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**New Zealand
Freshwater Sciences Society
Newsletter**

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Editorial



Welcome to the autumn 2007 newsletter of the New Zealand Freshwater Sciences Society. As you're aware, the purpose of this newsletter is to provide a mid-year update of what members have been upto, details of Society and other relevant publications, upcoming conferences and any other news that's considered to be of interest to members. This edition includes a limited number of photos from last years conference dinner. Thanks very much to all those who have contributed - it's great to get such a good response at such a busy time of year.

Cheers, Ngaire

Presidents Corner

The 2006 NZFSS conference at Rotorua seems a long time ago now, but for those of us still in damage control the memories are all too fresh. Thanks to David Hamilton and his organising committee for providing us with a great smorgasbord of local culture, public interaction, good science and memorable social events. Ali Howard, who has done a fantastic job organising the last few conferences, has recently resigned from her role with Nelson Tourism Services. Her calm demeanour in the face of apparent chaos will be sorely missed and we wish her well in her new endeavours.

The Rotorua conference marked the end of Neil Dean's presidency of the Society which has greatly benefited from his grasp of the "big picture", not to mention his dry wit. He is a hard act to follow and I would personally like to thank him for his past and continuing contribution to the Society.

The tribute to Mike Winterbourn held at the conference is culminating in a special edition of the University of Canterbury journal *New Zealand Natural Sciences* which Mike helped found. The journal's editorial staff is working hard to have this published soon and the papers will be freely available in electronic format. Mike has resigned as the Society's representative on the editorial board of the *New Zealand Journal of Marine and Freshwater Research*, and Barry Biggs has kindly agreed to take over that role.

Chris Arbuckle and his team have plans well in hand for an exciting conference in December to be held in Queenstown in conjunction with the Australian Society of Limnology. This conference will mark a milestone for the New Zealand Freshwater Sciences Society which started 40 years ago as the New Zealand Limnological Society with a membership of 45. The Society now has over 300 members with a diverse range of interests. We will be marking this 40th anniversary appropriately at the Queenstown conference and in other ways over the next year. Some of our founding members are currently experiencing health problems and we wish them well.

David Burger has "volunteered" to carry out a review of the Society's web site with a view to improving its functionality and making it more relevant to members. At the moment the web site is used mostly for conference organisation but it has enormous potential to provide a portal to tools, publications and other resources for all those involved in freshwater science, education and management. In addition, it may provide a means for Society members to engage in healthy debate over topical issues.

On another front, I have asked the former presidents Neil Deans, Jon Harding and Ian Boothroyd, along with myself and Brian Sorrell, to form a strategic directions committee to consider how the Society might want to develop over the next decade. If you have any thoughts on this please make them known to one of the committee members. We hope to be in a position to report back to the Society on this matter at the conference in 2008.

Kevin Collier

President, Freshwater Sciences Society of New Zealand



Mike Joy (left) introducing our new President



Members News

Centre for Biodiversity and Ecology Research, Waikato University

Ann Chapman continues her recovery from a health setback late in 2006. In her recovery she has welcomed visitors from the University and is always keen to keep abreast of news from the Society.

Methane in Lake Rotorua

M.Sc research by Lisa Pearson (supervised by **Chris Hendy** and **David Hamilton**) has shown that methane gas permeates much of the sediment of Lake Rotorua. The emission rate of these gases suggests that Lake Rotorua could be a major emitter of greenhouse gases. Deeper parts of the lake were pockmarked with many depressions 20 to 60 m in diameter and up to 6 m deep, which are believed to be generated by methane gas escaping from the bottom of the lake.

Kokopu enhancements

M.Sc student **Brenda Aldridge** (supervised by **Brendan Hicks** and **Kevin Collier**) has released threatened giant kokopu into streams to enhance natural populations. In a study that is part of Waikato University's Urban Restoration project, in collaboration with Environment Waikato, Brenda will monitor the survival of these fish over the coming year in restored and unrestored stream sections. If the stocking is successful, the released fish may attract wild fish into the streams, further increasing numbers of kokopu in Hamilton's urban streams.

Karori Sanctuary Reservoir

University of Waikato researchers, including **Brendan Hicks**, **Nick Ling** and **David Hamilton**, and **Susie Wood** (Cawthron) spent most of a week in the Karori Wildlife Sanctuary in February in order to remove introduced pest fish and carry out related water quality studies, including **Matt Prentice's** M.Sc. thesis to examine cyanobacterial blooms. Karori Wildlife Sanctuary in Wellington is one of the world's first predator-proof "mainland islands". Since the construction of a predator-proof fence in 1999, 13 mammalian species of pests have been eradicated, many trees have been planted and 11 species of native birds have been released, many of which are either endangered or threatened. A key element of the restoration strategy for the Sanctuary is to restore the freshwater ecosystem and to control the recurring algal blooms. Red-finned European perch are so numerous in lower Karori Sanctuary that the young perch eat most of the zooplankton that would normally control the phytoplankton, and native fish such as giant kokopu and bullies have disappeared. Day and night fish capture rates were compared using boat electrofishing. The sampling trip removed nearly 4,000 perch by a combination of boat electrofishing and netting.

Inland lake remote sensing

A new project has started on the use of remote sensing by satellite to provide wide spatial coverage of water quality in lakes. Initial research between the Departments of Biological Sciences and Geography at the University of Waikato shows that it is possible monitor water quality from satellite images. High-resolution Landsat images have enough information to show differences between individual Rotorua lakes, and even to show fine-scale differences in algal blooms within individual lakes. **Brendan Hicks** and **Lars Brabyn** are co-

supervising **Mat Allan** for his M.Sc in remote sensing, and hope to provide a tool for comparing past and future water quality where field data are otherwise sparse or absent.

Victoria University of Wellington

Margaret Harper (School of Geography, Environmental and Earth Sciences, Victoria University of Wellington) found a cruise on Lake Baikal fascinating, including the freshwater seals. This Pre-Conference trip was run by the Limnological Institute in Listvyanka as part of the 19th International Diatom Symposium. The conference programme included Jeremy Pickett-Heaps' excellent video films of algae. More recently she enjoyed being a "scientist" at the Otari-BioBlitz, including chatting to members of the public while at a microscope. As a diatomist she was asked not only to identify other algae, but also protists. If there is a BioBlitz in your area do help even if it's for a short part of the 24 hours.

News from Cantabria

Pepe Barquín is currently working at the University of Cantabria (Dpto. CYTAMA) dealing with water quality management and stream river conservation and restoration. During 15-20 of April 2007, **Ton Snelder** has visited from CEMAGREF, Lyon, and has been collaborating with Pepe in reviewing their classification methodology for the rivers of Cantabria, a province of Northern Spain. Pepe and Ton are currently thinking on collaborating in a comparison between Cantabria, Northern Spain, and Britania, Northern France, river ecosystems in order to explore the effects that highly heterogeneous versus homogeneous landscapes have on invertebrate community assemblages and on the performance of different river classification systems. In July, **Russell G. Death** will also visit the University of Cantabria for a couple of weeks. Pepe and Russell, along with one of his students (**Jono**), will sample a number of streams with contrasting algal biomass to look at the effects that algal productivity has on invertebrate communities and compare these patterns with the ones found in New Zealand.

News from Ian McLellan

The website on New Zealand Stoneflies being constructed by Steve Pawson and I is well under way. "New species of and keys to South American Gripopterygidae (Plecoptera)" a paper which Peter Zwick and I started some years ago is now in the hands of the editors of *Illiesia*, a journal which publishes only on topics pertaining to Plecoptera. Peter was the director of the Schlitz Fluss-station of the Max Planck Institute of Limnology which under his direction, and previously that of Joachim Illies, produced a wealth of Limnological information. Sadly the station closed late last year and Peter is now retired. A well known example of the station's work was that done on the small stream Breitenbach which I have visited on a number of occasions. Not only is it renowned for high number of invertebrate species (1044) recorded from there over 3 decades, but also for the host of projects done on many aspects of the stream's ecology and organisms.

XII International Conference on Ephemeroptera and the XVI International Symposium on Plecoptera will be at an International Joint Meeting at the State Museum of Natural History in Stuttgart, Germany, from 8-14 June 2008. See the following website: <http://www.jointmeeting08.naturkundemuseum-bw.de/>

Recent Literature

McLellan Ian, 2006. The Nymph of *Holcoperla angularis* (Wisely) (Plecoptera: Gripopterygidae) from New Zealand. *Illiesia*, 2(8):57-60.

Some unusual freshwater biological projects at Landcare Research

Stephen Moore has been working on some weird but interesting projects lately - here's a couple:



Toxicity of firewater

A Landcare Research team has just released a report on the environmental effects of fire fighting activities. The field work involved setting fire to a couple of buildings and collecting the toxic fire water brew draining from the sites. Fire water samples were nastier than expected - black, toxic fire water running down this stormwater drain (bottom right of photo) caused a small fish kill. Many such incidents will have gone unnoticed especially in urban areas.



Effects of oil palm on Papua New Guinea streams

Stephen spent two weeks in 2006 sampling streams in the Northern and West New Britain provinces of PNG, assessing the effects of oil palm activities. This study started the process of identifying which PNG freshwater invertebrates are likely to be the best indicators of habitat and water quality. Dragonflies and damselflies are probably among the best indicators - anyone interested in the odonata should spend some time in PNG!

Horizons Regional Council

One Plan

After 2 and a half years of intensive work, Horizons new proposed 2nd generation Regional Plan and Policy Statement - the "One Plan" will be notified at the end of May this year. A significant achievement for the team, but also the beginning of a new phase with the notification / submission processes.

The new water management framework is supported by a number of technical reports, most of which are currently out for external peer review. Below is a list of the major elements of the new water management framework and associated technical reports.

Water Management Zones. Forty-four Water Management Zones and 117 Water Management subzones have been defined in the Region. They are the geographical unit for integrated water management. In particular, waterbody values, water allocation regimes, water quality standards and land management strategies (including the controlled activity status for intensive farming) are all defined at the water management zone or subzone level.

Technical report (available): McArthur K., Roygard J., Ausseil O. and Clark M. (2007) Development of Water Management Zones in the Manawatu-Wanganui Region. Technical report to support Policy development. Horizons Regional Council Report N 2006/EXT/733. ISBN: 1-877413-47-X.

Waterbody Values. This project identified the values associated with the Region's waterways, using existing plans, internal knowledge and stakeholder consultation. Collectively, these values define what each water management zone will be managed for, under the One Plan. A total of 23 different values have been identified, and classed into 4 groups:

- the Ecosystem Values group includes 5 individual values recognising the intrinsic value of freshwater and coastal ecosystems for the living communities and natural processes they sustain.
- the Recreational and Cultural Values group includes 9 individual values, associated with the spiritual and cultural values and the recreational (i.e. non-consumptive or non-commercial) use of the waterbodies,
- the Consumptive Use Values group refers to the value of abstracted surface water in supporting the regional communities (e.g. community water supply) and economy (i.e. irrigation). It includes 4 individual values,
- the Social and Economic Values Group includes 5 individual values identifying that rivers and their margins provide services and uses that support and protect the regional communities and assets.

(Technical report available mid-May): Ausseil O. and Clark M. (2007) Identifying community values to guide water management in the Manawatu-Wanganui Region: technical report to support policy development.

River Classification. The definition of the Life Supporting Capacity Value required a river classification exercise to identify the different types of ecosystems. A modified REC was used to define 10 aquatic ecosystem classes. Note that each ecosystem class has a different set of proposed water quality standards associated with it, based on water quality requirements of aquatic biota representative of each ecosystem type.

Technical report (available): Ausseil O. and Clark M. (2007). River Classification of the Manawatu-Wanganui Region to support the definition of the Life-Supporting Capacity Value. Technical report to support Policy development.

- **Water quality Standards** were defined in relation to each value. The standards represent the baseline!
- **Nutrient loadings** were studied in rivers across the Region. Under the One Plan, intensive farming in degraded or at risk zones becomes a controlled activity (i.e. requiring resource consent). The rule will be introduced progressively across the Region's water management zones that are under pressure from NPS. Three technical reports are being produced to support the One Plan focus on Non Point Source (NPS) pollution, and the definition of CAP (Allocatable pollution framework).

Technical reports

(report in press): Ledein E., Ausseil O. and Roygard J. (2007). Identifying Point Source and Non-Point Source Contributions to Nutrient Loadings in Water Ways in Three Catchments in the Manawatu-Wanganui Region. Technical Report to Support Policy Development. Horizons Regional Council Report N 2007/EXT/771. ISBN: 1-877413-65-8.

(report in draft): Roygard, J (2007). Measuring and monitoring non-point source and point source nutrient contributions to water quality; technical report to support policy development. Horizons Regional Council Report.

(report in draft): McArthur K. and Clark M. (2007). Nitrogen and Phosphorus Loads to Rivers in the Manawatu-Wanganui Region: a regional analysis of low flow state. Horizons Regional Council Report.

Others - Water Quality

Upper Manawatu low flow study. Monitored 30 sites in the Upper Manawatu catchment for river flow and water quality (3 runs at three different flows) and inverts/periphyton/fish. The work was done with the participation of Massey University and Fish & Game. The results are to be used to monitor the effectiveness of the management objectives for water allocation in the Upper Manawatu catchment, better understand where contaminants originate from at different river flows (including calculating nutrients yields for each management zone and separating out point source and non point source), and to draw correlations between water quality / quantity and biomonitoring results. Two technical reports will follow (one on catchment nutrient yields, the other by Russell Death on the biomonitoring results).

The Mangapapa catchment is one of the tier two catchments in the Clean Streams Accord national monitoring strategy. Horizons, with some support funding from MfE/ FRST, is conducting intensive monitoring to establish a water quality, flow, aquatic communities and landuse baseline. A report will be produced in August 2007.

The SOE water quality programme will be reviewed again, to incorporate some of the compliance monitoring programme. The idea is to better coordinate the monitoring of the major discharges and the normal SOE water quality sites (i.e. same day in the same catchment). We hope this will provide better accuracy/ reliability to the contaminant source calculations.

Resource consents. The Fonterra Longburn resource consent (discharge to the Manawatu River) has been granted following Environment Court Mediation. Additional to the original decision, Fonterra will have to install two DAF tanks to remove about half of the BOD load from the waste water. Currently

on our desks are 8 other applications for significant discharges to water in the Manawatu catchment (6 municipal sewage and 2 industrial wastewater)... lots of fun in perspective !

Water Matters website (for water quality). Following on from the successful launch of the 'Water Matters' allocation and water quantity online website (www.horizons.govt.nz/watermatters), a project to have online water quality and discharge compliance monitoring is being scoped. This project is due to be online by the end of January 2008.

Aquatic biodiversity

Identification of sites/reaches of significance for aquatic biodiversity has been undertaken for protection under the One Plan. At the moment the sites are based on presence/absence of rare and threatened native fish and blue ducks but criteria have been established to allow the inclusion of sites for significant freshwater habitat values or 'biodiversity hotspots' in future. A draft technical report is back from peer review and the final report will be available by the end of May. Policies and rules for the protection of these sites from adverse effects from activities in the beds of rivers and lakes and on riparian margins have been developed.

Riparian Biodiversity (particularly with respect to gravel nesting and wading birds) has been addressed within a similar framework to the significant aquatic sites by Research Assistant **James Lambie**.

Regional Didymo partnership group (Horizons and Greater Wellington Regions) are gearing up to take over delimiting surveys for the surveillance and long-term monitoring of Didymo incursion into the Lower North Island.

(report in draft): McArthur, K, Clark, M and McGehan, J. (2007). Sites of significance for aquatic biodiversity in the Manawatu-Wanganui Region: technical report to support policy development. Horizons Regional Council Report.

(report in draft): Lambie, J. (2007). Riparian sites of significance based on the habitat requirements of selected bird species. Horizons Regional Council Report.

Water Allocation.

- Water allocation framework development for the Manawatu-Wanganui Region completed for the One Plan (see technical report).
- Water Matters website launched (see above).
- IFIM surveys completed for the Makatoku and Makara Rivers (Ruapehu).
- Low flow investigation in the Upper Manawatu (see above).

(report in draft): Hurdell, R, Roygard, J and Watson, J (2007). Regional Allocation Framework - Technical report to support policy development. Horizons Regional Council Report.

Environment Southland

Didymosphenia geminata eradication trials began in the Princes Creek (near Te Anau) during February using chelated copper, run by NIWA with assistance from Environment Southland (ES). ES has also assisted with visual surveys to reassess likely environments for Didymo colonisation, which were coordinated by NIWA throughout the Southland region in March/April. Didymo has recently been identified in Lakes Te Anau and Manapouri, and the lower Oreti River at Wallacetown.

Phytoplankton Blooms have frequented the Southland coast this autumn, with two large blooms dominated by the non-toxic diatoms *Asterionellopsis sp.* and *Attheya armatus*.

Living Streams Phase One of the Living Streams Programme has been completed with an Investigation into Water Quality in the Waihopai Catchment. The objectives of Phase One were to determine the state of water quality in the Waihopai Catchment and identify links between landuse, non-point source pollution, and water quality. The Living Streams Programme is based on the concept of empowering the community to take action by the provision of information. Phase Two is a Longitudinal Catchment Pollution Source Study carried out by the Compliance Division and involves the identification of pollution sources within the Waihopai catchment through faecal sterol analysis, and Phase 3, The Waterways Action Project, involves working in partnership with the community to ensure healthy waterways, increase community awareness and ownership and empowering communities to take positive environmental action.

A catchment study was initiated in the Sandstone Stream (northwest of Gore) in February, following a refined version of the Living Streams model to identify links between landuse and water quality within the catchment.

Estuarine Monitoring Broad scale habitat and sediment mapping was completed in the New River and Waikawa estuaries, and Waituna Lagoon in March, with the aim of tracking long term sedimentation trends and changes in habitat in Southland's estuaries.

Central Wetlands Database Phase 1: the initial development of a wetlands database for Southland has been successfully completed. This project involves the collation and centralisation of information from existing wetland databases to generate a central source of wetland information for Southland.

Water Allocation

ES has a staged management approach to surface water allocation under the proposed Regional Freshwater Plan.

- Rivers with <10% MALF allocated have MALF as default minimum flow.
- Rivers with 10-30% MALF allocated require minimum flows to be derived from generalised habitat models.
- Rivers with >30% MALF allocated require instream habitat analysis (IFIM type methodology) to set minimum flows.

Low flow gauging programme and MALF estimations for catchments lacking permanent or long-term flow information has continued over the summer period. 15 new sites (specifically in the Mararoa and Waiau catchments) have been added into the programme which encompasses approximately 125 gauging sites. Several TruTracker pressure transducers are to be purchased and temporally installed in selected streams to record low flow information in the coming summer. Stream depletion effects through consented groundwater takes are also being factored into surface water allocation totals.

Proposed Gravel Extraction/Habitat Restoration Sites Survey

For 10 years, ES has extracted the bulk (~90%) of its gravel resources away from active river beds and in the process restored or rehabilitated lost or degraded riverine features. These features include ox-bow lakes, floodway ponds and backwaters.

Mining aggregate in former floodway plains mitigates the major issues of in-stream gravel extraction, such as bed degradation, channel incision and associated lateral erosion of river banks. Well selected sites can provide very large volumes of high quality aggregate, with no disruption to extraction due to high river levels. In Southland, many riverine features lost through river bed degradation (caused by historical excessive gravel harvesting in river beds) are now being reactivated with the river system, producing a win-win situation for all key stakeholders.

Apart from 3 visual surveys (of fish and waterfowl) of which the last was performed in 2001, there have been no rigorous studies of the morphological or biological effectiveness of these habitat sites and to see whether they are evolving such as typical natural riverine features would.

A proposed survey, to monitor the evolution of selected gravel extraction/habitat restoration sites, is likely to include: electric fishing, macrophyte and algal coverage assessments, bird surveys and water quality sampling by ES and Southland Fish and Game staff.

Three surveys (before, during and after extraction) are likely to be performed at each of 5 various rehabilitation sites.

Macroinvertebrate/Fish Sampling

ES is aiming to reduce the number of macroinvertebrate sites monitored (currently ~75 sites) and tie in macroinvertebrate sites more closely with long term SoE water quality and hydrological sites. ES also plans to start annual monitoring of fish community composition at selected SoE sites. Additional electro-fishing will be undertaken to ascertain fish assemblages for minimum flow work, in conjunction with generalised habitat/IFIM surveys.

Contributed by **Kirsten Meijer**

Greater Wellington Regional Council

Greater Wellington has been involved in a number of freshwater investigations and projects over the last 6 months.

Alton Perrie is currently taking an in-depth look at our rivers SoE data for the first time since a major review of our monitoring programme in 2003.

In conjunction with **Ian Duggan** (University of Waikato), **Alton Perrie** has looked at the potential for inferring the lake trophic status of Lake Wairarapa using zooplankton composition. Initial results were promising and when we review our lake monitoring programmes the possibility of regular zooplankton monitoring will be investigated.

Juliet Milne and **Laura Watts** have recently completed a report documenting the toxic benthic cyanobacteria proliferations that affected several of the region's rivers during 2005/06. Cyanotoxins identified in samples of *Phormidium* sp. mats - and thought to be responsible for the deaths of at least five dogs in the Hutt River catchment in late 2005 - included homo-anatoxin-a - previously unreported in benthic

cyanobacteria in New Zealand. Juliet and Laura assisted **Susie Wood** (Cawthron) to prepare a paper highlighting this finding.

Juliet Milne and **Alton Perrie** have been investigating water quality in Hull's Creek, a highly modified urban tributary of the Hutt River. This creek is listed in Greater Wellington's Regional Policy Statement as being in need of enhancement (for water quality) but had not been investigated in any detail for about 8 years.

Instream flow assessments continue in high-priority catchments, in accordance with our "Framework for Instream Flow Assessment in the Wellington region" (completed last year). The information gathered will help in the review of our current water allocation policies in the Regional Freshwater Plan, due to commence in 2009. Overseen by **Laura Watts** the investigations include: continuous dissolved oxygen and temperature monitoring in a range of stream types, concurrent flow gaugings to determine interactions with groundwater systems in the Wairarapa, and, with assistance from **Joe Hay** and **John Hayes** (Cawthron), a RHYHABSIM survey of the lower Ruamahanga River in April 2007. We are also in the process of upgrading flow monitoring stations on the Waipoua River, Parkvale Stream and Mangatarere Stream, so that low flows are more accurately measured in these catchments.

Barry Robertson and **Leigh Stevens** (Wriggle Ltd) were engaged in December 2006 to undertake broadscale survey of the beaches and major river estuaries between Baring Head on Wellington's south coast and the Mataikona River estuary on the eastern Wairarapa coast. Substrate characteristics and significant areas of flora and fauna were mapped for a total of 14 river estuaries (12 river mouth lagoon estuaries, one coastal lake and one tidal river). Risks to the health of the estuaries (e.g., sedimentation, eutrophication, contaminants, habitat loss) were also identified and will be taken into account in developing an estuarine monitoring programme for the region.

Summer Warr is overseeing the development of an urban stream management strategy utilising data from ecological and habitat surveys of urban streams conducted by Kingett Mitchell over the last couple of years. The streams are to be categorised in terms of their ecological health, with stream protection and rehabilitation strategies identified for each category. Current tasks include:

- integration of fish/physical environment relationships identified in Massey University's "Point-Click-Fish" (modelling probability of fish presence) work for the region;
- detailed mapping of the urban stream network using 5m digital terrain models;
- compilation of detailed impervious cover data for the region; and
- identification of areas of future urban development where urban stream protection and management work is most needed.

In conjunction with the Wellington City Council, Greater Wellington is studying the Ohariu Stream catchment to assess ways of promoting riparian management in catchments that are not eligible for financial assistance. This is part of a national programme led by **Terry Parminter** (AgResearch) to develop improved policy approaches for encouraging landowners to protect and enhance biodiversity on their own land. The Ohariu catchment is small, close to Wellington city, and has large and small farms as well as 'lifestyle' and residential homes. There are some bush fragments in the catchment but most of the stream has no vegetation cover and is unfenced. The problems affecting the stream (high levels of bacteria and nutrients, poor water clarity and high summer water temperatures) are similar to those affecting other small rural streams around the Wellington region. The first step in the study - completed in January - was to assess the state of the stream and the attitudes of the residents. Also in January, **John Quinn** (NIWA) and **Michelle Bird** (Greater Wellington) completed a riparian assessment of the stream and the potential benefits of enhancing these areas, and **Mike Joy** (Massey University) completed a fish survey at the three sites in the Ohariu Stream where we have temperature loggers, and one site in the Makara Stream which is the other main tributary with similar land cover but less intensive farming. The next step in this project is to engage with the community in 'new ways'.

Fish passage work continues. A fish pass constructed in the Kaiwharawhara Stream (Wellington city) late last year is proving successful with koaro found upstream of the culvert for the first time this summer. Consent approval provided, fish passes will be constructed in two further urban streams - Hull's Creek and Owhiro Stream - in coming months.

Finally, we are currently looking for a new water quality scientist to replace **Juliet Milne**. Juliet moved into a team leader role in March, coordinating Greater Wellington's team of 8 environmental scientists.

Contributed by **Juliet Milne**

Environment Bay of Plenty

Matt Bloxham continues to keep track of blue-green algal blooms in the Rotorua lakes. This summer was remarkably clear of blooms perhaps due to the weather. The worst site, Okawa Bay, has been reticulated for sewage so that may have helped also. Matt is also working hard with Operations staff to install fish friendly flood gates. He has also reported on fish passage issues between Ohiwa Harbour and its tributary streams.

Paul Scholes has progressed the Bay of Plenty bathing quality data to a stage where a lot of sites now are approaching 100 analyses for the past 5 years. Paul has reported on a comparative study of advanced septic tank systems. This trail has run at the Rotorua District council Wastewater Treatment Plant. Paul continues to monitor the regions lakes, rivers and estuaries. He has conducted a trail treatment of Sullivans Lakes, Whakatane. A biological product was added to the lake as well as melter slag.

John McIntosh is involved in lake remediation studies with a range of researchers from the University of Waikato, NIWA, SCION, Landcare Research and other contractors. A major lake remediation project, the Ohau Channel diversion, will begin in May 2007.

Contributed by **John MacIntosh**

Hawkes Bay Regional Council

Taharua River Targeted Investigation The Taharua River continues to show declining water quality in terms of increasing dissolved nitrogen concentrations and turbidity while biological monitoring (MCI, chl_a, AFDW) continues to show no real change. We have decided to focus our biological monitoring on the confluence of the Taharua with the Mohaka River. We believe that the ecological effects are likely to be more prominent on the Mohaka River as it has a more stable substrate as opposed to the predominantly pumice and sand based substrate of the Taharua. We recently contracted **John Hayes** from Cawthron to provide guidance on how the monitoring programme could be altered to address effects on the health of the trout fishery. John's report was presented to council and was well received.

Lakes - Our lakes monitoring programme commenced in September 2006 in the southern Kaweka area. A recent LakeSPI survey gave the Kaweka lake a good bill of health which was good to hear. Monitoring of this lake will continue for a further year after which we will move on to the more ugly ducklings of our region (Lakes Oingo and Runanga).

Macrophyte sampling protocols for wadeable streams We recently headed out into the field to trial the macrophyte sampling protocols on our urban streams of our SOE programme. As you can imagine nearly every exotic species of plant under the sun in them and very low native plant diversity presence. We found the indexes of MTC, MCC an MNC relatively easy and quick to calculate and the assessments themselves were

quite rapid. We hope to continue assessing our urban streams using this protocol, many thanks Environment Waikato and NIWA for the development of these.

Control Ex, A Fake Oil Spill Event Recently staff headed out for a fake oil spill training exercise at the port of Napier. The event went very smoothly and has placed us in good stead in the event that a real event does happen.

State of the Environment Report 2006 The 2006 summary report focused on cyanobacteria blooms in our lakes, urban stream health and how it compares to other land uses and general ecosystem health of the rivers in our SOE programme.

Sampling Frequency Review Recently NIWA reviewed our sampling frequency for our SOE surface water quality monitoring programme. The recommendation is that if we want to address policy issues sooner then obviously monthly monitoring is the way to go. As it stands the network has monthly monitoring in two catchments (Taharua and Tukituki) that we consider to be under increasing agricultural development while the remaining catchments have a quarterly sampling regime. We may need to sweeten up our councillors if we wish to move the entire programme to monthly monitoring and this could well be worth the effort.

Fish Monitoring This year we managed to get 23 of our targeted 25 sites monitored for fish. Some sites proved very difficult such as the Runanga and Oingo Lakes which were often too turbid to see much and water levels were too high for wading which meant getting out with a kayak, however we did set 6 minnows at these sites and managed to catch some bullies. We look forward to the development of some fish monitoring protocols in the future.

Assessment of Ecological Effects Guidelines Some guidelines have been drafted for the assessment of ecological effects for wadeable streams. These guidelines have been produced to guide consultants who perhaps aren't entirely up to speed with sampling protocols or for which aquatic biology may not be their forte. At this stage the fish monitoring component specifies what we currently do here at council. It is likely that this section will be amended in the future once fish monitoring protocols have been developed.

Contributed by Brett Stansfield, Geoff Wood, Graham Sevicke-Jones

Northland Regional Council

Monitoring team has continued with their usual consent, environmental incident and state of the environment monitoring. Some new projects or additions to the programme are described below:

Dairying and clean streams accord monitoring

The farm dairy effluent team have got a small study going on in a catchment to try to identify any differences as a result of the uptake of the Dairying and Clean Streams Accord in Northland. This is part of a national project funded by MfE for the first year and includes water quality and macroinvertebrates. We hope to continue sampling in our region for another year. Contact: **Tess Dacre**, tessd@nrc.govt.nz

Periphyton and fish monitoring

Have added periphyton monitoring to the SOE Monitoring of our Regional River Water Quality Monitoring Network (RWQMN) sites, annually in conjunction with our macroinvertebrate sampling. Had trouble finding suitable substrate to sample at many sites, due to the soft bottomed nature of many Northland rivers. Will need to investigate this further before next summer, possibly look at using artificial substrates. *Would be interested to know what other councils do in terms of sampling methods and sample analysis.* Contact: **Tanya Gray**, tanyag@nrc.govt.nz

Planning to set up a regional fish monitoring programme in 2007-2008 at these same RWQMN sites (dependant on budget approval). Will hopefully work in conjunction with DOC and carry out reasonably intensive surveying at a subset of sites each year, so that sites are resurveyed every 3 years. Contact: **Tanya Gray**. Carrying out fish surveys on selected dune lakes this year, particularly on Pouto Peninsula where dune lake galaxiids have been recorded or could potentially exist. Contact: **Emma Simpson**, emmas@nrc.govt.nz.

Lakes – aquatic weed control

Looking at options for eradicating and controlling the spread of aquatic weeds in some of our more pristine lakes, from a biosecurity/lake ecosystem and land management perspective such as grass carp, herbicide application and restricting spread in lakes such as Swan lake (Pouto), Heather and Ngatu (Aupouri). Contacts: **Don McKenzie**, donm@nrc.govt.nz or **Emma Simpson**

Recreational Bathing Programme

Have used Faecal sterol analysis (ESR) on samples from ongoing problematic freshwater sites to help identify source of contamination. Will also look at using DNA markers at some of these sites as well. Once sources are identified, the results will be used to get regional council, district councils and communities working together to make some changes in the catchment to improve water quality. Contact: **Tanya Gray**.

Envirolink projects

Northland Regional Council was successful at getting Envirolink funding for NIWA to develop a user friendly statistical software package for analysing water quality data, which when completed will be available for all Councils to use. Contact: **Tanya Gray**.

Northland Regional Council has several small grant Envirolink projects underway including a questionnaire and risk assessment to determine whether a monitoring programme for contamination of surface water by pesticides is needed in Northland (Contact: **Tanya Gray**), see Envirolink website for more information on other projects.

State of the Environment Report

We are producing our larger 5-yearly State of the Environment report this year. It will be web-based and hopefully available on the NRC website by the end of the year. Contact person: **Tanya Gray**.

Staff changes

A few staff changes over the last year. **Kerry Webster**, Environmental Monitoring Officer – Water Quality, has officially resigned to be a fulltime mum, **Penny Johnston** has replaced Kerry permanently. **Sharif Zainal Aziz**, Policy Analyst – Water & Soil, has resigned and moved back home, Sharif was replaced by **Ryan Paulik**. **Stuart Savill** has become Water & Wastes Team leader (consents) and **Daniel Gulliver** has started in Stuart's position as Consents Officer – water & wastes.

Contributed by **Tanya Gray**

NIWA

Acoustic assessment of trout populations in large lakes. Over the last several years NIWA has been working at developing for the NZ Fish and Game Council a robust and workable acoustic methodology for assessing salmonid populations in large South Island lakes. This work has been funded jointly by Fish and Game and the NIWA Capability Fund. In 2006 we conducted a series of experiments in Lake Coleridge to confirm that bottom dwelling brown trout could be distinguished satisfactorily from benthic macrophytes. Following the success of this work, in February 2007 over three weeks we successfully collected extensive

data from seven lakes (Coleridge, Tekapo, Benmore, Hawea, Wanaka, Wakatipu, and Te Anau) using the NIWA Greta Point acoustics group's SIMRAD 120kHz system with a new wide angle transducer built by IRL to our specifications. After much effort and some frustrations, we now have a system that can be used jointly with F&G and NIWA to begin a long term monitoring programme in these lakes and determine trends in salmonid abundance over time. Such information will enable F&G to more effectively manage these increasingly important recreational fisheries. (**Gavin James**, NIWA Christchurch).

John Quinn (NIWA) and **Michelle Bird** (Greater Wellington) completed a report in March 2007 that applies the Riparian Management Classification (RMC; <http://www.niwascience.co.nz/ncwr/tools>) to sites in the Ohariu Valley, west of Wellington. The RMC approach assessed current riparian zone functions that can enhance aquatic habitat and water quality (e.g., stream bank stabilisation, filtering of contaminants in surface runoff, provision of shade to control stream temperature etc) and potential functions with application of best practical riparian management. Potentials for improvement in riparian functions were greatest in unconstrained sections of small streams that currently have minimal riparian management. Findings will feed into a joint AgResearch/Regional Council FRST programme on "Improved policy interventions for encouraging the voluntary use by landowners of practices protecting and enhancing biodiversity".

The NZ Food Safety Authority and the Ministry for the Environment have obtained funding from the CDRP (Cross Departmental Research Pool) for a three-year research programme entitled: "Campylobacter in food and the environment: examining the link with public health". This task will be performed by the inter-agency Enteric Zoonotic Disease Research Modelling Group, chaired by **Graham McBride** (NIWA). This group has members drawn from ESR, Massey University, NIWA, NZFSA and MfE. Its challenging task brings together expertise on food contamination, health effects, veterinary science, catchment science and risk analysis. It is charged with developing a better understanding of the whole Campylobacter cycle, and to use that to identify mitigation measures that will be effective in lowering New Zealand's burden of campylobacteriosis.

It's been a busy year in the Hamilton biology lab for **Brian Smith** with a considerable amount of adult insect identification going on. Over the summer period Brian and **Steph Parkyn** were investigating the distances that known forest species of adult aquatic insects were flying into open pasture landscapes. Brian and Steph are also in the process of wrapping up their literature review of adult aquatic insect dispersal with a focus on conservation and restoration of habitats. Brian will be presenting a summary of their findings at the upcoming Royal Society of Entomology conference in Edinburgh in July. Perhaps the biggest kick for Brian this year has been finding two males of a new species of *Oxyethira*. The best part was they were found in a restored urban reserve in Hamilton city during a joint Environment Waikato (courtesy of **Kevin Collier**) funded survey of small urban streams and seepages. This small, urban reserve is the only place in New Zealand that this species has been recorded. Maybe the saying 'if you build it, they will come' has some merit, or at the very least, 'if you restore it, they will stay!'

Bob Wilcock co-hosted the 4th visit to NIWA of Professor **Steve Chapra**, Tufts University, during February-March 2007. During his visit Steve worked with **Bob Wilcock** on a paper describing the importance of ion-pair complexes and calcite formation on: (i) lake phytoplankton and nutrient relationships, and (ii) being able to accurately model diurnal pH and make predictions about climate change effects on freshwaters. Steve also collaborated with: **David Hamilton** (lake water quality modelling); **Kit Rutherford** (stream eutrophication and nutrient spiralling) **Rob Davies-Colley** (development of a Secchi disc predictive model for freshwaters); **Graham McBride** (modelling the influence of dairy farming on Campylobacter levels in waterways) and **Max Gibbs**

Ngaire Phillips has considerably increased her knowledge of freshwater mussels (kakahī) as a consequence of work being undertaken in her Te Arawa (Rotorua) lakes programme. This programme is in its second year of funding and is aimed at developing a sustainable management framework for Te Arawa, who recently settled on ownership of the lake beds. Work on kakahī this year has included assessing kakahī condition and contamination levels from various lakes (with **Erica Williams**), developing a measure for quantifying internal shell deformities (most of which are caused by the commensal Chironomid *Xenochironomus canterburyensis*), along with a student project (**Samantha Happy**) examining population structure in relation

to depth and environmental parameters. In addition, **Chris Hickey**, **Shane Grayling** and Ngaire have been attempting to develop a system for harvesting and growing on glochidia (parasitic juvenile stage) in laboratory tanks, using trout as the host fish species. This has proved particularly challenging. In addition to her work on kakahi, Ngaire also recently undertook a successful field experiment examining resistance and resilience of estuarine cockles to urban contamination and will also be investigating the potential genetic basis for these characteristics. Finally, she is currently undertaking laboratory tests to examine these characteristics in the freshwater clam *Sphaerium novaezelandiae*.

Contributed items



Stream Restoration Indicators Workshop Nov 2006: Results

Stream restoration is a key activity for Regional Councils throughout New Zealand, for example where farm streams are fenced to exclude grazing stock or erosion control measures are implemented. Currently there is no consistent methodology available to assess whether stream restoration efforts are successful. To determine the scale of the issue, we held a workshop at the New Zealand Freshwater Sciences Society Conference in November 2006 that was well attended by Regional Council staff as well as representatives from many other agencies (DoC, Fish & Game etc.) and scientists involved in stream restoration (50 - 60 attendees). We asked about the number of restoration projects or stream care groups around different regions. Most respondents knew of up to 10 stream care groups or council-led restoration projects in their region, and others had many more e.g., Canterbury and Wellington 20 - 30, Northland 50 stream/land care groups. There was a clear indication from all regions that the number of stream restoration projects was increasing. We also surveyed the specific types of restoration occurring in regions and the perceived need for monitoring tools for each type of restoration (13 responses, table below). The responses indicated a clear need for monitoring tools almost across the board for all the restoration types we outlined, with particular importance on instream habitat enhancement, riparian planting, reintroduction of biota, riparian filter strips, and stormwater controls.

Restoration Type	How common? Please rank from 1-5 (1 = nil-minimal, 2 = a few, 3 = common, 4 = many, 5 very frequent)		Is there a need for monitoring tools for this type? (1 = nil-low, 2 = low, 3 = medium, 4 = high, 5 = very high)	
	Most Common	Average Rank	Most Common	Average Rank
Riparian planting	2	2.6	4	3.9
Instream habitat enhancement	1	1.5	5	4.0
Restoration of large scale gravel	1	1.2	2	2.7
Fish passage enhancement	3	2.3	4	3.2
Dam removal	1	1.0	1	2.0
Bank stabilisation/erosion control	2	2.8	3	3.2
Stock exclusion	3	3.0	4	3.5
Daylighting piped streams	1	1.0	1	1.7
Riparian filter strips	1	1.7	4	3.5
Bridging for stock	1	2.1	1	2.1

Restoration Type	How common? Please rank from 1-5 (1 = nil-minimal, 2 = a few, 3 = common, 4 = many, 5 very frequent)		Is there a need for monitoring tools for this type? (1 = nil-low, 2 = low, 3 = medium, 4 = high, 5 = very high)	
Pest management	1	1.8	4	2.8
Stormwater controls	1	1.9	4	3.7
Meanderisation	1	1.1	1	2.3
Flow regime enhancement	1	1.2	4	2.8
Sediment regime enhancement	1	1.3	4	2.9
Reintroduction of biota	1	1.1	5	2.9

In order to monitor the success of restoration, there need to be measurable targets that relate to the goals of the restoration. We asked the workshop attendees to give 5 votes to the types of goals that were most important for them to be able to monitor and show the success of their restoration efforts. The top three were well above all others and these were, in order of importance: Aquatic biodiversity, Ecosystem function, and Water quality. The remaining goals in decreasing order of importance were Terrestrial biodiversity, Education, Health of downstream receiving environments, Cultural, Aesthetic, Fisheries, and Recreation. This response provided a clear imperative to focus on indicators relating to Aquatic biodiversity, Ecosystem function, and Water quality.

FRST has recently approved funding, through the Envirolink scheme, for the development of a suite of indicators that will allow councils to set specific restoration goals and measure the success of those goals. This is a two year project involving NZFSS members **Steph Parkyn, Kevin Collier, John Quinn, Jon Harding, Russell Death, Roger Young, Ngaire Phillips, Rob Davies-Colley, Fleur Matheson, and Mike Joy** and overseen by **Juliet Milne, Brett Stansfield, Olivier Ausseil, and Adrian Meredith.**

Please contact Steph Parkyn s.parkyn@niwa.co.nz for any queries.

New Oligochaete Guide

Adrian Pinder has developed a guide to the higher level groups of Australian freshwater oligochaetes - an improvement on the family key in the 1994 CRCFE guide. Some highly unusual species are separated out in this key to make couplets simpler and new taxa collected since 1994 have required changes to the keys anyway. The plan is to slowly add to this with more illustrations and keys to genera and species in the future. In the meantime if anyone would like a copy (pdf) please contact me (Ngaire - nr.phillips@niwa.co.nz) or Adrian at Adrian.Pinder@dec.wa.gov.au

Conference Reports

**New Zealand Freshwater Sciences Society Conference,
November 2006, Rotorua**



A picture speaks a 1000 words - participants at the FSSOC conference dinner, Blue Baths, Rotorua





6th International Symposium on Ecohydraulics

18- 23 February 2007

Christchurch, New Zealand

Contributed by Ian Jowett

The 6th International Symposium on Ecohydraulics was held 18- 23 February 2007 at the Christchurch Convention Centre in Christchurch, New Zealand. The International Symposia on Ecohydraulics have been promoted and coordinated by the Eco-Hydraulics section of the International Association of Hydraulic Engineering and Research (IAHR) and the International Aquatic Modelling Group (IAMG) since 1994.

The International Ecohydraulics Symposia have emerged from the need for a more interdisciplinary approach to the study of water movement and its environmental and ecological implications. It is precisely this aspect of the conference that is so striking - the bringing together of specialists of genuinely diverse backgrounds in biology, chemistry, ecology, environmental science, geology, hydrology, hydraulics, and engineering that gives these symposia their very special and valuable nature.

The sixth Symposium focused on bridging the knowledge gap between hydraulics and biology. The conference opened with a welcome reception for the over 350 delegates at which there was a rousing traditional welcome and performance from an indigenous Maori cultural group, along with eye-catching presentations on the natural history and scenic wonders of New Zealand.

The technical side of the conference covered 5 days, with poster displays running throughout the conference, and presentation sessions spanning the topics of water management; river restoration; flow regimes; habitat and biological modelling in terms of fish, dispersion, plants, processes and methods; fish passage; invertebrates; sediment-flow interactions and effects on habitat; solutes; and habitat suitability. The sessions were punctuated with four keynote presentations demonstrating the interconnected diversity addressed by the symposium:

- Gary Parker on design of combined controlled flood releases and gravel feeding in order to rehabilitate damaged riparian habitat in gravel-bed rivers downstream of dams;
- David Hart on strengthening science-engineering partnerships for increased understanding and improved management of instream flows;
- Aaron Packman on hydrodynamic transport and microbial processes in surficial sediments: cells and solutes;
- Bernard Boudreau on moving in a veiled world: mechanics of movement in cohesive sediments; and
- Nicholas Hughes on a future vision for ecohydraulics: objectives and prospects.

As with any conference, there were additional highlights in the organised technical tours and social programmes. The middle day of the conference was reserved for technical tours that were designed to expose the delegates to current and future water issues of the region whilst savouring the local scenic and natural history wonders. Delegates enjoyed guided tours of the local geology, world-famous gravel-bed braided rivers, local water resources and issues, and irrigation and hydro-electric schemes. The symposium partners programme included similar scenic, wine and "taste of New Zealand" tours.

The conference was organised by Conference Innovators Ltd together with the local organising committee. The principal conference sponsors were IAHR and a range of New Zealand bodies, including: the Royal

Society of New Zealand, the National Institute of Water and Atmospheric Research Limited (NIWA), the Cawthron Institute, Environment Canterbury, Meridian Energy, and consulting firm Tonkin & Taylor.

With the close of the conference, the baton was passed to the University of Concepción to organise the January 2009 International Conference on Science and Information Technologies for Sustainable Management of Aquatic Ecosystems. This conference in Concepción, Chile will serve as a joint meeting of the 7th International Symposium on Ecohydraulics and the 8th International Conference on Hydroinformatics. A special workshop on the sustainable future of Patagonia is also planned. We look forward to seeing you there!

Upcoming Conferences



Upcoming Workshop

Water Resources: Information Challenges in a Changing Environment

Sponsored by NIWA's National Centre for Water Resources and National Climate Centre
6-7 June 2007, Te Papa, Wellington

This two-day workshop will draw together water resource management stakeholders to identify the key issues that constrain sustainable water resource use in new Zealand.

For more information and registration details, contact Mike Scarsbrook (m.scarsbrook@niwa.co.nz)

Water: an inconvenient truth

Joint Conference of the New Zealand Freshwater Sciences Society and the Australian Society for Limnology Queenstown, 3rd to 7th December 2007

This meeting is special because it will bring together freshwater scientists from New Zealand and Australia. The challenges in the new millenium facing freshwaters and freshwater scientists are vast and troubling, with strong sociopolitical dimensions to add to our normal ecological focus. With this in mind, we have assembled a formidable team of plenary speakers, from New Zealand, Australia and the USA, who will address the theme of "Water - an inconvenient truth" (following in Al Gore's footsteps)... Keynote speakers include :

[Morgan Williams](#) - Just completed 10 years as New Zealand's Parliamentary Commissioner for the Environment.

[Peter Cullen](#) - Appointed an Officer of the Order of Australia for service to freshwater ecology.

[Bruce Wallace](#) - Past president of the North American Benthological Society.

For more details check out <http://www.es.govt.nz/events/wit/index.aspx>

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