatures from aerosols released from algal blooms. We have also been fortunate to host **Alain Zuur** and **Elena Ieno**, statistical gurus, who have been helping us update our skills in analysing ecological data.

Otherwise we have all been deliciously busy sharing our expert opinion at numerous consent hearings involving water allocation, water 'enhancement' and hydropower. Somewhere in between all the hearings we made time for summer drift-dive sampling, DIDSON samples, and even just plain old bug collecting. We have even made a good start to the publication list for the year, so stay tuned!

Greater Wellington Regional Council

State of the Environment monitoring with some new fishing trials

We recently completed 12 months of testing SoE water samples for anions/cations, total suspended solids (TSS) and, at selected (largely urban) sites, heavy metals. Testing for TSS and heavy metals is to continue at a subset of sites.

This year **Alton Perrie** began trialling SoE fishing methods developed by **Bruno David** (Environment Waikato) in an attempt to increase our ability to report on the state of fish communities within our region and to track changes over time. While only four sites have been fished so far, this programme will hopefully grow in subsequent years and has the potential to provide valuable information for our SoE reporting.

Cyanobacteria

Summer Warr has been busy overseeing weekly testing of microbiological water quality and semiquantitative assessments of periphyton cover at 21 freshwater sites over November to March. Warm, stable weather led to prolific growths of toxic matforming benthic cyanobacteria (*Phormidium* spp.) at a number of sites at times during the summer period. The Hutt and Waipoua rivers were affected the most but, unlike in 2007/08, there were no reports of dog deaths as a result of contact with mats/toxins. However, a young girl became ill with stomach cramps after swimming in a tributary stream of the Waipoua River. Testing of cyanobacteria samples from that stream came back positive for anatoxin at concentrations that were high enough to be linked with the girl's illness, in the opinion of **Dr Susie Wood** from Cawthron. A dry autumn has meant that cyanobactrial mats remained widespread in the Hutt,



Cyanobacterial mats in the Hutt River, Silverstream, autumn 2009

Waipoua and Mangaroa rivers late into the year. However, toxicity sampling undertaken by Cawthron in late March showed only very low concentrations of anatoxin.

Greater Wellington has been funding **Mark Heath**, a Victoria University MSc student investigating species composition and toxicity of benthic cyanobacteria in Wellington's rivers. Mark is currently completing the write-up of his thesis.

Water quality and ecological investigations

Temporary monitoring of temperature and dissolved oxygen is continuing in several lowland Wairarapa streams. In spring 2008, we kicked off a 12-month targeted investigation into poor water quality in the Mangatarere Stream catchment, near Carterton. The Mangatarere Stream catchment has multiple stressors, including reduced flows in summer, intensive landuse (dairy farming and New Zealand's largest piggery), and treated wastewater from Carterton township. The investigation encompasses surface water (with concurrent stream gaugings), groundwater and soil quality sampling. Macroinvertebreate and periphyton sampling has also been conducted and some fish monitoring is planned.

What effect is "flood protection" having?

Many of our larger rivers are routinely "managed" by river engineers for "flood protection purposes" and it seems we know very little about the actual effects these works have on the river ecosystems. Early this year **Alton Perrie** began some preliminary work looking at the effects of instream river works on the Waingawa River, an approximately 20 km-long tributary of the Ruamahanga River. Channel "re-alignment" has occurred in a 4 km reach of this river in the last year. Monitoring so far has involved repeated habitat mapping of a 1 km-long reach before and after significant freshes and before and after bulldozers have been through. Some invertebrate and fish monitoring has also be done. While it is still early days in this investigation it is clearly evident that the habitat has changed significantly (especially pools and deep runs, which have mostly disappeared). How this affects the aquatic ecosystem, and whether a large fresh will reinstate more natural habitat, remains to be determined.

Urban fish negotiate a maze of structures

Our urban streams are often "written off" by the community, consultants, district councils and sometimes even the regional council as having little or no ecological value – therefore there has often been little effort to protect these ecosystems. Earlier this year, **Alton Perrie** and **Summer Warr** conducted a fish survey on a number of urban streams in the Wellington City and wider metropolitan area to increase our knowledge of fish communities in these streams. Surprisingly, despite significant lengths of piping (more than 2 km in some cases), large dams, weirs, grade control structures and perched culverts (not to mention the pollution!) many of these streams contained large populations of banded kōkopu, kōaro, redfin bullies and eels. However, species with limited climbing ability were absent from these streams and it was also apparent that in some streams recruitment of some species was fairly intermittent (only large size classes were present). At one site recruitment appears not to have occurred in the last 15–20 years, with only two fish caught (one kōaro and one banded kokopu > 25 cm), suggesting it will likely become a fishless reach of stream in the near future. The

next step will be to try to work out why fish are getting through some piped sections and not others. The results of these surveys will be used in the ecological classification of urban streams in the Wellington region which will form the basis of tighter rules in the next Regional Freshwater Plan around activities in urban streams.



This kōaro was found in a tributary of the Ngauranga Stream in Khandallah, Wellington City, upstream of a large waterfall and approximately 400 m of piped stream

Hydrology in the Te Hapua wetland

In collaboration with Kapiti Coast District Council, **Douglas McAlister**, **Sheree Tidswell** and Greater Wellington monitoring staff oversaw the installation of monitoring equipment around the Te Hapua wetland system on the Kapiti Coast. This includes water level monitoring of groundwater in the layered leaky aquifer system and open water wetland level. Greater Wellington is supporting a Masters student from Victoria University to study the hydrology of the wetland and groundwater system.

Instream flow assessments for water allocation

Laura Keenan has been continuing work on our instream flow assessment programme, to help in the review of our water allocation and minimum flow policies in the Regional Freshwater Plan



Joe Hay (Cawthron) and Alton Perrie (Greater Wellington) install a rod for an IFIM survey of the Waiohine River

(review due to commence in December 2009). The current investigations include а **RHYHABSIM-based** habitat instream study of the Waiohine River (being carried out with help from of Joe Hay Cawthron), and investigations into flow instream requirements of a small spring-fed Wairarapa stream, Papawai Stream.

University of Canterbury Freshwater Ecology Research Group

From tropical waters in Nigeria, to high country streams in the South Island, and everything in between ...

It's been a big and busy year for the faculty, staff, and students of the University of Canterbury's Freshwater Ecology Research Group (FERG). **Angus McIntosh**, who holds the Mackenzie Foundation Chair in Freshwater Ecology at the University of Canterbury, is leading three projects connected with how the size of a stream and the configuration of stream networks influence aquatic food webs. The first project, being undertaken in Colorado in collaboration with **Bobbi Peckarsky**, is almost finished and has investigated how flow variability across a riverscape affects trophic interactions between fish, grazers and algae. The Mackenzie Charitable Foundation has funded the second project which is investigating the role of stream size in riparian management. This research involves **Jon Harding**, **Dev Niyogi**, and **Michelle Greenwood** (current post-doc). A new post-doc, **Samuel Kibichii**, is about to arrive and will be undertaking this research for the next two years. Angus's final project, funded by the NZ Marsden Fund, is being spearheaded by post-doc **Pete McHugh**; for this project, they will investigate the dynamics of spatially compressed stream food webs.

In addition to ongoing work in Singapore (see below), **Jon Harding** has recently expanded his tropical research interests to Nigeria. He just returned from the highlands of the Mambilla Plateau, where he and **Danladi Umar** (PhD student) are studying the associations between land-use patterns and stream invertebrate diversity. Jon, in collaboration with his students and post-docs (below), also continues to actively research the effects of acid mine drainage on New Zealand's freshwater ecosystems.

Mike Winterbourn has just completed two years of fieldwork in the lower Selwyn River to examine changes in invertebrate populations and the life histories of mayflies. The study period coincided with a prolonged period of low flow and a massive flood whose effects on the fauna have been documented. He is also collaborating with **Tanya Blakely** and **Jon Harding** in a study of Singapore stream invertebrates and with **Steve Pohe** and **Olly Ball** of NorthTec, Whangarei, in a survey of the littoral fauna of 17 lakes on the Aupouri Peninsula, Northland.

Hamish Greig is wrapping up postdoctoral research on methodologies for predicting, managing, and remediating the impacts of mining on stream ecosystems. He's now off to the University of British Columbia where he'll be investigating how climate variability influences the



Jon Harding searches for meiofauna in Doneguals Stream

assembly and resilience of communities, as part of a Canadian Commonwealth Postdoctoral Fellowship. Early into her PhD, **Kristy Hogsden** is studying the effects of acid mine drainage (AMD) on stream food web structure and function on the South Island's West Coast. **Justin Kitto** (MSc student) is researching mechanisms of benthic invertebrate community recovery in AMD-impacted streams on the West Coast; his work explores the significance of colonist pools and re-colonisation pathways to the remediation process. **Jarred Arthur** (MSc student) is currently investigating the influence of riparian and catchment characteristics on stream invertebrate community structure and function. Through his work, Jarred hopes to identify associations between upstream-forest characteristics and stream communities in downstream, non-forested reaches.

Tanya Blakely, in collaboration with Jon Harding, Mike Winterbourn, and Angus McIntosh, is beginning year two of a postdoctoral study funded by the Singapore Government. For this effort, Tanya has obtained samples from a wide variety of Singapore's "streams" (i.e., sites ranging from concrete canals to more natural, forested streams). Using the resulting data, she hopes to develop a biotic index for assessing the biological health of Singapore's running waters. After a short stint travelling overseas in 2008, including a visit to the University of California's Angelo Reserve field station, Frank Burdon has returned to FERG to study the effects of fine sediment deposition on habitat connectivity and food-web connectance in stream ecosystems for his PhD; he'll focus mainly on impacts to the hyporheos, but will also consider how human disturbance propagates through groundwater, stream, and riparian food webs. Duncan Gray (PhD student) continues his work on the importance of groundwater-influenced ecosystems in braided river landscapes. After conducting a South Island-wide faunal survey, as well as several localised experimental and survey studies, he's nearing the end of his studies. Troy Watson (MSc student) has just finished his first season of field work for his thesis research on the influence of light on community and ecosystem processes in North Island caves. Taryn Wilks recently joined FERG to pursue Master's research on the effects of lake-level fluctuation (either manually lowered or wind driven) and salinity variation (through sea water intrusion) on the littoral community of Te Waihora.

ohoto: Kristy Hogsden



Troy Watson and Duncan Gray sample the hyporheic zone in the Hawdon Valley

Michelle Greenwood (post-doc), with the help of a small army, just completed a large-scale survey of 84 streams as part of FERG's five-year study of riparian management on the Canterbury Plains. Also working on the McKenzie Foundation project, Hannah Franklin (Master's student) is evaluating patterns of water quality across a subset of these streams using a network-based approach. Katharina A.M. Doehring (Master's student) has nearly finished her two-year study on the effects of urbanisation on stream fish communities in the greater Nelson area; her work particularly emphasises understanding how man-made barriers (i.e., culverts) affect the upstream movement of whitebait species. Phil Jellyman (PhD student) continues his research about stream size- and disturbance-related effects on the structure of stream

fish communities. Pursuing a similar research theme, **Rebecca Neumegen** (PhD student) is studying the spatial patterns and processes affecting invertebrate community structure in West Coast stream networks. **Amy Whitehead** (PhD student) is finishing up a three-year study that aims to improve conservation efforts focused on whio, the threatened riverine blue duck. Using a variety of analytical approaches, her work identifies areas of high conservation value as well as management strategies (e.g., predator control) that may help to preserve this rare species. **Darragh Woodford** has nearly completed his PhD research on the effects of introduced trout on the population structure and distribution of native non-diadromous galaxiids in South Island high-country streams. Through his work, Darragh hopes to create a management tool that will help predict trout impacts at a landscape scale. And lastly, PhD student **Faradina Merican** is researching the diversity and distribution patterns of cyanobacteria in the catchment of Te Waihora.

Environment Canterbury

Keeping an eye on the big picture

Adrian Meredith continues to run the regional water quality monitoring programmes, regional stream health monitoring programmes, investigations of "Living Streams", and stream restoration programmes. These include a water quality monitoring network of 90 streams and rivers, a lakes network of 25 high country lakes, a region-wide macroinvertebrate and habitat monitoring programme of more than 140 sites (based loosely on US EPA Rapid Bioassessment Protocols), and investigations in catchments that are either degraded through intensified agricultural areas, or are the focus of community group activities (the Living Streams programme). New programmes initiated over this past year have been extending monitoring to Akaroa and Lyttelton harbour streams. Investigations continue in the Waitaki catchment and inland Mackenzie Basin where there are widespread proposals for irrigation and intensification. A huge focus is the continued scoping or development of large scale irrigation schemes across the Canterbury Region.

Shirley Hayward continues to run monitoring and investigation programmes on Lakes Ellesmere (Te Waihora) and Forsyth (Te Wairewa) and their tributaries, programmes looking at irrigation effects in the Amuri basin, pesticide monitoring, and assessing flow issues in catchments such as the Waipara, Hurunui, Waiau and Pareora Rivers. Shirley also continues her interest in algae and periphyton and coordinates ECan's role in the ongoing 'Didymo' surveys and surveillence in the central South Island. Toxic algae is an emerging issue in both rivers and lakes that takes up a lot of Shirley's time over the summer months.

Michele Stevenson runs the summer freshwater bathing beach monitoring programme and is heavily involved in ECan's new Improving Urban Waterway Health programme of work. Various investigations are underway looking at contaminant sources to key tributaries of the Avon and Heathcote rivers in Christchurch, as well as a pilot faecal source tracking study in the Avon River. Stormwater management issues and advice to the consents team about stormwater discharge applications are a significant part of Michele's work. The Christchurch City Council has begun a process of preparing Integrated Catchment Management Plans for stormwater management areas in the city and the first of these has been submitted as a consent application, requiring considerable time to assess.

Lesley Bolton-Ritchie manages the marine component of our programmes and continues to expand the coastal water quality and ecology monitoring programmes. She also maintains the marine bathing beach programme and deals with an increasing number of ocean outfall discharges in the region, as well as applications for other activities in the coastal zone.

Mary Beech manages the ecological field and lab work. Fieldwork is still primarily conducted each summer by Canterbury University School of Biological Sciences students (last summer having included **Josh van Vianen**, **Patrick Lees**, **Kimberley Roberts** and **Jared Arthur**. Mary is also involved in baseline and effectiveness monitoring of the Living Streams restoration programme. Recently Mary has been trialling methods of measuring sedimentation in streams and rivers throughout the region, as accumulation of fine sediment is a significant issue in Canterbury, particularly in low gradient spring-fed streams.

Robyn Croucher continues to coordinate and run the Chatham Islands freshwater and lagoon monitoring and investigations programme as part of Environment Canterbury's contract to

supply regional council services to the Island. Robyn is also involved in surface water quality investigations and monitoring projects for mid and north Canterbury rivers (Ashburton, Waimakariri and Waiau).

Taryn Wilks is involved in numerous surface water quality investigations and monitoring projects, for example, investigating periphyton growth and nutrient limitation in the Hurunui and upper Ashburton catchments and involvement in the high country lakes monitoring programme. Taryn is now also underway with her Master's thesis at the University of Canterbury looking at how lake level fluctuation and salinity influence the food web structure of Lake Ellesmere/Te Waihora.

Graeme Clarke represents the team in the Timaru office and undertakes a considerable amount of field work as part of the surface water monitoring programmes run by Adrian and Shirley. He also helps run the recreational water monitoring programme, the marine sampling programme and periphyton monitoring in South Canterbury.



Michele Stevenson (left) and Mary Beech using the quoer method

The year has seen continuing pressure on water resources for irrigation. The allocation of water resources in Canterbury remains a dominant theme. Proposed hydroelectric and irrigation schemes in the lower Waitaki catchment have challenged the operative Waitaki Water Allocation Plan. A region-wide Canterbury Water Management Strategy is now being developed to ensure that future allocation is coordinated and considers the full range of water uses and values. Integrated catchment management of water resources is becoming a key focus, with an increasing need to understand surface and groundwater relationships and the effects of groundwater abstraction and allocation on surface water instream values. The team provided input to the Regional Environment

Report, released early this year, and is in the process of extending this analytical work to produce an updated technical overview report of the region's surface water quality. A significant piece of work over the past year has been reviewing the water quality objectives and standards in the proposed Natural Resources Regional Plan (Canterbury's regional plan). This has assisted the planners with revision of objectives, policies and rules in response to submissions on the water quality chapter of the plan. Hearings are ongoing.

Environment Southland

Rethinking water in the deep south

Kirsten Meijer and the Environmental Information Division at Environment Southland have been working with NIWA and **Ian Jowett** to establish minimum flows for the Oreti River catchment. We have been continuing our annual fish monitoring and reviewing our surface water quality monitoring network for State of the Environment reporting, as well as analysing long-term trends in water quality data. We have spent time re-evaluating the sanitary inspection and recreational grades for popular freshwater bathing spots in Southland and reviewing the council's Discharge Plan (particularly with respect to discharges of dairy farm effluent to land, cumulative effects, septic tanks and stormwater, and contaminated land). We are currently receiving submissions on our Long Term Council Community Plan and determining 'Sensitive Environments' for the Discharge Plan. This process involves identifying sensitive catchments in the Southland region with respect to surface and groundwater.

Marlborough District Council

Significant sites

The main emphasis for **Peter Hamill** and the Marlborough District Council freshwater team over recent times has been the review of the Regional Policy Statement. A review of Marlborough's wetland inventory is underway using the latest aerial photography and satellite imagery to update the wetland database and assess the significance of the wetlands. A review of sites of significance for Marlborough's aquatic biodiversity is also underway. The Council is moving towards a catchment-based approach for its water quality guidelines and associated water monitoring programme.

Evaluating your stream

Auckland Regional Council (ARC) continues to host two-day training workshops for the Stream Ecological Valuation (SEV) assessment methodology, which are run by **Richard Storey**, **Stephen Moore** and **Martin Neale**. The workshops are well attended, with attendees including environmental consultants, regional and local council staff from around the country and industry representatives.

ARC has begun rolling out the SEV method to our State of the Environment monitoring network, with 34 sites sampled in late summer 2009. A paper based on the SEV method, with **David Rowe** from NIWA as lead author, has recently been accepted for publication in the journal *Environmental Management*.

Missing streams!

We've recently "found" 7000 km of permanent streams in the Auckland Region! Previous estimates of streams in the region have given figures of around 6500 km from the River Environment Classification (REC) and around 9500 km from the NZMS260 map series. A recent study of headwater streams (Wilding & Parkyn, 2006) surveyed 21 km of watercourse, of which only 8.5 km were represented by blue lines on the NZMS260 map series. Using ARC's most recent LiDAR survey,



A net full of grass carp

Richard Storey and his colleagues at NIWA produced a digital elevation model, calibrated using data from Wilding & Parkyn (2006), and ultimately a new stream channel map for the Auckland Region. This exercise has indicated that there are around 16500 km of permanent stream in Auckland. Ongoing testing and refinement of the model will continue. See TR2009/028 from www.arc.govt.nz for further information.

Grass carp released in Lake Wainamu

After a lengthy consenting and approval process, 270 grass carp have been released into Lake Wainamu in an effort to manage *Egeria densa*. The invasive weed, first recorded in the lake in 1991, is now the dominant plant in the lake and has

been identified as the cause of \mathcal{Q} declines in water and ecological quality. It is anticipated that the

fish will take three to four years to consume all the weed, after which time they will be removed to allow native macrophytes to recolonise the lake from the seed bank. Further information is available from **Graham Surrey** (graham.surrey@arc.govt.nz).

Students

ARC operates an MSc student partnership programme, where students receive work experience and support through the duration of their



Marcus Cameron watches as Graham Surrey transfers grass carp into the lake

studies. The following two students have recently submitted their theses:

- **Peter Hancock** (<u>peter.hancock@arc.govt.nz</u>) The effects of stream riparian cover and insect contributions to the diet of banded kokopu (*Galaxias fasciatus*)
- **Claire Cunningham** Trace metal accumulation by *Potamoprygus antipodarum* and biofilms of Auckland streams

There are currently an additional six freshwater students at different stages of the programme; their research subjects will be included in future newsletters.

Staff changes

Kylie Park has taken a year's extended leave to teach English in Japan; Peter Hancock, one of our recent MSc student partnership graduates has accepted a one year contract to replace Kylie during her absence.

References

Wilding, T. and Parkyn, S. 2006. Small headwater streams of the Auckland Region. Volume 1: Spatial Extent. Auckland Regional Council Technical Publication TP313.



State of the Environment reporting

The surface water quality and ecology team have been busy putting together technical reports for the council's five yearly state of the environment summary. The approach has been slightly different this time round by reporting on a catchment by catchment basis. Three catchments have been assessed by **Olivier Auseil** of Aquanet Consulting, two catchment reports by **Sandy Haidekker** and five by **Brett Stansfield**. Brett has also completed a lake technical report for the Western Kaweka Lake which was peer reviewed by Noel Burns of Lakes Consulting.

Upper Mohaka targeted investigation

The upper Mohaka technical report was peer reviewed by **Richard Storey** of NIWA and is currently awaiting final review by **Graham Sevicke-Jones**. Intensified land use in this highly sensitive catchment remains a concern and the council has committed to further research of modelling land use effects on both ground and surface water quality.

Trout food

Fish and Game and the Regional Council completed field work for an envirolink-funded project on trout energetic modelling. **Karen Shearer** and **John Hayes** from Cawthron are our service providers for this; it will be interesting to see what effects (if any) are likely to emanate from this study in terms of fish diet.

LTCCP project planning and budgeting

All LTCCP project proposals submitted to Council have been approved so we will be very busy over the next three years. Projects of significance include:

- 1. Development of nutrient water quality criteria for the control of undesirable periphyton growths for all of our major catchments.
- 2. Determining nutrient limitation status of our major river catchments using nutrient diffusing agar bioassays.
- 3. Catchment sensitivity analysis of our major catchments using the CLUES model.
- 4. Studying the effects of climate change on intermittent streams.
- 5. Determining the effects of returning the Sandy Creek flow path back to Lake Tūtira.
- 6. Assessing the Māori values of our major catchments using the Cultural Health Index.
- 7. Developing a core set of water quality variables that can be used for planning purposes to assess the quality of our rivers and streams.
- 8. Further stream ecological valuation work for our priority catchments in the Napier and MeeAnee urban catchments.
- 9. The usual state of the environment monitoring and reporting of our rivers, lakes and wetlands.

Lake Tūtira monitoring buoy

This monitoring buoy has given us no end of troubles as we have had issues with the data logger itself, public curiosity leading to accidental vandalism (fishing lines caught around temperature sensors) and poor cell phone reception. We recently installed a pressure sensor onto the data logger for our lake water level management purposes which seems to be working reasonably well, but we still have further work to improve the cell phone reception. **Chris McBride** from the University of Waikato is our buoy guru and he is working on a new aerial in the hope that this will improve matters.

Grass carp in Tūtira lakes

Grass carp were released into the Tūtira lakes (Whakapiro, Tūtira and Opouahi) as they are the only lakes in New Zealand that contain the noxious aquatic macrophyte *Hydrilla*. Monitoring of the weed extent is conducted by Biosecurity NZ; our role is to undertake monthly water quality monitoring of the lakes (which we got underway in June 2008). It will be interesting to see what physical and chemical changes are likely to occur as these lakes change from a macrophyte-dominated littoral zone to phytoplankton-dominated then hopefully to native aquatic macrophyte-dominated systems.

Fish barrier monitoring

All barriers to our fish have now been identified within the Heretaunga Plains Catchment area. It's now a matter of getting this data entered electronically so we can undertake some analysis and reporting of barriers in this part of our region.

The Department of Conservation

The positives and negatives of barriers

Jon Bray has designed methodology to test the effectiveness of fish screens for a fish barriers working party with Environment Canterbury. A major win recently has been to secure consent to build a 'positive barrier' to protect a sub-population fragment of Lowland longjaw galaxias (*Galaxias cobitinis*). The barrier will exclude brown trout, which pose a significant threat to this population. Jon has also been advocating for increased funding, effort and awareness for mudfish conservation, creating a new species specific plan and database for this purpose. **Logan Brown** has been working on identifying fish barriers in key waterways and following up with options for remediation, helping with Horizons Regional Council's Sites of Significance – Aquatic monitoring and advocating for freshwater protection through the RMA processes.

It was thiiiis big ...

Emily Atkinson has been monitoring the health of eel populations in the Awarua/Waituna wetlands in Southland. The wetlands are currently the main focus of work along with advocacy for the protection of freshwater fish and their habitat through the RMA. **Hugh Robertson** has re-familiarised himself with NZ wetlands and is now immersed in the Arawai Kākāriki project, coordinating research ranging from submerged macrophyte monitoring in Waituna Lagoon to field surveys in the bogs and swamps of Whangamarino.

Muddy fish, fishy mud

Mike Lake has been preparing for mudfish monitoring and surveys which will be undertaken in spring. These will be conducted using the new guidelines available through the University of Waikato CBER site (http://cber.bio.waikato.ac.nz/publications.shtml). **Dave West** is returning to his fish-centric roots now the Freshwater Section of the Aquatic and Threats unit is back to a full complement. Expect more work on trying to help native fish and kill exotic fish which dare stray into places they should not be. **Hannah Rainforth** has been researching potential inanga spawning habitat in the Whanganui Conservancy. She is up to her knees in mud and tall fescue.



Emily Atkinson sizes them up at Waituna

Purging the pests

Helen McCaughan has been ridding the world of pest fish, with eradication of rudd in Centennial Lake, Timaru, and continued surveillance and monitoring at selected sites around Canterbury. She continues her advocacy work through contact with schools and putting on displays at events.

Time for holidays, new beginnings and homecomings

Amy McDonald is on leave for six months, but before taking off on her adventures she managed to show important Northland lakes and wetlands to 86 classrooms around the country through virtual field trips and the Wet Feet programme. **Natasha Granger**, our tireless advocate for freshwater issues, has recently taken maternity leave. **Jane Goodman** has been seconded to National Office to fill Natasha's role. After a 3 year stint in Fiji as Chief Technical Advisor for the IUCN Regional Office for Oceania, **Philippe Gerbeaux** has recently resumed working with the Department as Senior Technical Support Officier Freshwater, based in the Christchurch Research and Development Regional Office. Key tasks for this year will be to lead the biosecurity component of the freshwater programme, contribute to the continuation of WONI and to support policy work.

Giant giants

Over the last year presenting evidence on behalf of DoC at hearings for the proposed Matiri and Wairau hydroschemes has taken up a lot of **Martin Rutledge's** (Nelson Freshwater TSO) time. On the fishier side of things survey work by DoC, other agencies and researchers continues to turn up some interesting finds and increase our knowledge. The discovery of a new species of freshwater mussel in a Golden Bay stream, *Echyridella onekaka*, is an example. For those into big fish stories check out the picture of a giant kōkopu captured in an Abel Tasman stream last year – it's over 40 cm long.



Fat fish

Michel Dedual has been collaborating with GNS Institute to research the distribution of stable isotopes in the organisms along the trophic chain in Lake Taupō. Michel and **Elizabeth Heeg** are also working with Victoria and Montana Universities, exploring the genetic make-up of rainbow trout in the Taupō catchment as part of Elizabeth's PhD thesis. The initial results are exciting, particularly with respect to the genetic makeup of early versus late spawning trout.

Michel in collaboration with the University of Washington and Cawthron Institute has also been involved in a project looking at the prey-predation relationships between rainbow trout and their prey in Lake Taupō.

Michel has also been gathering data to describe the seasonal wellbeing of adult rainbow trout in Lake Taupō measured by the fat content of fish caught by anglers. Another research project now into its third year involves PIT-tagging of adult and brown trout returning to spawn. This has allowed the Department to follow the survival and growth of individual fish and is returning some very useful data, particularly for the Lake Otamangākau fishery. Michel has also been reviewing and collating information on methods to establish environmental flows in rivers and on the impacts of hydro-peaking regimes on aquatic ecosystems.

NIWA

Developing a wetland MCI

Alastair Suren has been involved in a variety of FRST-funded and commercial work for a variety of clients. Most of his work is currently examining invertebrate communities in lowland wetlands, and he and **Janine Wech** recently completed an extensive national survey of 154 wetlands throughout the country. These samples came from a variety of wetlands, ranging from those in unmodified pristine catchments, to highly modified ones in urban or rural landscapes. The samples are currently being processed by **Paul Lambert** and **Angie Lambert**, with the ultimate aim (with **John Stark**) of seeing whether a wetland macroinvertebrate community index score can be developed.

Quantifying 1080 in streams

Another investigation that has taken some of **Alastair Suren's** time is modelling the fate of 1080 baits that land in catchments to determine the maximum likely concentration of 1080 in stream water following an aerial application. This work is being done with NIWA hydrologist, **MS Srinivasan**, and we will be doing a field calibration of the model this winter. Finally, he is continuing on with his work in the Christchurch Wastewater Treatment Ponds (with Janine Wech) in examining ways to control nuisance swarms of midges during summer.

Didymo and groundwater

Cathy Kilroy is still almost fully occupied with work connected with *Didymosphenia geminata* (didymo). The most exciting recent project is a collaboration with **Prof. Max Bothwell**, Environment Canada, running a series of experiments to try to find out why didymo doesn't grow in some spring-fed creeks. The results to date indicate that there is nothing in spring creeks that kills didymo. We still have to fully explore the hypothesis that there might be something missing from groundwaters, which didymo needs. This work has been funded by NIWA (Capability Funds), NZ Fish & Game, and the Department of Conservation, and will continue in 2010. On the non-didymo front Cathy has been working with **Alastair Suren** looking at patterns of algal community composition in lowland wetlands, and their use as indicators of wetland condition, compared with invertebrates.

He ika, he ika e

Bob McDowall is looking forward to the pending completion of a book on the place of freshwater fishes in Māori culture and economy, and is still struggling with a large manuscript that draws together the historical and ecological biogeography of the native freshwater fish fauna. No resolution is in sight for the taxonomic status of the *Galaxias vulgaris* species complex, quite probably a consequence of close relationships and much local adaptation. The place of diadromy in fish ecology and evolution continues as a strong interest.

Flowing in

JoAnna Lessard is a new river ecologist in New Zealand who joined NIWA in April. JoAnna's primary research interest is studying the influence of water management on stream habitat and community structure, particularly aquatic macroinvertebrates. Her main focus this year will be working as a partner in the new Lake Ellesmere Tributary Research Area (LETRA). LETRA is providing scientists, graduate researchers and interns with a data-rich system for environmental research, and a setting that promotes collaboration and multidisciplinary studies. The initial aims for NIWA scientists are to characterise hydrological processes in aquifers and streams, build a hydrological framework for ecological research, and begin long-term studies of flow-biota interactions. JoAnna is coleader of two of the flow-biota studies, "Macrophyte-flow interactions and their ecological effects in lowland streams" and "The influence of macrophytes in groundwater dependent streams on the macroinvertebrate community".

Last pool standing

Laura Drummond has been focussing on her master's research with the University of Canterbury and NIWA. Laura's research focuses on the ecology and hydrology of the last wetted refuge in a retreating river – scour pools. One of her objectives is to look at how flow cessation and the gradual drying of pools affects macroinvertebrate emergence and development. In the field, she has sampled the ecology through benthic and emergent methods and measuring hydrology and water chemistry in pools. She has also conducted a mesocosm experiment to look in finer scale at the patterns observed in the field.

How much is too much?

Scott Larned is guiding NIWA's Water Allocation Programme into its 7th year, and is gearing up for the next FRST bidding round. A new initiative for our programme this year is the establishment of an intensive research area in the Lake Ellesmere catchment. Studies of stream-aquifer exchange, macrophyte ecology, and flow-biota interactions are just getting underway. A joint scientist exchange programme with the French institute CEMAGREF is continuing – the focal areas for this programme are hyporheic ecology and the ecohydrology of intermittent rivers in New Zealand and France. When not administering, conniving, and taking a rare sabattical, Scott is continuing research in hydrodynamics, invasive species, water quality, flow regimes, periphyton, food web analysis, etc. A clear case of chronic short attention span.

Maurice Duncan presented hydrological evidence on behalf of Environment Canterbury (Ecan) to the Central Plains Water Enhancement Scheme Hearings. He has completed a 2D hydrodynamic modelling study of the Waiau River, North Canterbury, where the relationship between flow and instream habitat was reported. Again for ECan, Maurice has completed a review of the B allocation block regimes for the Waimakariri and Hurunui Rivers. A common element among the studies was the recommendation of a gap between the A and B allocation blocks so that any hydrograph flatlining occurring due to B block allocations was at a flow rate that enhanced instream values. The Waimakariri 2D modelling was extended to look at bed disturbance for flows up to the mean annual flood to provide input into the benthic invertebrate time series model being developed by **Doug Booker** (NIWA), **Dean Olsen** and **John Hayes** (Cawthron).

Doug Booker has been undertaking research on eco-hydraulics and environmental flow setting, mostly in relation to fish and fish habitat. Doug led a project jointly funded by the Department of Conservation and Foundation for Research Science and Technology to compare environmental flow methods. This involved comparison of the results gained through application of two tools used to inform the environmental flow setting process for 10 example rivers with respect to New Zealand's legislative framework. These tools were: a) physical habitat modelling, which can be used as part of the In-stream Flow Incremental Methodology (IFIM); and b) the indices of hydrologic alteration, which can be used to implement the Range of Variability Approach (RVA). Doug has also developed a method for predicting width-discharge relationships at ungauged sites.

Roddy Henderson is busy with the National Databases: Water Resources and Climate programme. This programme, which runs networks of recording sites for climate, water resources and water quality across New Zealand, and contributes data to archives that are freely available to the public, was awarded an extra \$1.196M in April. In October the programme will come under a

long-term contract specific to backbone infrastructure, under the 'Backbone Research and Science Scheme'. Other work supported by Capability Funding has included investigation of real time QA techniques for hydrology data, and development of a tool for assessing small hydro potential at ungauged locations, which incorporates the results of previous work in mapping hydrological statistics. The tool includes modelled estimation of environmental flows and scheme capacity, and allows for flood effects. A first version of the tool will be available on the NIWA web site in the near future. Roddy also continues consulting work with a number of power companies involving assessment of hydrology for new schemes and the impact of planning changes on existing ones.

Mama Eel vs. power scheme ...

Don Jellyman has continued with some eel research, as well as substantial involvement with the hydro industry that has involved investigations on a number of rivers, and presentation of evidence at both regional hearings, tribunals, and the Environment Court. A highlight has been the collaborative work with Meridian Energy of tracking migratory female longfin eels in Lake Manapōuri (with **Jacques Boubée**, NIWA, Hamilton; **James Holloway**, Meridian), with many eels still able to find their way out of the lake despite the major flow diversion to the power station. In conjunction with colleagues and local iwi, Don has recently completed a survey of eel and lampreys in the mataitai area of the Mataura River, and continues to oversee NIWA's contracted freshwater research for the Ministry of Fisheries.

Billy the fish: Damn that take

Marty Bonnett continues to spend much of his time assessing the environmental effects of either hydro dams or irrigation intakes on New Zealand's freshwater fish, and typically this has resulted in his presenting evidence at a variety of hearings. There has still been some time for writing up studies on benthic fish in Te Waihora, running electric fishing machine operator training courses around the country, and trying to manage the NIWA fish group in Christchurch.

Shock news - electrofishing not as good as we thought

Eric Graynoth is investigating the efficiency of electric fishing with **Marty Bonnett** and **Don Jellyman**. Preliminary mark recapture and day/night depletion studies in Pigeon Bay Stream indicated efficiency was lower than has been previously recorded, especially for small fish. We found the stocks of small eels, bluegilled, redfinned, upland and common bullies and torrent fish were replenished at night by fish which lived deep within the substrate during the day. Further studies will be undertaken this summer in a variety of habitats to determine the biases present in standard daytime electric fishing. He is also researching longfin eels, sockeye salmon, environmental flow assessment methods and the potential impacts of lower Waitaki River power and irrigation schemes.

This is my rock, you bully

Shannan Crow is currently working on the morphology and taxonomy of non-diadromous galaxiids in the South Island. Shannan is also working on niche use of freshwater fishes and how this is altered by inter-specific competition and various spatial and temporal scales.

A new invader?

Karen Robinson has spent the year continuing to carry out work on *Didymosphenia geminata*, testing chemical eradication and checking samples for various local organisations around the South Island for new incursions. Non didymo-related algae identification has also been carried out. Karen completed zooplankton identification on archived samples from Lake Taupō dating back to 2000, and picked up a possible new invading zooplankton species from a number of South Island lakes, in conjunction with **Ian Duggan** at the University of Waikato and **Carolyn Burns** at Otago University. Karen has also been moonlighting as a marine zooplankton analyst, working on samples from around NZ and the Antarctic.

30 years of restoration data

Clive Howard-Williams has been writing in his "spare" time between duties as NIWA's Chief Scientist for Freshwater and Coasts. He has just completed a write up with **Stu Pickmere** of the 30year data set on the Whangamata Stream at Lake Taupō. The stream was retired from sheep pasture in 1976 and a riparian vegetation and water quality data set has accumulated since then. This is one of the longest continuous records of restoration change available and is currently being reviewed by DoC for publication in their Science for Conservation series. Clive continues to oversee NIWA's wider range of FRST and consultancy projects in freshwater and is on several government and regional council committees and advisory panels in the freshwater, coasts and Antarctic arenas.

The N in wetlaNds

Kit Rutherford and team have developed a catchment-scale nutrient model, ROTAN, and applied it in Rotorua (for EBoP) and Taupō (FRST funded research). The Taupō model captures the results of recent NIWA field studies on the role of small natural wetlands in attenuating nitrogen, and GNS work on groundwater lags. The Rotorua model is providing input data for Waikato University's lake models.

Bob Wilcock continues to maintain the water quality and quantity aspects of the "Best Practice Catchments for Sustainable Dairying" project and has co-authored an article on the Taranaki catchment (Wai-o-kura) in the special restoration issue, vol. 43 (3), of NZ Journal of Marine and Freshwater Research . Bob's current interests include emissions of N₂O from agricultural waterways in general, and wetlands in particular. A review of the benefits and costs of greenhouse gas mitigation measures in intensive pastoral agriculture has recently been published (**Wilcock, R.J.**; **Elliott, S.**; **Hudson, N.**; **Parkyn, S.**; **Quinn, J.** 2008: Climate change mitigation for agriculture: water quality benefits and costs. Water Science & Technology 58(11): 2093-2099). Along with five others from New Zealand, he attended the Society of Wetlands Scientists meeting in Madison, Wisconsin during 22-26 June 2009, and gave a presentation at the Symposium on wetland ecosystem services in agricultural landscapes, comparing approaches in USA and New Zealand. Travel was sponsored by MFAT and MoRST.

Is a pine fine? Is ice nice?

Aslan Wright-Stow has continued working on the impacts of exotic forestry harvesting on streams in the Coromandel with **John Quinn**. He is also continuing his work on the impacts of calcium magnesium acetate (CMA) for highway de-icing applied to the Desert Road, and roads in the South West Central Plateau and Hawke's Bay regions. He recently extended this research by looking at the effects of CMA on dissolved oxygen in a lowland stream. Aslan presented a paper at the NABS meeting in Salt Lake City, looking at the relative influence of landuse and water source on cave and spring ecosystems. He has continued to work on a range of marine and lakes projects in his capacity as a scientific diver.

You guessed it - it's getting worse

Rob Davies-Colley has stepped down from management of the Aquatic Pollution Group at NIWA in Hamilton. He has since taken on the role of spokesperson for the National Rivers Water Quality Monitoring Network (NRWQN), which had its 20th birthday in January 2009. (Rob was one of the original designers of the NRWQN two decades ago.) A major trend analysis using the NRWQN database was conducted by Rob and NIWA water quality scientist, **Deborah Ballantine**, for the Ministry for the Environment (http://www.mfe.govt.nz/publications/water/water-quality-trends-<u>1989-2007/index.html</u>). We found that water quality in NZ continues to decline overall. Despite a major cleanup of point source pollution, diffuse pollution continues to increase as pastoral farming intensifies and expands. Rob's ongoing research includes aspects of microbial water pollution and stream ecology (he recently modelled the recovery of shade-temperature and wood regimes following riparian re-afforestation). He has also undertaken a small foray back into aquatic optics with a paper on estimating light attenuation in river waters. Rob is on the executive committee of the International Water Association (IWA) Specialist Group on Diffuse Pollution, and plans to host that group's 15th international conference (DIPCON11) in Rotorua, New Zealand, in September 2011.

There's something in the water

Graham McBride has continued to lead the modelling project "Campylobacter and the environment: establishing the link with public health". Good progress is being made in determining sources, transmission and exposures (including environmental exposures) for this troublesome pathogen.

Those pesky Hydrobiosidae

Brian Smith has been jet setting around Europe and has recently returned from the 13th international Symposium on Trichoptera held in Bialoweiza, Poland. Brian has also recently received funding to finish off the guide to those pesky Hydrobiosidae that he and **John Ward** initiated a few years ago.

Eke tangaroa

Ngaire Phillips continues her involvement in the ecology of customary fisheries in the Rotorua (Te Arawa) lakes in her newly funded FRST programme, "Barriers to environmental sustainability for iwi managers". This year sees the completion of the first stage of a manipulative in-lake experiment which aims to investigate the interactions between exotic macrophytes and the culturally important species, koura (freshwater crayfish) and kakahi (freshwater mussels). We have characterised baseline koura populations and a range of physico-chemical measures at four sites each in lakes Rotoiti and Rotomā and have recently cleared experimental macrophyte plots. We have also completed a series of lab trials to examine the effect of toxic cyanobacterial blooms on juvenile kākahi and koura. These experiments, led by Sue Clearwater and Susie Wood (Cawthron) represent the first of their type in NZ. Ngaire has also been involved in a two-year ARC funded project examining inter-generational effects of contaminants on freshwater clams. This has involved undertaking a challenging selection experiment (with Glenys Croker and Anathea Albert) and involves ecological and genetic investigations. The results showed a clear shift in genetic composition between populations of adult and juveniles clams subject to stormwater contamination. Ngaire also continues leading the Health Research Council Funded programme on contaminants in traditional foods. And on top of all that she maintains her interest in invertebrate species traits. Ngaire also recently took over as Group Manager of the Freshwater Ecology group at NIWA Hamilton.

Stream Bug vs. Estuary Worm

David Reid moved over from Australia to join NIWA's Freshwater Ecology group in Hamilton in March of this year. Since then he has primarily been working on a project comparing effects of sedimentation on benthic communities in streams and estuaries. This work has produced some interesting results, with estuarine communities appearing to be more sensitive to sediment than stream communities. David has also recently been involved in assessments of the state of the Rangitaiki River, and the collection of benthic invertebrates and CPOM from caves in Waitomo.

Some recent publications by NZFSS members

Barquin, J., and Death, R.G. 2008. Physical and chemical differences in karst springs of Cantabria, northern Spain: do invertebrate communities correspond? *Aquatic Ecology* 43: 445-455.

Burger, D.F., Hamilton, D.P., and Pilditch, C.A. 2008. Modelling the relative importance of internal and external nutrient loads on water column nutrient concentrations and phytoplankton biomass in a shallow polymictic lake. *Ecological Modelling* 211: 411-423

Collier, K.J. 2008. Linking multimetric and multivariate approaches to assess the ecological condition of streams. *Environmental monitoring and assessment*.

Collier, K.J. 2008. The Average Score Per Metric: an alternative metric aggregation method for assessing stream health. *New Zealand Journal of Marine and Freshwater Research* 42: 367-378.

Collier, K.J., Aldridge, B.T.M.A., Hicks, B.J., Kelly, J., Smith, B.J. in press. Ecological values and restoration of urban streams: constraints and opportunities. *New Zealand Journal of Ecology*.

Collier, K.J., Clarkson, B., Aldridge, B., Hicks, B. 2008. Can urban streams be restored? Linking vegetation restoration with urban stormwater mitigation. Proceedings of the NZWWA Stormwater Conference, Rotorua, New Zealand Water & Wastes Association.

Collier, K.J., Hamer, M., Chadderton, W.L. 2009. A new artifical substrate for sampling deep river macroinvertebrates. *New Zealand Natural Sciences*.

Death, R.G. 2008. Effects of floods on aquatic invertebrate communities. *in* J. Lancaster and R. A. Briers, editors. Aquatic Insects: Challenges to Populations. CAB International, UK.

Death, R.G. 2008. Margalef's Index. Page 2209 *in* S. E. Jorgensen and B. D. Fath, editors. Encyclopedia of Ecology. Elsevier B.V., Oxford.

Death, R.G., Collier, K.J. in press. Measuring stream macroinvertebrate responses to gradients of vegetation cover: when is enough enough? *Freshwater Biology*.

Ellery, P.M. and B.J. Hicks. in press. Restoration of floodplain habitats for inanga (*Galaxias maculatus*) in the Kaituna River. *NZ Natural Sciences 34*.

James, A.B.W., Dewson, Z.S. and Death, R.G. 2008. Do stream macroinvertebrates use instream refugia in response to severe short-term flow reduction in New Zealand streams? *Freshwater Biology* 53: 1316-1334.

James, A.B.W., Dewson, Z.S., and Death, R.G. 2008. The effect of experimental flow reductions on macroinvertebrate drift in natural and streamside channels. *River Research and Applications* 24: 22-35.

James, A.B.W., Dewson, Z.S., and Death, R.G. 2009. The influence of flow reduction on macroinvertebrate drift density and distance in three New Zealand streams. *Journal of the North American Benthological Society* 28: 220-232.

Mi, W.J., Zhu, D.W., Zhou, Y.Y., Zhou, H.D., Yang, T.W., Hamilton, D.P. 2008. Influence of *Potamogeton crispus* growth on nutrients in the sediment and water of Lake Tangxunhu. Hydrobiologia 603: 139-146

Paul, W., Hamilton, D. P. and Gibbs, M. M. 2008: low-dose alum application trialled as a management tool for internal nutrient loads in Lake Okaro, New Zealand. *New Zealand Journal of Marine and Freshwater Research*. 2008, 42: 207-217

Paul, W.J., Hamilton, D.P., Gibbs, M.M. 2008. Low-dose alum application trialled as a management tool for internal nutrient loads in Lake Okaro, New Zealand. *New Zealand Journal of Marine and Freshwater Research*, 42: 207-217

Robson, B. J., Webster, I. T., Hamilton, D. P., and Chan, T. 2008. Ten steps applied to development and evaluation of process-based biogeochemical models of estuaries. *Environmental Modelling and Software*, 23: 369-384

Robson, B.J., Bukavechas, P., and Hamilton, D. P. 2008. Modelling and mass balance assessments of nutrient retention in a seasonally-flowing estuary (Swan River Estuary, Western Australia). *Estuarine, Coastal and Shelf Science* 76: 282-292

Rowe, D.K., Parkyn, S., Quinn, J., Collier, K., Hatton, C., Joy, M., Maxted, J., Moore. S. in press. Stream Ecological Valuation (SEV): a rapid method to score the overall value of stream reaches. *Environmental Management*.

Segal, R.D., Waite, A.M. and Hamilton, D.P. 2009. Nutrient limitation of phytoplankton in solar salt ponds in Shark Bay, Western Australia. *Hydrobiologia* 626: 97-109.

Stevens, M.I. and Hicks, B.J. 2009. Mitochondrial DNA reveals monophyly of New Zealand's *Gobiomorphus* (Teleostei: Gobioidei: Eleotridae) amongst a morphological complex. *Evolutionary Ecology Research* 11: 109-123

Tanentzap, A., Yan, N., Keller, B., Girard, R., Heneberry, J., Gunn, J.M., Hamilton, D.P., Taylor, P.A. 2008. Cooling lakes while the world warms: Effects of forest re-growth and increased dissolved organic matter on the thermal regime of a temperate, urban lake. *Limnology and Oceanography* 53: 404-410

Trolle, D., Hamilton, D.P., Hendy, C. and Pilditch, C. 2008. Sediment and nutrient accumulation rates in sediments of twelve New Zealand lakes: influence of lake morphology, catchment characteristics and trophic state. *Marine and Freshwater Research* 59: 1067-1078

Trolle, D., Zhu, G., Hamilton, D.P., Luo, L., McBride, C. and Zhang, L. 2009. The influence of water quality and sediment geochemistry on the horizontal and vertical distribution of phosphorus and nitrogen in sediments of a large, shallow lake. *Hydrobiologia* 627: 31-44.

Wood, S.A., Jentzsch, K., Rueckert, A., Hamilton, D.P. and Cary, S.C. 2009. Hindcasting cyanobacterial communities in Lake Okaro with germination experiments and genetic analyses. *FEMS Microbiology Ecology* 67: 252-260.

Young, R.G., Collier, K.J. in press. Contrasting responses to catchment modification among a range of functional and structural indicators of river ecosystem health. *Freshwater Biology*.

Theses completed

Blair, J.M. 2008. An investigation of koi carp (*Cyprinus carpio*) movement in the Waikato region using laser ablation otolith microchemistry. MSc thesis, University of Waikato, Hamilton. 107 p.

Brown, L.A. 2009. Habitat determinants and predatory interactions of the endemic freshwater crayfish (Koura, *Paranephrops planifrons*) in the Lower North Island, New Zealand. MSc, Massey, Palmerston North

Chakraborty, M. 2008. Spatial pattern in macroinvertebrate communities in headwater streams of New Zealand and a multivariate river classification system. MSc, Massey, Palmerston North.

Daniel, A.J. 2009. Detecting exploitable stages in the life history of koi carp (Cyprinus carpio) in New Zealand. PhD thesis, University of Waikato, Hamilton, New Zealand.

McEwen, A. 2009. Fine scale spatial behaviour of indigenous riverine fish in a small New Zealand stream. MSc, Massey, Palmerston North

Rainforth, H.J. 2008. Tiakina kia ora. Protecting our freshwater mussels. MSc, Victoria University of Wellington, Wellington

Tana, R. 2009. Population dynamics and migrational history of torrentfish (*Cheimarrichthys fosteri*, Haast 1874) in two Waikato streams on the North Island of New Zealand. MSc thesis, University of Waikato, Hamilton. 83 p



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 and Honorary Membership

Rules

- 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. Closing dates for nominations are 30 June of each year. 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.

S.I.L. 1987 Trust Fund Awards

The Society administers grants for overseas travel by young scientists and visits by overseas scientists through the S.I.L. 1987 Trust Fund. The two grants are the S.I.L. 1987 Trust Fund Travel Award and the S.I.L. 1987 Trust Fund Guest Lecturer Award.

S.I.L. 1987 Trust Fund Travel Award

Objective: To enable outstanding young scientists to attend overseas conferences, seminars or workshops, or to visit institutions to learn techniques, develop expertise, use equipment, collections or library facilities not available in New Zealand.

Eligibility: Applicants shall be New Zealand-based members of the New Zealand Freshwater Sciences Society. Preference will be given to candidates less than 35 years of age, or who graduated in the previous 10 year period.

Previous awards: No person shall be ineligible for an award because of a previous award.

Applications: Applications shall be made on the electronic form available either on the website (http://freshwater.rsnz.org) or from the Secretary of the New Zealand Freshwater Sciences Society (b.sorrell@niwa.co.nz) by the date shown below.

Applicants will need to state their aims and objectives, submit a draft itinerary, supporting letters from relevant institutions, overseas contacts, a curriculum vitae, a list of publications, a draft budget showing other sources of financial support obtained or being sought, and name two referees.

Criteria: Applicants will be judged on the benefits that are likely to accrue to the candidate and limnological research in New Zealand as a result of the trip.

Reporting: The successful candidate will submit a trip report for publication in the Society's newsletter. Where appropriate, the successful candidate will also describe the work done during the trip at the next annual meeting of the Society.

Award: The award will cover the costs of travel (up to 100% for the grantee only) together with a contribution towards accommodation and living expenses up to \$2000.00 or such higher sum that may be determined by the Trustees.

Tenure: Such period/periods as the Committee thinks fit.

Frequency: The award may be made annually provided there are suitable candidates. The Committee may decide not to make an award in any particular year.

Closing date: Applications must be submitted to the Secretary/Treasurer by 30 November in any year for travel the following year. All material (including letters of support from referees) must be submitted electronically as pdfs or Word documents to the Secretary/Treasurer. Material received only as hard copy cannot be considered.

S.I.L. 1987 Trust Fund Guest Lecturer Award

Objective: To provide financial support for visits to and/or within New Zealand by eminent overseas limnologists, whose visits will benefit New Zealand's limnological research community as a whole.

Eligibility: Candidates should be eminent in some field of limnological research and have the ability to make a contribution to limnological research in New Zealand.

Previous awards: No person shall be ineligible for an award because of a previous award.

Applications: Applications shall be made on the electronic form available either on the website (http://freshwater.rsnz.org) or from the Secretary of the New Zealand Freshwater Sciences Society (b.sorrell@niwa.co.nz) by the date shown below.

Nominations: Candidates must be nominated by a financial member of the NZFSS who will submit on their behalf a letter outlining the aims and objectives of the trip, a curriculum vitae, a list of publications, a draft itinerary, a draft budget showing other sources of finance if any, and the names of two referees.

Criteria: The candidates shall be judged on their eminence in the field of limnological research and their ability to make a contribution to New Zealand's limnological research community. Visitors will be expected to address the annual meeting of the NZFSS and to visit several New Zealand research institutions including universities.

Reporting: The successful candidate will submit a trip report for publication in the Society's newsletter.

Award: The award will cover the costs of travel (up to 100% for the grantee only) together with a contribution towards accommodation and living expenses up to \$2000.00 or such higher sum that may be determined by the Trustees. In determining the value of the award the Committee shall take into account the fact that overseas scientists are often better able to receive financial assistance than New Zealanders. **Tenure:** Such period/periods as the Committee thinks fit.

Frequency: The award may be made annually provided there are suitable candidates. The Committee may decide not to make an award in any particular year.

Closing date: Applications must be submitted to the Secretary/Treasurer by 30 November in any year for Guest Lecturers proposed for the following year's conference. All material (including letters of support from referees) must be submitted electronically to the Secretary/Treasurer as pdfs or Word documents. Material received only as hard copy cannot be considered.

Minutes and reports

Minutes of the 41st Annual General Meeting of the New Zealand Limnological Society Inc. (Trading as NZ Freshwater Sciences Society)

The AGM was held at the Quality Hotel Plymouth International, New Plymouth. The meeting opened at 12:50 pm, Thursday 27th November 2008.

Present: Kevin Collier, President; Marc Schallenberg, Elected Member; Neil Deans, Immediate Past President; Janine Wech, assistant Secretary-Treasurer; and 46 members.

- 1. Apologies: Adrian Meredith, Brian Sorrell, Trevor James, Gerry Closs, Ngaire Phillips, Chris Arbuckle.
- 2. Minutes of the 40th AGM:

Matters arising from minutes: Dealt with under general business.

Motion: That minutes be accepted as a true and correct record of the 40th AGM (*David Spiers/Amy McMillan carried*).

3. President's Report

First up a highlight. It is my pleasure to announce on behalf of the Awards Committee that the NZFSS medal has been awarded to Graham McBride. Graham has had a long and distinguished career in freshwater science extending over 30 years. His work has bridged several disciplines ranging from pollutant transport modelling, to statistical analysis and design of water quality monitoring networks, through to human health issues related to waterborne pathogens. Graham is recognised internationally as a specialist in the philosophy and procedures of water quality management, and has been a tireless teacher and statistical advisor to generations of New Zealand water quality scientists, and more recently ecologists brave enough to go there. Congratulations to Graham. He is not able to make it to this conference, but hopefully will be available next year to present a plenary address and receive his medal.

In the latest newsletter I published an open letter on work-related stress outlining the results of the recent survey on this matter. Although, the response rate to this survey wasn't high as a percentage of total membership, many of the issues highlighted provided, in my view, important insights into causes of and potential solutions for stress that needed to be shared. If this letter is helpful to only one person then it will, from my perspective, have been worth the effort, so thank you to all those who took the time to pass on their thoughts. I encourage you to draw this letter to the attention of anyone who you think might benefit from reading it. Alternatively, if you provide me with contact details I am happy to forward the letter on.

This letter reinforces some of the issues highlighted in the recent science manifesto for the recovery of New Zealand science put together by the National Science Panel through the Royal Society. It is unclear whether any follow-up strategy for that document is planned, but at a recent Constituent's Society meeting that I attended on behalf of NZFSS, this issue was highlighted in the context of including

the findings in the Royal Society briefing to the new minister of science. At that meeting, we were informed that the Royal Society has abandoned plans to merge the science journals into a single publication, so the New Zealand Journal of Marine and Freshwater Research will live on for the meantime although the long-term future is still not clear. I like to think that the two submissions made by NZFSS on this matter had some influence.

Moving on to Society matters, some of you may have heard that Brian Sorrell has moved to Denmark for the next two years. Thankfully, Brian is happy to continue in his Secretary-Treasurer role from afar. However, some things can't be done electronically and Janine Wech has kindly agreed to be Brian's "stunt-double" when required. David Burger is retiring from the web master role this year; he has done a lot of work developing a new-look and more informative format which we hope will soon be up and running. Thanks are also due to some committee members who are retiring. John Stark is stepping down after having served 15 years on the Awards Committee, so thank you John for this extended period of service. Mike Scarsbrook has also resigned from the Awards Committee and from his role in coordinating sales of the NZ Stream Invertebrates book which has now been remaindered. One box of books has been given to each university to pass on to deserving students studying stream invertebrates. This remaindering will result is a paper loss that may affect the Society's accounts next year.

Ngaire Phillips has shown a lot of energy in editing the newsletter over the last few years, increasing it from an annual publication to two issues per year. We have certainly appreciated these efforts, but understand her decision to move on from this role. As Ngaire mentioned in the latest newsletter, it is becoming increasingly difficult to get material from members for inclusion in the newsletter which we are required to produce under the constitution. Personally I look forward to catching up on the activities of groups and individuals, trolling through publication lists to see what I've missed, and reading members' anecdotes. I'm not sure how many share this view (maybe I should get out more), but perhaps it is time discuss whether we need to change the focus to re-engage with our membership and make it more relevant? I look forward to some discussion on this matter.

Earlier this year, the Society received funding from the Lotteries Commission towards an oral history project in recognition of the 40th Anniversary of the Society. Neil Deans received training in oral history and undertook interviews over the past 5 months with the following long-serving members of the Society, several of whom were founder members. Neil would like to thank those who were interviewed, including (in alphabetical order) Carolyn Burns, Vivienne Cassie-Cooper, Ann Chapman, Geoff Fish, Betty Flint, Rob McColl, Bob McDowall, Ian McLellan, Mike Patrick, Donald Scott and Mike Winterbourn. Their recordings are now being transcribed, with copies being made for those persons interviewed and made available for inclusion in any Society records and/or history. These will ultimately be lodged with the Oral History centre of the National Library, with permission of those interviewed. Neil would also like to thank the Royal Society of New Zealand (Wellington Branch) for assistance with a recorder and transcription, the National Library Oral History Centre, and the Lotteries Commission for their support and encouragement in this interesting exercise. Contact Neil if you would like to know more about the project, and I would like to thank him for these efforts.

It's great to see our first conference in the world's No. 1 city being such a success, and on behalf of the Society I wish to pass on our thanks to Rosemary Miller and her organising committee. In 2009 we will be holding our first conference in Whangarei in association with the New Zealand Hydrological Society (NZHS). I met with the NZHS executive last month to discuss the conference organisation. Rudi Hoetjes has agreed to be NZFSS co-chair of the organising committee with help from local members of the Society. In 2010 the conference will be held in Christchurch, or some exotic location nearby decided by the organising committee.

I move from the Chair that this report be accepted. (Kevin Collier/Carried).

4. Secretary Treasurer's Report

Membership

Total membership at 11 November 2008 was 395. Membership figures for the last four years are shown in Table 1 & 2. Total membership is slightly higher than other years, reflecting a healthy number of new members joining over the past 12 months. There have been 33 new members joining since 1 December 2007 (13 student/unwaged and 20 ordinary).

As reported at the 2007 AGM, we have had a long-running problem with our bank over charges and additional reporting requirements for payments by Visa, preventing us from accepting Visa payments over that time. For this reason a subs renewal was not carried out during 2007/08. Happily, this issue has been resolved thanks to a very helpful BNZ banker who helped us organise an on-line system that removes the problem. It also will mean much faster processing of Visa payments than before, and better itemisation on your bank statement for Visa payments – i.e. better service overall for everyone.

Because of the missing subs renewal, the current membership status figures are not comparable with other years. About 20% are currently paid up reflecting some members who we were able to process by other means. We will shortly be doing a two-year renewal to bring the membership back up to date: we apologise in advance to all members for the inconvenience of this, and assure them that normal service has been resumed!

	2008	2007	2006	2005	2004
Members current:					
Paid	89	252	178	237	154
Unpaid	202	44	76	42	100
Members in arrears:					
1 yr	37	37	48	38	47
2 yr	36	2	28	20	24
3 yr	2	-	11	8	8
Other:					
Honorary	11	11	11	11	11
Life	3	3	3	1	1
Legal req.*	1	1	1	1	1
Societies	5	5	5	5	5
Libraries	9	9	9	9	9
Total	395	364	370	372	360

Table 1. Financial status of membership.

* Not a member

Table 2. Type of membership

	2008	2007	2006	2005	2004
Ordinary	263	235	244	260	252
Corporate	31	32	30	24	23
Honorary	11	11	11	11	11
Life	3	3	3	1	1
Unwaged/student	82	78	77	71	68
Other (Societies)	5	5	5	5	5

Finances

The accounts were audited by Stephen Dine of Brown Web Richardson, Hastings.

The Society continues in sound financial condition and is in a good position to continue supporting its aims. Our total assets (including equity in stock of unsold invertebrate and Freshwaters books) at 30 June 2007 were \$79,975. Expenditure was low this year and was exceeded by income by \$8596 mainly due to higher interest rates on our term deposits, lower bank charges, and the absence of any significant printing of posters or other publications during 2007/08. Of course the likely forecast given the economic downturn is for lower interest rates and higher bank charges!

Subs income was much lower this year than usual due to the banking problems discussed at last year's AGM, which have been rectified and so this should catch up substantially as we recover the arrears during 2008/09.

We also banked \$877 from sales of our various books. As of 31 October, 105 copies of FoNZ are in stock. The invertebrate book was remaindered after the last conference and the remaining stock is being distributed free to students at Universities, so overall book sales made a loss of \$996.

The Queenstown conference made a net loss of \$3369, mainly due to additional room charges levied by the hotel. This budget was finalised after 30 June 2008, so most of this loss will hit the Society during the 2008/09 financial year.

The other major expenditure items in 2007/08 were \$521 for cakes celebrating the society's 40th anniversary at the 2007 AGM, \$714 for the NZFSS medals, and \$686 for printing of the newsletter.

We have one term deposit, the combined Jolly Fund, with \$46,520.77 at 11 November 2008. The Current Account at 11 November 2008 was at \$15,608.76.

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

Motion: That the Society accounts for 2007/08 be accepted (Janine Wech/Angus McIntosh carried).

5. S.I.L 1987 Trust Fund

Annual Report for 2007-2008 (Prepared by Kit Rutherford, Treasurer; Presented by Jon Harding) Charities Commission

A change in legislation required the Trust to register with the Charities Commission to retain out tax-free status rather than operating under an agreement with the IRD. This was easier to accomplish than expected and did not cost anything in legal fees.

We are now registered with the Charities Commission.

It requires us to send an Annual Return – due 30th September 2009 – should be no problems there. Reminder – any individuals making donations to the Trust can claim a tax credit.

Trust	30th	28th	March	31st	March	14th April	17th
	September	2008		2008		2008	September
	2007						2008
BNZ cheque acc	63						38
International Equity	31,918			25,959			
Strategic Bond	23,194			18,445			
Total	55,112			44,404			40,145
International Equity							
Strategic Bond		-4,800				-4,487	
Adjusted total		44,404				40,678	
		Whiteh	ead			Jellyman	

Income/Expenditure for 2007-2008

Notes

We made a net loss of \$5680 in 2007-2008.

The International Equities Trust has taken a beating. Hopefully it will bounce back but that may not happen for 1-2 years.

Sum available for awards in 2009 (based on the Trust's Deed)

Total	\$2,000
5% of assets	\$2,000
Interest	NIL

We are not looking in good shape to make any awards next year!

Motion: That the S.I.L Trust accounts for 2007/08 be accepted (*Bruno David/Colin Townsend carried*).

6. Publications:

- **Newsletter:** Ngaire Phillips stepping down as newsletter editor. Kevin Collier proposed that now would be a good time to look at the format of the society newsletter.
 - Mike Joy suggested that a forum-type approach might be more appropriate, where people could add their opinion. Jon Harding noted that there had always been difficulties in getting submissions/responses from people and this was the main issue in the difficulties of the newsletter. Other suggestions from members was that an on-line newsletter might have a better submission rate and greater readership; the editor to deal with only one contact person per organisation; and allowing more time (2 to 3 weeks) for contact people to gather information to submit.
 - Newsletter frequency once a year was preferred by members.
 - May was mooted as the best time to send out the annual newsletter.
 - Discussion on the e-forum as a place for popular articles was discussed. Comment was made as to whether this was the best place to put articles as people reading the forum were more likely to already be in agreement – placing popular articles in other forums would be a better use of effort.
 - Further discussion amongst members regarding the duplication of material in the newsletter with material on the internet (universities, NZFSS, etc.). One suggestion was that the Society could have a co-ordinated approach linking sources of material together, so that information would be comprehensive and up-to-date; whereas the newsletter is out-of-date as soon as it is written.
 - This discussion ended when it was pointed out that a newsletter is required under the NZFSS constitution.
- **Posters:** There has just been a reprint of all posters (3,000 each). They are freely available just need to pay for shipping. Vivienne Cassie Cooper suggested that a future poster could focus on freshwater algae.
- **Crustacean book:** Kevin Collier reported that Ann Chapman's manuscript is with Trevor at Landcare Press. Trevor has made significant progress in assembling the book.
- 7. Future Conferences: The Whangarei conference in 2009 is being co-ordinated by Amy. It is a joint conference with HydroSoc. Transport to Whangarei was discussed at Conference Housekeeping this morning, with the possibility of buses being organised from Auckland to Whangarei (~2 hrs) a suggestion that will be looked into. The Christchurch conference in 2010 is being co-ordinated by Jon and Angus.

8. Election of Society Officers:

- **Kevin Collier** was re-nominated for **President**. (*The nomination was proposed by Neil Deans/seconded by Jon Harding*).
- Brian Sorrell was re-nominated for Secretary/Treasurer. Currently, Brian is carrying out this role from Denmark with assistance from Janine Wech in Christchurch. (*The nomination was proposed by Shirley Haywood/seconded by Alastair Suren*).
- Marc Schallenberg and Chris Arbuckle were re-nominated for the role of Committee Officers. (The nomination for Marc Schallenberg was proposed by Carolyn Burns/seconded by Matt Bruno-Davidson; The nomination for Chris Arbuckle was proposed by Kate McArthur/seconded by John Quinn).
- Hannah Rainforth was nominated as Newsletter Editor. (The nomination was proposed by Kate McArthur/seconded by Alastair Suren).
- Mary deWinton and David Spears were nominated for the (two) roles of S.I.L Representatives. (The nominations for each were proposed by Neil Deans/seconded by Vivienne Cassie Cooper).
- Wendy Paul is to take over from David Burger as Webmaster (non-elected position).

9. General Business:

- **Proposed changes to New Zealand journals:** RSNZ is continuing with the journals in their present form, however the long-term future of the journals is unclear. Voluntary editorship may happen in the future, so further developments are probable.
- Website improvements: David Burger has developed a new-look format which is still to be put on-line. It should be available in the near future. For any further suggestions regarding the website, let Wendy Paul know.
- NPS Submission: Carolyn Burns and Colin Townsend have agreed to forward the submissions. As an outcome of the NPS session on Monday, 24 November, nominated people are to develop certain points. These need to be placed onto the online forum for members comments as soon as possible (i.e. within the week). These will be edited by the exec. then forwarded to Carolyn and Colin. The deadlines are tight, so need to get these developed asap. There will be a further right-of-reply after NPS submissions have closed so members should think further about what should be clarified in the statement.
- **e-forum:** Marc Schallenberg reported that there were about 20 regular users of the forum. With the NPS, etc. there should be more opportunity to use the forum. Instructions will be sent out; members can submit anonymously if they wish. There are diverse ways of using the forum so members are encouraged to use it.
- NZFSS representative on MAF Biosecurity advocacy groups: NZFSS was approached (as a broker organisation) to identify someone with appropriate qualifications and experience to represent the freshwater perspective. Candidates were nominated at executive meetings. At the executive meeting at the conference on Tuesday, Natasha Grainger was nominated and she has agreed to take up this role. Kevin Collier voiced his appreciation in Natasha accepting the role. The NZFSS has also been approached by DoC to find a representative that can present a viewpoint on NZFSS. Some discussion needs to be made before a list of names can be put forward.

The meeting closed at 1:40 pm.

Waters for the Future: Balancing its values

The New Zealand Hydrological & Freshwater Sciences Societies Joint Conference



23 - 27 November 2009 Whangarei, Northland

Meet you there ..

Abstracts due 30 September 2009

http://on-cue.co.nz/nzhs_fss09/index.html

New Zealand Freshwater Sciences Society

How do I join?

Print out the following details, fill in the boxes and mail to Secretary/Treasurer, Brian Sorrell, c/- NIWA, PO Box 8602, Riccarton, Christchurch, New Zealand. b.sorrell@niwa.co.nz



Title:	Surname:
Initials:	First Name:
Address:	
Telephone:	(main) (other)
Fax:	Email:
Membership type (corporate, waged, student, unwaged):	
Please fill out the following permissions:	
I agree to the NZ Freshwater Sciences Society publishing my membership details.	
Choose one: Yes	No Please sign:
I give permission for my email address to be added to the NZFSS email mailing group	
Choose one: Yes	No Please sign:
My preferred format for receiving the NZFSS newsletters is as a:	
Choose one:	Electronic pdf Hard copy
Brief List of Your Professional Interests:	

Payment:	
Waged/Corporate \$40	
Student \$10	
Unwaged \$10	
Royal Society of New Zealand Travel Grants* (optional) \$4	
TOTAL AMOUNT \$	
Make cheques payable to "NZ Freshwater Sciences Society"	
Payment by Credit Card:	
Visa Mastercard (circle one)	
Name on card:	
Card no:	
Expiry date:	
Signature:	
Send to:	

Secretary/Treasurer Brian Sorrell, c/- NIWA, PO Box 8602, Riccarton, Christchurch, New Zealand. b.sorrell@niwa.co.nz

*used for overseas travel awards for beginning NZ scientists and administered by The Royal Society of New Zealand

New Zealand Freshwater Sciences Society constitution

- 1 <u>The name of the Society</u> shall be the New Zealand Limnological Society Incorporated.
- 2 <u>Objectives</u>: 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 <u>Membership</u>:
 - (a) <u>The members</u> 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 <u>notified</u> by the Secretary of their election and sent a copy of the constitution.
 - (c) Any member may <u>resign</u> by giving notice in writing to the Secretary, and paying all subscriptions due.
 - (d) Any member shall notify the Secretary in writing of a <u>change of address</u>.
 - (e) The Committee shall have the power to <u>cancel membership</u> in the case of conduct considered prejudicial to the Society.
 - (f) All members are entitled to receive the Society's <u>Newsletter</u> free of charge.

5 <u>Executive and Meetings</u>:

(a) There shall be an <u>Executive Committee</u> 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 <u>elected</u> 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 1 month after their election.
- (e) <u>Candidates</u> 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 <u>General Meeting</u> 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 <u>a quorum</u>, 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) <u>Votes of members</u>. Each Member shall have one 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 <u>Finance</u>:

- (a) <u>Annual Subscription</u>: 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) <u>The funds</u> 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 <u>charitable purposes</u> 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) <u>Payment of accounts</u> 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) <u>An Annual Report and Financial Statement</u> shall be prepared and posted to members. The Financial Statement shall be audited by a person appointed at the previous General Meeting.

7 <u>Organisation</u>:

- (a) The Secretary-Treasurer shall keep (i) a <u>Minute Book</u> containing full minutes of all meetings, and (ii) <u>a Register</u> with the names, addresses, professional interests and date of joining of all members.
- (b) <u>Affiliated Bodies</u>. 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) <u>Changes in the Constitution</u> 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 <u>charitable objects</u>, the <u>personal benefit clauses</u>, or the <u>winding up clause</u>, except as specified under clause 7(g) below.
- (e) <u>The Common Seal</u> 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 <u>dissolution</u> 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 <u>an Inland Revenue Department approved charitable organisation</u>, may be named in place of the Royal Society of New Zealand.

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105B Lake Crescent HAMILTON Lake water quality; ecological modelling; sediment chemistry and diagenesis dt24@waikato.ac.nz

Mr Sven Sebastian Uhlmann

Address Unknown Influence of land use on river ecosystems; impact of multiple stressors

Miss Rossana Untaru

Chemistry Department University of Waikato Private Bag 3105 HAMILTON Lake eutrophication; trace elements and nutrients in freshwater and sediments

Mr Bill Vant

Environment Waikato P O Box 4010 HAMILTON Water quality; data analysis and interpretation; public communication bill.vant@ew.govt.nz

Dr Piet Verburg 48 Rimu St HAMILTON 3200 Limnology; large lakes; climate change p.verburg@niwa.co.nz

Dr Christina Vieglais

Address Unknown Invasion biology; incursion response; new organisms; didymosphenia

Mr Eduardo Villouta Stengl

Freshwater Manager, Aquatic & Threats Unit Department of Conservation P O Box 10-420 WELLINGTON 6143 evillouta@doc.govt.nz

Dr Jonet Ward

949 Shands Rd RD 6 CHRISTCHURCH 7676 Aquatic ecology; Water quality, wetlands, management of aquatic resources tjward@ihug.co.nz

Mr Troy Watson

2 Montana Ave CHRISTCHURCH <u>tnw17@student.canterbury.ac.n</u> <u>Z</u>

Miss Kiryn Weaver

Institute of Natural Resources -Ecology Massey University Private Bag 11-222 PALMERSTON NORTH trout-macroinvertebrate interactions; seasonal variations of macroinvertebrates kirynw@hotmail.com

Ms Kerry Webster Address Unknown Trace metal transport and fate in aquatic systems

Dr Jenny Webster-Brown

Chemistry Department University of Auckland Private Bag 92-019 AUCKLAND Trace metal chemistry in aquatic environments j.webster@auckland.ac.nz

Ms Janine Wech

NIWA P O Box 8602 Riccarton CHRISTCHURCH Ecotoxicology - algae, lemna, cladocerands in lab-based toxicity tests; freshwater ecology and water quality j.wech@niwa.co.nz

Mr Rohan Wells NIWA P O Box 11-115 HAMILTON Macrophytes; lake management r.wells@niwa.co.nz

Mr David West

Department of Conservation Research, Development & Improvement Division P O Box 13049 CHRISTCHURCH Native freshwater fish, esp. large galaxiids; fish passage; whitebait; galaxiid diet; age and life history; fish health dwest@doc.govt.nz

Dr Eddy White 3-26 Robinson Terrace TAUPO *Eutrophication*.

Miss Michelle White 7 Drumfearn Place Callum Brae HAMILTON

meshellann@gmail.com

Miss Amy Whitehead

School of Biological Sciences University of Canterbury Private Bag 4800 CHRISTCHURCH Freshwater ecology and conservation biology; habitat associations; population modelling amy.whitehead@pg.canterbury. ac.nz

Mr Simon Whitton

1 Singleton Road Cardiff Wales CF24 2ES UNITED KINGDOM Fisheries management; river habitat restoration; salmonid fish; general freshwater ecology simon.whitton@environmentagency.gov.uk

Ms Belinda Whyte

Address Unknown Environmental impact appraisal; native freshwater fish; aquatic invertebrates

Dr Bob Wilcock

NIWA P O Box 11-115 HAMILTON Lowland streams, water chemistry, land use change; gas transfer r.wilcock@niwa.co.nz

Mr Thomas Wilding

Stream ecology; lake monitoring; urban waterways; fish habitat modelling

Miss Anna Wilkes

Golder Associates (NZ) Ltd P O Box 2281 CHRISTCHURCH Water quality; resource management awilkes@golder.co.nz

Miss Taryn Wilks

3/364 Madras St CHRISTCHURCH Land-water interactions; pressures; in-stream biota; *mitigation; best practice* management; effects; sustainability; conservation; restoration. tarvn.wilks@ecan.govt.nz

Mr Ben Wilson

Fish and Game New Zealand Auckland/Waikato Region Brymer Road RD 9 HAMILTON Freshwater fish bwilson@internet.co.nz

Prof. Emeritus Mike

Winterbourn School of Biological Sciences University of Canterbury Private Bag 4800

CHRISTCHURCH Stream ecology; aquatic entomology; land-water interactions;colonisation processes michael.winterbourn@canterbur y.ac.nz

Mr Keith Wise 20A Debron Avenue Remuera AUCKLAND 1050 Aquatic insects and Neuroptera kwise@akmuseum.org.nz

Mr Ian Wiseman

20 Colenso St Sumner CHRISTCHURCH Water quality investigations; aquatic ecosystem monitoring and assessment; passive mine remediation technology; environmental effects iwiseman@skm.co.nz

Ms Susie Wood

Cawthron Institute Private Bag 2 NELSON Toxic cyanobacteria in New Zealand; taxonomy of species and identification of cyanotoxins susie.wood@cawthron.org.nz

Mr Darragh Woodford

School of Biological Sciences University of Canterbury Private Bag 4800 CHRISTCHURCH Freshwater fish ecology; conservation biology darragh.woodford@pg.canterbu ry.ac.nz

Mr Aslan Wright-Stow

NIWA P O Box 11-115 HAMILTON Water quality; stream ecology; effects of siltation; landuse effects on stream health; freshwater invertebrate taxonomy a.wright-stow@niwa.co.nz

Dr Roger Young

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Dr Jens Zollhöfer

36 Hawford Rd Opawa **CHRISTCHURCH 8002** Stormwater; resource consent